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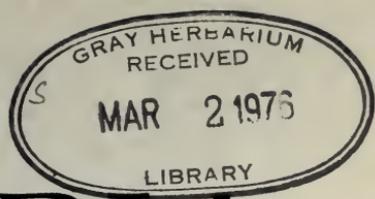
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# ARNOLDIA

*The Arnold Arboretum* Vol. 36, No. 1 Jan./Feb. 1976



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President and Fellows of Harvard College.

Cover: *Myrciaria cauliflora* (*jaboticaba*) nursery stock designed and  
planted in this container three years ago. Photo: P. Chvany.

# Subtropical Bonsai for Indoor Gardening

by CONSTANCE TORTORICI DERDERIAN

Traditional bonsai are trained hardy trees and shrubs grown in classic containers on shelves or benches and brought indoors to be enjoyed for a day or two, then returned to the growing area. In winter they require dormancy, as do the same species growing in the ground. If one has succumbed to the charm of these miniatures of nature and one lives in a cold climate, winter is a time of parting, for the bonsai must go into a cold frame or other storage place until spring.

Happily, such deprivation is no longer necessary because bonsai enthusiasts have discovered a new challenge: growing subtropical trees and shrubs in containers *indoors*, at all seasons if desired.

The purpose of this article is to provide an introduction, rather than a detailed guide, to this new facet of the ancient art. Anyone experienced with hardy materials will find subtropicals a "breeze" to work with. They require a much shorter period to develop from potted tree to bonsai; in two years of training a specimen can be developed that would take four or more years with the use of hardy material. If one starts with nursery stock, it is not so risky to cut back large-sized plants, and because subtropicals have comparatively shallow root systems, they adapt well to shallow pot culture. Surface roots develop nicely because they are growing almost twelve months of the year; branches thicken and form fine twigs sooner because growing and pinching also are continuous.

As a group subtropical material is more colorful than hardy material. Many of the trees and shrubs produce showy blossoms, some blooming more than once a year, or even constantly. Among frequent bloomers are *Malpighia*, *Calliandra*, the jasmynes, and *Serissa foetida*, known as the snow rose in the south.

In addition to flowering trees and shrubs, some also produce fruit that is a delight to see. Outstanding in this category are some of the citrus family; *Punica granatum nana*, bearing perfect miniature pomegranates; *Carissa grandiflora*, with edible



*Malpighia puniceifolia* nursery stock planted over the rock to show natural root growth. Photo: P. Chvany.

fruits preceded by very fragrant blossoms; *Severinia buxifolia*, which develops interesting black fruits; and *Triphasia triphylla*, offering scented white flowers followed by tiny, lime-shaped fruits.

Bark and leaf forms also are appealing in color and variety. Bark color ranges from almost white to almost black; texture can be spongy to "hard as nails." In appearance bark can have a matte finish or a high shine, and its character is evident as soon as one year of growth in a seedling.

*Melaleuca quinquenervia*, cork tree or punk tree, has a bark so spongy that a flying golf ball will penetrate it an inch or more. The bark is matte creamy-beige and shaggy in appearance. Bright red-brown, shiny, and peeling a little in a very thin layer is the bark of the gumbo limbo, (*Bursera simaruba*); that of the *Malpighia coccigera* is the more familiar dark brown,



Above: Bark, blossom, and leaves  
of *Malpighia coccigera*.  
Right: Bark of *Myrciaria cauliflora*.  
Photos: P. Chvany.



*Punica granatum nana* fruit. Photo: P. Chvany.



*Malpighia coccigera* — 8 inches tall, grown as a bonsai for fifteen years. Branch on right allowed to grow out of proportion to thicken as it replaces original one that was broken accidentally. Photo: P. Chvany.

and lightly furrowed like our hardy trees. *Malpighia puniceifolia* has tiny white, birchlike horizontal markings that are interesting in a group planting. Little known because it is on the list of protected trees is holywood or lignum-vitae (*Guaiacum*), with bark that is almost white and rough in texture. The wood is so hard that it will sink in water. A tree with mottled bark is jaboticaba (*Myrciaria cauliflora*). Whereas the bark on a four-year-old *Stewartia* shows no variation of color, a four-year-old jaboticaba shows all the colors of an adult tree.

Some subtropicals have foliage as interesting as flowers. First among these is the *Malpighia coccigera* or Singapore holly which bears at the same time spiny, holly-shaped leaves and smooth-edged oval ones, both very shiny deep green. *Breynia distica*, called Jacob's coat, has leaves of many colors; they are mottled in shades of red, white and green. The leaf of *Hibiscus rosa-sinensis* 'Snow Queen' is light gray-green in the center with a white border tinged all around with pink. *Serissa foetida variegata* has tiny creamy-white rimmed, dark green leaves. From a distance it looks as if it were in bloom.

*Pithecellobium brevifolium*, commonly called ebony, has a light green compound leaf with leaflets so small that the tree has a feathery, fernlike appearance. *Acacia baileyana* has a



*Bucida spinosa* — 20 inches tall, 30 inches wide. Collected specimen grown in container for five years. Photo: P. Chvany.

similar leaf but it is bluish-green and silvery underneath. The foliage of *Sparmannia*, African hemp, is shaped like a maple leaf, but is fuzzy and yellow-green. Even some of the very large-leaved trees like *Grevillea* and *Jacaranda* can make acceptable bonsai because the leaves are deeply cut and light in feeling.

The same general rules for selecting hardy bonsai materials apply to the subtropicals. Choose plants with small leaves and short internodes. If possible, avoid grafted material because it usually has ugly swellings on the trunk. In the south one often finds nursery stock has been grafted on nematode resistant roots. For example, *Gardenia radicans* is grafted on *Gardenia jasminoides* stock; *Gardenia radicans* is very desirable for bonsai because it has small leaves and small flowers. If there is no choice and the graft is well done or can be concealed neatly, the design of the bonsai may not be ruined.

Since subtropicals are in bloom frequently, choose plants with small flowers so that the proportions of the bonsai will not

be destroyed. Hardy material blooms for such a short period that this selectivity is not always a requirement.

As with all the rules in bonsai, there are exceptions. Plants with compound leaves usually are avoided in hardy bonsai; in subtropical material there are too many to pass over. Therefore, one should simply choose the smallest leaved plants and work with them to see if bonsai techniques will reduce the leaf sufficiently to keep the overall tree in proportion. *Pithecellobium* and *Acacia*, for example, work well for small bonsai. *Grevillea* and *Jacaranda* would have to be large bonsai; be sure you have room for them.

The greatest satisfaction comes from hunting subtropical bonsai material in the wild, which is considerably easier than hunting for hardy trees. The ground is never hard (except when the digging is in coral rock), and the weather is warm.

*Lantana* — collected plant. Photo: P. Chvany.





*Calliandra haematocephala nana* — nursery stock planted in cascade style and overpotted to allow growth to thicken trunk and branches. In the meanwhile the composition is pleasing; note blossoms. In this container four months. Photo: P. Chvany.



*Trachelospermum* —  
12 inches overall;  
grown seven years as  
a bonsai; blooms well.  
Photo: P. Chvany.

*Carissa grandiflora* from a cutting.  
Grown as a mame over ten years.  
Has never fruited or flowered al-  
though its parent did. Foliage is  
one-fifth normal size. Height is  
8 inches. Photo: P. Chvany.



Learn the optimum time for collecting the material desired as well as what equipment will be needed. Keep the collected trees very moist until well-established to insure success. One should not bring material from the southern states to the north unless it has been inspected and approved by the U.S.D.A., by the way.

In the northeast, subtropical material is not so readily available, but prowling the nurseries and flower shops is half the fun for bonsai enthusiasts. With the increased interest in indoor gardening under lights, the variety in the commercial establishments is growing, and a wider selection is appearing.

There are a few plants that are especially amateur-resistant and therefore satisfactory as a beginner's bonsai. *Calliandra*, powder puff plant, has red feathery blossoms shaped like a semihemisphere. They burst forth from a bud shaped like a red raspberry, and the leaf is compound. The plant responds well to top and root pruning and will blossom sporadically all winter — the number of blossoms depending upon the amount of light. In a north window with no sun there will be one to six or more at a time; in an east or south window the bonsai will be covered with blooms.

Exotic, modern in appearance, and altogether appealing is the sea grape, (*Coccoloba uvifera*). It is grown for its leaves, which are reddish in color when they first come out, later turning a deep green and then bright red and yellow before they drop. In the south the first crop of leaves is cut off to cause the second to be smaller; in New England the normal light in winter is weak and short in duration so that the leaves grow small and in good proportion. The sea grape is tolerant of poor light and dry soil.

The genus *Ficus* provides a whole range of rugged bonsai for beginners. The plants are fast growers and soon produce the effect of a mature tree. They are also tolerant of poor soil, poor light, and poor humidity.

Again, *Malpighia* must be mentioned — both *M. coccigera* and *M. puniceifolia*, the latter having a perseverance that is a comfort to the novice. Even when a specimen has been defoliated due to desiccation, placement in the shade and careful watering will induce new growth.

*Nicodemia diversifolia* with its oak-shaped leaves is easy to grow, but attention to its shaping must be given.

When explaining that bonsai are made from trees and shrubs one should also mention vines, for they, too, are woody-stemmed plants. Although many subtropical vines have blos-



*Cuphea hyssopifolia* — from a cutting planted in this container five years. Shown life-size. Photo: P. Chvany.

soms that are too large for bonsai (blossoms and fruit do not reduce in size even though the leaves do), there are many desirable materials from which interesting specimens can be made.

Among these are *Trachelospermum* (confederate jasmine) and *Clerodendron*, which have attractive growth patterns, foliage, and flowers; *Hedera helix* and *Ficus repens*, which make handsome mame (mah-may) bonsai — miniature trees not more than six inches overall. *Trachelospermum* grows slowly and has fragrant blooms occasionally; should its shape be neglected, it responds to a few snips or a severe pruning. *Hedera helix* has one major problem: the initial pruning. Once a plant is found with a sufficiently large trunk, it is very difficult to cut away the luxuriant long growth that such a specimen would have!

Spectacular in bloom is bougainvillea. It does require attention to its needs, however, and must be warm and dry to produce flowers.

In designing bonsai the ideal is to represent nature in miniature. Neither grotesque forms nor unnatural designs are acceptable to modern bonsai enthusiasts. (In ancient times creators of bonsai exaggerated the twisted trunks beyond those found in nature, and the practice was encouraged by the approval of a royal personage upon a visit to a nursery.) But styling a bonsai to the same form found in nature is not always practical. Formal upright style is represented by the araucarias which, although good house plants, are difficult to reproduce in miniature. *Taxodium distichum* will make a magnificent formal upright bonsai, but it requires a cooler winter than summer even though indoors. To have a bonsai of this design one may substitute compatible material that is easier to shape, such as *Eugenia myrtifolia*, *Ficus neriifolia regularis*, or *Ulmus parvifolia*.

Informal upright and slanting styles are most often seen in nature and are the easiest to duplicate as bonsai. Under slanting style is windswept style and one can have fun with it in deciding "how the wind is blowing" and which way the tree will lean. If the "wind" gets out of hand the result may be a semi-cascade style. Cascade style trees do not grow in nature in the south. The closest to cascade would be a vine that has traveled as far upward as it can and then begins to grow downward. Plants other than vines that lend themselves to cascade styles are *Calliandra*, *Carissa*, *Gardenia*, *Lantana*, *Serissa*, and juniper.

Driftwood style is found mostly along the shores where trees have survived the struggle against storms; inland, with few exceptions, they decay and soon disappear if damaged. *Conocarpus erectus*, *Jacquinia keyensis* and *Taxodium distichum* are good subjects for this style, for the wood is slow to deteriorate and "silvers" nicely.

Spring is always the best time to pot up hardy bonsai. Subtropicals (with exceptions) can be started successfully throughout the year at the grower's convenience. Naturally, heavy pruning of the top must be done when the roots are severely cut back; after that, light pruning and pinching of branches and twigs can take place at any time, as can wiring. (It may be prudent to paper-tape the wire, for many subtropical plants have tender bark.) Established subtropical bonsai have two periods of strong growth: spring and fall. Reshaping and heavy top pruning should be done before these periods.

Style dictates the shape and depth of the container used. Shallow round, oval, or rectangular trays are most appropriate since they are complementary to the informal upright and

slanting styles of subtropicals. Cascade and semicascade styles, of course, require a deep container for balance.

Even though the tray is shallow, a free-draining soil is very important. Subtropical bonsai, with rare exceptions, prefer a light humus and sand-soil mixture slightly acid to neutral. Watering is simplified under these conditions; generally, a heavy application once a day should suffice. In the dark winter months as the light and temperature decrease, reduce watering; except for the mames it is even possible to skip a day.

With heavy watering of a small amount of soil, a regular program of fertilization is advisable to replace the nutrients that have leached out. Frequent but VERY dilute applications of an all-purpose product are recommended.



*Ficus neriifolia regularis* — five-tree grove planted six years ago from nursery stock. Height is 22 inches. Photo: P. Chvany.



*Ficus benjamina* — from nursery stock grown as a bonsai fifteen years. Height is 28 inches. Note surface roots. Photo: P. Chvany.



*Above: Ficus neriifolia regularis. Cuttings newly planted to make a mame group planting.*

*Below: Pinus halepensis. Both plants grown from seed six years ago; the right one as a bonsai for four years. Photos: P. Chvany.*



The familiar indoor pests — mealy bug, scale, spider mites, etc. — will attack subtropical bonsai, but unless the air is very still and very hot, it is possible for the plants to go through the winter without trouble. If infestations do occur, they may be dealt with in the usual manner by spraying with insecticides. This is not always practical in a house or small apartment, however. A simple solution is to use a ½-inch-wide soft paint brush dipped in alcohol to brush the entire plant trunk, branches and both sides of the leaves; then rinse off under a spray of water. (The surface of the soil should be covered with plastic during this operation.) An alternative is to wash the plant with soapy water. In case of heavy infestation, both treatments can be used consecutively.

It is possible to leave these small gems of horticulture untended for a few days if precautions are taken to prevent desiccation. The easiest procedure is to water and drain each bonsai thoroughly and enclose it in a plastic bag placed out of the sun; that will keep it from three to five days. Or water the bonsai thoroughly and set it in a tray filled with ½ to 1 inch of water. The plant will be sitting in it for only a day; in three days the water will have evaporated and the bonsai will be drying. Alternatively, if the thermostat is lowered and the shades drawn, the plant will not use much water and can wait forty-eight hours for its next application.

A way to determine if there is sufficient light to grow bonsai indoors is to photograph the growing area with a simple Instamatic or similar camera, and film normally used for outdoor photography. If there is no image when the film is developed, there is not enough light; conversely, the better the photograph, the better the growing conditions.

Small subtropical bonsai — those about 14 inches or less — grow well under fluorescent lights. Taller bonsai require more complicated light systems to assure good light on the lower branches. A combination of good natural light, plus artificial light to lengthen the day, has proved to be most productive of good plant health and blossom.

A dear friend and accomplished horticulturist recently said to me, "I've always considered bonsai the chamber music of horticulture and up to now I've not been ready to get into that." When one finds one's self "into that," the return is immeasurable in new interests, pleasurable activity, visual delights, and satisfaction to the soul.

*Constance Derderian is Honorary Curator of the Bonsai Collection at the Arnold Arboretum.*



*Top: Jacquinia keyensis — collected in 1972. Has very brittle branches; still breaking with leaves from wood that seemed dead.*

*Below: Ficus aurea — 3½ inches high planted in the rock two years.*

*Photos: Deborah Thompson*



*Subtropical Plants Suitable for Indoor Bonsai*

These are plants with which I have had from two to fifteen years of experience. The list of possible subtropical material is almost endless.

- 1 — do very well in normal house conditions
  - 2 — adapt easily
  - 3 — need careful attention
  - 4 — difficult requirements
- 4 *Acacia baileyana* (golden mimosa) — wants cool growing temperatures
  - 3 *Acacia farnesiana* — will adapt to warm temperatures
  - 3 *Bougainvillea* spp. — will drop leaves if too wet or too cold
  - 2 *Breynia disticia* var. *roseopicta* (Jacob's coat) — needs sun for best leaf coloration
  - 2 *Bucida spinosa* (black olive) — water well, root prune quickly and lightly
  - 2 *Buxus japonica* (boxwood) — keep in cool spot, root prune lightly
  - 2 *Buxus microphylla nana* — do not overwater or overfertilize
  - 1 *Calliandra haematocephala* and *C. h. nana* (powder puff plant) leaves fold at night
  - 3 *Camellia sasanqua* — depending on variety blooms Oct. to Feb. in cool temperatures
  - 2 *Carissa grandiflora* (Natal plum) — resents heavy root pruning
  - 3 *Citrus* spp. (calamondin, marco orange, meyer lemon, grapefruit)
  - 1 *Clerodendron thomsonae* (glorybower) — keep well watered
  - 1 *Coccoloba uvifera* (sea grape) — do not overwater or overfertilize; likes alkaline soil
  - 1 *Conocarpus erectus* (buttonwood) — water well, tend to pinching
  - 2 *Cuphea hyssopifolia* — needs sun for bloom
  - 1 *Eugenia myrtifolia* (brush cherry) — grows quickly; easy to shape
  - 1 *Eugenia uniflora* — full sun for edible fruit
  - 3 *Eurya japonica* — keep warm and well-drained
  - 1 *Ficus aurea* (strangler fig) — tolerant of heat and dryness; leaf reduces drastically
  - 1 *Ficus benjamina* (weeping fig) — will develop aerial roots
  - 1 *Ficus diversifolia* (mistletoe fig)
  - 1 *Ficus neriifolia regularis* — responds well to heavy pruning of top
  - 1 *Ficus pumila minima* — very slow but worthwhile
  - 1 *Ficus retusa nitida* — tolerant of poor light
  - 3 *Galphimia gracilis* — shape by pruning; brittle
  - 2 *Gardenia jasminoides nana* — uniform temperature and moisture
  - 2 *Gardenia radicans* — will grow in window without sun
  - 1 *Guaiacum officinale* (lignum vitae) — grow warm and in full sun for truly blue flowers
  - 1 *Hedera helix* (English ivy)
  - 2 *Hibiscus rosa-sinensis* 'Snow Queen' — do not overwater; full sun for best leaf color

- 2 *Ilex vomitoria* (Yaupon holly) — wire carefully; prune roots lightly; pot up quickly
- 2 *Ixora* spp. — acid soil, tolerant of poor light but needs sun for full bloom
- 3 *Jacaranda* spp. — difficult to achieve lavender-blue flowers on terminals
- 3 *Jacquinia keyensis* (joewood) — collected only. Keep roots damp, pot quickly
- 2 *Jasminum dichotomum* (pinwheel jasmine) — stands pruning well
- 2 *Jasminum pubescens* (star jasmine) — keep warm, moist, and in good light
- 3 *Juniperus chinensis sargentii* — best in cool temperatures; pinch carefully
- 2 *Juniperus procumbens nana* — stands heavy pruning; keep foliage thinned out
- 3 *Lagerstroemia indica* (crapemyrtle) — keep moist and in good light for bloom. Adapts to any style.
- 2 *Lantana* spp. — brittle to wire, easy to shape by pinching
- 4 *Leptospermum scoparium* (tea tree) — resents heavy root pruning
- 2 *Ligustrum japonicum* (Japanese privet) — wants neutral to alkaline soil; easy to shape
- 1 *Malpighia coccigera* (Singapore holly) — burns in sun; do not keep wet
- 1 *Malpighia puniceifolia* — when a twig breaks it heals and grows if not severed
- 2 *Melaleuca quinquenervia* (cork tree) — stands heavy top and root pruning
- 2 *Myrciaria cauliflora* (jaboticaba) — fertilize carefully to prevent yellow leaves; needs sun for its edible fruit
- 2 *Olea europaea* (olive) — tolerant of heat and dryness
- 2 *Pinus elliottii* (slash pine) — needles do reduce; start with young plant
- 1 *Pinus halepensis* (Aleppo pine) — tolerant of heat and dryness; do not repot often
- 1 *Pithecellobium brevifolium* (ebony) — best shaped by pruning
- 2 *Pittosporum tobira* — best shaped by pruning because of growth pattern
- 2 *Podocarpus macrophylla* 'Maki' (southern yew) — root prune carefully; responds well to top pruning
- 1 *Punica granatum nana* (dwarf pomegranate) — tend to pinching
- 1 *Pyracantha angustifolia* — likes alkaline soil; tolerant of dryness
- 4 *Quercus nigra* — same as *Q. virginiana*; water well
- 4 *Quercus virginiana* (live oak) — start with young plant; do not repot often, and root prune very lightly
- 2 *Raphiolepis indica* (Indian hawthorn) — slow grower; brittle to wire
- 3 *Rhododendron indicum* (azalea) — 'Coral Bells' (Kurume) an excellent variety
- 2 *Serissa foetida* (snow rose) — tend to pinching, do not overfertilize

- 2 *Serissa foetida variegata* — tolerant of poor light but becomes leggy if grown too dark; tend to pinching for shape
- 1 *Severinia buxifolia* — very brittle to wire
- 1 *Sparmannia africana* (African hemp) — grows quickly, shapes easily by pinching
- 4 *Taxodium distichum* (bald cypress) — needs a cool and dry period to lose foliage, then plenty of water to grow
- 1 *Trachelospermum jasminoides* (confederate jasmine) — pinch out vining growth
- 1 *Triphasia triphylla* (limeberry) — keep warm, well watered; watch for wire cuts
- 2 *Ulmus parvifolia sempervirens* (evergreen or Chinese elm) — good shallow root system
- 1 *Vitis munsoniana* (bird grape) — fast grower, tolerant of poor light and heat



*Bibliography*

- Ballard, Ernesta D. 1973. *Growing Plants Indoors*. Barnes and Noble, Scranton.
- . 1974. *The Art of Training Plants*. Barnes and Noble, Scranton.
- Brockman, C. Frank. 1968. *Trees of North America*. Golden Press, New York.
- Crockett, James U. 1971, 1972. *Time-Life Encyclopedia of Gardening*. Time-Life, New York.
- Harrar, Ellwood S. and Harrar, J. George. 1962. *Guide to Southern Trees*. Dover, New York.
- Hull, George F. 1964. *Bonsai for Americans*. Doubleday, New York.
- Jenkins, Dorothy H. and Wilson, Helen Van Pelt. 1954. *House Plants for Every Window*. Barrows, New York.
- Kuck, Loraine E. and Gongg, Richard C. n.d. *A Guide to Tropical and Semitropical Flora*. Tuttle, Rutland, Vt.
- Mattoon, W. 1943. *Common Forest Trees of Florida and How to Know Them*. Florida Forestry Assoc., Jacksonville.
- Maxwell, Lewis S. 1961. *Florida Plant Selector*. Lewis S. Maxwell, Tampa.
- Morton, Julia F. 1971. *Exotic Plants*. Western Publishing Co., New York.
- . 1974. *Wild Plants for Survival in South Florida*. Trend House, Tampa.
- Perry, Lynn. 1964. *Bonsai: Trees and Shrubs*. Ronald Press, New York.
- Snyder, Ethel. 1952. *Florida Trees*, 2nd ed. Ethel Snyder, Sanibel, Fla.
- Stowell, Jerald P. 1966. *Bonsai: Indoors and Out*. Van Nostrand, Princeton.
- Sturrock, David. 1959. *Fruits for Southern Florida*. Southeastern Printing Co., Stuart, Fla.
- Taylor, Kathryn S. and Gregg, Edith W. 1969. *Winter Flowers in Greenhouse and Sun-heated Pit*. Scribner, New York.
- Taylor, Norman. 1961. *Taylor's Encyclopedia of Gardening*, 4th ed. Houghton Mifflin, Boston.

*Pithecellobium brevifolium* — 9 inches. Grown from a seedling and wired to adjust branch placement. Photo: P. Chvany.



*A fine, old specimen of Sassafras growing in Dorchester, Mass. The picturesque, craggy crown is typical of mature trees of this species.*

*Photo: R. Weaver.*

# Sassafras: A Neglected Native Ornamental

by RICHARD E. WEAVER, JR.

One of Boston's fine old trees is the specimen of Sassafras (*Sassafras albidum*) pictured on the opposite page. It is growing in the front yard of a home owned by Mrs. B. Carney at 153 Savin Hill Avenue, Dorchester, and it measures 43 feet in height with a trunk circumference of 6 feet, 5 inches. Although little is known of its history, the tree is certainly more than a hundred years old.

Sassafras is a common and familiar tree throughout most of the eastern half of the United States, from southern Maine west to Iowa and south to Florida and Texas. The picturesque common (and generic) name is of obscure origin, but it was used by the French settlers in Florida as early as the sixteenth century. The tree is characteristically a plant of forest margins and clearings, but it also is often somewhat weedy, appearing in old fields, hedgerows, and along roadsides where it rapidly forms clumps by means of suckers and stolons. It is often thought of as being a rather small tree, but in the southern part of its range it occasionally reaches considerable size. The largest specimen on record (*American Forests* 75(2):24. 1969), growing in Owensboro, Kentucky, is 100 feet tall with a trunk circumference of 17 feet, 3 inches. Therefore the tree featured in this article is rather a small one in comparison to the "national champion," but still an exceptional specimen considering that it is growing in an urban environment near the northern limit of the species' hardiness range. Still, it is by no means the largest tree of its species in Massachusetts. That distinction goes to a specimen in East Taunton with a height of 56 feet and a trunk circumference of 9 feet, 10 inches. An even larger one, long since gone, was reported (Russell, G. W. 1886. *Gardener's Monthly* 28: 22.) to have grown in West Cambridge in the mid-nineteenth century.

Sassafras, with one American and two Asiatic species, is a member of the Laurel Family, a large group of primarily tropical woody plants; several genera are native to the United States, but the only other representative in the New England flora is the Spicebush (*Lindera benzoin*). The family is named for the Grecian Laurel, *Laurus nobilis*, of the Mediterranean region (not to be confused with the native Mountain Laurel, a member of the Heath Family or Ericaceae), the leaves of which are the source of the bay leaf used as a seasoning in cooking. The leaves, stems, and/or bark of most members of the Laurel Family contain pleasant-smelling oils, and therefore are strongly aromatic when crushed or scraped. These oils are distilled from the wood of *Cinnamomum camphora*, an Asiatic member of the family, to produce the camphor of commerce; the dried bark of another species of *Cinnamomum* yields the spice cinnamon.

Various parts of the Sassafras tree also give off a spicy fragrance when crushed, and the oil distilled from the bark of the roots has been used commercially as a flavoring in candies, medicines, and soft drinks, such as root beer and sarsaparilla, and as a perfume in soaps. The oil also has mild antiseptic qualities, and it was used in dentistry as a disinfectant of root canals. In addition, a tea brewed from the roots and served either hot or cold, has long been a popular drink in rural areas of this country, both as a refreshment and as a "spring tonic."

The healing qualities of Sassafras were once believed to be quite considerable. As early as 1574, soon after the tree's discovery, various extracts were hailed as a virtual panacea, and they commanded high prices in Europe. Several expeditions were sent to the New World with the express purpose, among others, of collecting Sassafras. Among these was the voyage of Bartholomew Gosnold and Bartholomew Gilbert in 1602, one of the earliest to the coast of New England. Good accounts of this fascinating aspect of our history may be found in the following: Carroll, C. F. 1973. The timber economy of New England. Brown University Press, Providence, pp. 42-44; and Randall, C. E. 1964. A toast to a tree. *American Forests* 70(5): 22-24; 42.

Eventually Sassafras fell into disrepute as a panacea, and recently oil of sassafras actually has been found to be potentially hazardous. Experiments carried out by Lehman (Assoc. Food Drug Officials U.S., Quart. Bull. 25: 194. 1961.) under the auspices of the United States Food and Drug Administration, found that if safrol, one of the primary constituents of



Foliage, male flowers (#1), female flowers (#2), and fruits of *Sassafras albidum*. From: Michaux, F.A. 1818. *The North American Sylva*, vol. 2, plate 81 (as *Laurus sassafras*).

the oil, were fed to rats in large quantity, they developed liver cancer, and if fed in smaller quantities, it produced other, non-cancerous damage. And, as reported in the 25th edition of the *Dispensatory of the U.S.A.* (1955), safrol, if taken in sufficient dose, quickly kills by paralysis of respiration; lesser doses cause death by "widespread fatty deterioration of the heart, liver, kidneys, etc." The same reference also reports, from the December 1888 *Cincinnati Lancet-Clinic*, that a teaspoon of the oil itself ". . . produced in a young man vomiting, collapse, somewhat dilated pupils, and pronounced stupor." The FDA, as a result, placed a ban on sassafras oil in 1960.

Sassafras lumber has never been of commercial importance, partly because trees of timbering size are few and far between and partly because the wood is brittle and coarse-grained. However, since it is quite resistant to rot and it shrinks very little upon drying, the wood has been used for fence rails, railroad ties, buckets, barrels, and small boats.

Even though its wood is weak, its healing powers mostly fable, and its oil a potential hazard, Sassafras is still a useful tree and a very beautiful one as well. Few of our native trees have so many ornamental qualities and yet are so infrequently cultivated.

Sassafras is attractive at all seasons. The yellow-green flowers appear in the springtime before the leaves, in late April or early May at the Arnold Arboretum, and although individually they are not showy, a tree in full bloom is pleasing, giving about the same effect as a Norway Maple, Spicebush, or Cornelian Cherry. The leaves are a fresh yellowish-green during the summer, and they are unusual in that basically three different types are found on an individual tree (see illustration). The fruits are of a type unique to the Laurel Family. Those of Sassafras resemble a small dark blue cherry perched atop a red stalk-like structure reminiscent of the shape of a golf-tee. The fruits, though attractive, are seldom seen for several reasons: (1) Sassafras trees are basically either male or female, as in hollies, so not all individuals produce fruit; (2) fruit production is evidently sporadic, even in basically female trees; and (3) the fruits are eaten by a variety of bird species as soon as they ripen. The color and the effect of the fall foliage is about as spectacular as that of any tree, the leaves typically turning orange with tints of yellow, red, and salmon, and for this reason alone the tree deserves more recognition as an ornamental. Finally, Sassafras is attractive even in the winter with its bright green twigs and picturesque profile. In younger individuals,

the branches are horizontal with upturned tips, while older specimens, like the one pictured here, develop a rugged, craggy crown.

Little information is available on the behavior of *Sassafras* in cultivation. It has not been used as a street tree to any appreciable extent, so it is not known whether or not it would be a suitable species for this purpose. The fact that such a large apparently healthy specimen is present in Dorchester, however, suggests that it will tolerate urban conditions. *Sassafras* apparently prefers acidic, sandy, well-drained soils, but I have seen it growing perfectly well in heavy limestone soils. It is not susceptible to any serious diseases, and the Japanese Beetle is its only major insect pest. The larvae of several other species do feed on the leaves of the tree, causing but minor damage, but this may not be an unfavorable attribute since two of them, the Spicebush Swallowtail and the Prometheus Moth, are among our more attractive insects.

*Sassafras* is somewhat difficult to propagate and definitely difficult to transplant, perhaps helping to explain why it is not more frequently cultivated. According to Mr. Alfred Fordham, Propagator at the Arnold Arboretum, the seeds germinate readily if stratified when fresh, but they are seldom available in large quantities. Propagation by cuttings is difficult if not impossible, unless the cuttings are taken from sucker shoots. The root system is extensive and the roots themselves are fleshy; only seedlings or small saplings can be successfully transplanted as a rule. But perhaps with the ascendency of sophisticated containerized growing by nurserymen, the *Sassafras*, one of our most ornamental native trees, will become more readily available to the horticultural public.

# Small Shrubs with Noteworthy Winter Bark

by MARGO W. REYNOLDS

The homeowner with a large expanse of land has the opportunity to experiment somewhat and develop separate areas devoted to specific genera of perennials, showy shrubs and the like. In a small garden, because of its limited size, all things must be rolled into one. If done well, with forethought and careful planning, it can have nearly as much variety as its larger counterpart without sacrificing style or aesthetics.

Since numbers of plants must of necessity be restricted, it is important to select those that can fulfill multiple purposes. Shrubs planted solely for their flowers, fruits or form are too limiting for the small garden. Every attempt should be made to seek out materials that have a combination of attributes — good form plus fragrant flowers, attractive fruits as well as eye-catching blossoms, low maintenance with fruit tempting to birds, etc.

Toward that end, this article proposes to present shrubs that, in addition to other primary attributes, have the secondary characteristic of interesting bark to recommend them. Since bark, for the most part, is not readily discernible until the leaves have fallen off in the autumn, these plants are especially valuable in the winter landscape. Inexperienced gardeners, if they think of the winter garden at all, think of it as the dull period that follows autumn's foliage extravaganza and precedes spring's bulb display. Adding a few shrubs such as these to the garden could make it an object of year-round interest rather than "just another garden."

## *Shrubs With Red Winter Color*

A number of shrubs exhibiting a characteristic red winter bark are suitable for planting in the small garden. Space dictates that we limit these to only a few, and the ones selected



*Cornus sericea*. Photo: P. Chvany.

are some of the best. The selection includes both upright shrubs and groundcovers, evergreens and deciduous specimens, plants with prominent floral displays, and those with inconspicuous flowers. Certainly there should be something for everyone.

**Dogwood.** As a group, shrubby dogwoods afford some of winter's most attractive colors. There are at least ten species that could be used, but, undoubtedly, the most spectacular of the group is *Cornus alba* 'Sibirica', the Siberian Dogwood. With a maximum height of 9 feet, it can be used as either a prominent specimen shrub in a moist area or as a backdrop for lower growing dwarf conifers. Its twigs reach maximum coloration in winter when they become a lovely coral-red.

Faster growing than the Siberian Dogwood but equally at home in moist locations is *Cornus sericea*, commonly known as Red Osier Dogwood. The winter twigs of the species are a brilliant red and when seen "en masse" they almost appear as a sheet of flame. Two varieties exhibiting differing twig colors are also available. *Cornus sericea* 'Flaviramea' colors yellow and *C. sericea* 'Nitida' is green. Because they spread rapidly by underground stolons, this species and its varieties are especially suited to bank plantings where they succeed in checking erosion.

**Rose.** Among red-twiggged shrubs, some of the roses present themselves as possibilities. Many have a dull or dark red bark that is perfectly satisfactory in the winter landscape. There are several, however, whose coloring is a more glossy red, and one of these is *Rosa virginiana*, the Virginia Rose. Indeed, as an all-round rose in general, this is certainly one of the best. Flowers appear in late spring, followed by good summer foliage, blazing autumn color and fruits, and brilliant red twigs in the fall. It attains a height of approximately 6 feet and is most effectively used as an informal barrier hedge. A vigorous growth habit requires that this shrub be kept under restraint in the small garden, but if cut to the ground every few years or so it grows back into a handsome specimen in no time at all.

**Willow.** Once seen, it is difficult to forget the graceful weeping willow with its long, slender yellow branches gently raking the ground in the breeze. One of the most handsome willows by far is *Salix alba* 'Chermesina', the Redstem Willow. If left to mature into a tree this will reach a height of 75 feet, but if cut back frequently and regularly it can be maintained as a good-sized shrub with conspicuous, vibrant red-orange twigs. As a tree its color is considerably less pronounced. Like all willows it prefers moist soil, but beware of planting near septic lines or drainage pipes. A very invasive root system has the tendency to clog the pipes and cause problems.

#### *Green-Twiggged Shrubs*

**Broom.** Two of the most attractive green-twiggged shrubs belong to the same genus — *Cytisus*. Commonly called "brooms" because of the use to which they were put in centuries past, these relatives of the pea maintain a uniform green all winter, giving them an evergreen look. Add to this the fact that they are lovely in flower, have small, dainty leaves, and are virtually insect and pest free and it is understandable why so many people have developed an affection for these plants. They are not terribly fussy as to site requirements and actually prefer a poor, dry, sandy soil with good sun. Two of the very best are *Cytisus* × *praecox* and *Cytisus scoparius*.

The former, the Warminster Broom, is more reliably hardy in New England than the Scotch Broom (*C. scoparius*), although the latter has managed to naturalize itself on Cape Cod and Nantucket. Pale yellow flowers cover the 6-foot Warminster Broom in profusion each May, making this one of the first brooms to flower each spring.

*Cytisus scoparius*, up to 9 feet, is slightly taller and offers hybrids with great variation in flower color.

#### *Shrubs With Exfoliating Bark*

Plants with exfoliating bark are among the most eye-catching in the white world of winter. Whether the bark peels off in long, thin strips, as on the White Birch, or in small, irregular patches as it does on the Stewartias, the contrasts and color tones between the layers are unparalleled for visual interest.

**Stewartia.** Although most Stewartias fall into the tree category, the Showy Stewartia (*Stewartia ovata grandiflora*), at 15 feet, is worthy of inclusion in the small lot. In addition to tree bark, which on older trees flakes off in irregular patches exposing lighter colors beneath, there are the flowers and autumn color to consider. The large (4-inch diameter) white flowers are extremely showy with very attractive purple stamens, and the foliage colors up to a distinctive orange in fall. Devoid of leaves in the winter, the Showy Stewartia nonetheless remains prominent in the landscape because of its very distinctive bark. An excellent small tree accent plant, it is not reliably hardy north of southern New England.

**St.-John's-Wort.** *Hypericum prolificum* (Shrubby St.-John's-Wort) is one of the taller of these woody shrubs at 3-4 feet. It is a vigorous grower and forms a rounded mound covered with yellow flowers and glossy green leaves. Like the brooms, most Hypericums will do well in a dry, sandy soil with plenty of sun. The bark is a cinnamon-like red-brown that separates readily into masses of thin scales.

#### *Curious Barks*

**Euonymus.** The Winged Euonymus (*Euonymus alatus*) is one of the hardiest of all Euonymus species. It reaches a maximum of 9 feet and has ornamental value for several reasons. Its autumn color is a vivid scarlet, suggesting its other common name — Burningbush. It is often noticeable in the autumn in highway plantings along major roadsides.

The twigs are covered all over with a corky growth that lends this shrub an aura of the exotic. Although not as visible from the distance as the shrubs with colored twigs, Winged Euonymus still merits planting if only because it is somewhat unusual. It makes an excellent hedge as well as a specimen shrub. Be forewarned, however, that all Euonymus are susceptible to se-

rious infestations of scale. The vine types are attacked more frequently, but all species should be carefully watched for signs of the pest.

A few notes on cultural practices necessary for the maintenance of optimum color are in order here. As many of these shrubs mature and grow older, the glossy, vibrant twig coloration displayed in their youth tends to grow dull and almost disappear. Heavy pruning annually in the early spring generally results in the vigorous production of new young shoots that will color up nicely by winter. Oftentimes it is entirely in order to cut a rank, overgrown shrub right down to the ground in order to stimulate new shoot growth. In most of the above-mentioned shrubs, resurging growth develops quickly and in the *Rosa virginiana*, for example, it will have achieved a lovely form only two years after being cut down.

As is the case with autumn foliage coloration, twig coloration is dependent upon sunlight and reasonably good soil. The addition of a nitrogenous fertilizer to the soil is an additional factor often spelling the difference between adequate and superlative coloration.

The list of plants with interesting bark is a fascinating one and could go on almost endlessly. For the person with a small property and the desire to cultivate a winter garden, the above suggestions are listed as mere starting points. The scope and aesthetics of plants with winter appeal are limitless and certainly worth pursuing.



*Photo: P. Chvany.*

## News from the Arnold Arboretum

The Arboretum's herbarium is a reference collection of dried, mounted plant specimens numbering more than one million sheets, and is a valuable source of information as a complement to the living collection and the library.

Currently on display at the Administration Building in Jamaica Plain is an educational exhibit designed to show how the plant specimens are collected and pressed, the methods used in mounting them to their protective sheets of paper, the system by which they are arranged and stored, examples of ways the specimens are used in research, as well as other facets of an herbarium such as ours.

Visitors to the Arboretum are invited to study this extensive display which will be open weekdays through March from 9 A.M. to 5 P.M.

IDA H. BURCH

# Arnoldia Reviews

**Vegetation of West Virginia.** Earl L. Core. Parsons, W. Va.: McClain Printing Company. 1966. 217 pages, illustrated. \$7.00.

The author's concept of vegetation refers to the ecological organization of flora in communities, and its interrelationships with other forms of life. The paper jacket depicts an overview from West Virginian mountaintops and is synoptic of the work within, which is a companion to a predecessor, the *Flora of West Virginia*.

The text commences with the geography, topology, climatology, and geology of West Virginia, illustrated by the necessary charts and tables. Evolutionary ages are presented; the zones of vegetation and their characteristic flora and fauna are offered; endemic and epidemic species are differentiated and enumerated; plant communities are characterized.

These topics are treated in breadth and depth by the author. Documentation in scholarly footnotes is frequent, and there is a well-organized index. Unfortunately the gravity of the presentation makes it onerous reading.

This book is best suited to the student of elementary botany, especially of the south Atlantic states.

ELINORE B. TROWBRIDGE

**The Native Orchids of the United States and Canada** (excluding Florida). Bronx, N.Y.: The New York Botanical Garden. 1975. 361 pp., illustrated. \$40.00.

This rather sumptuous volume is one that most orchid or wildflower enthusiasts would love to own. However, many more of us would have fulfilled our desires if the book were somewhat condensed and therefore less expensive. The color photographs, however beautifully posed and reproduced they may be, are certainly excessive. Many plates, and there are 96 of them — mostly a full  $7\frac{1}{2} \times 10\frac{1}{2}$  inches, contain essentially repetitive photographs; a particularly striking example is Plate #51, representing *Platanthera peramoena*, which is made up of one photograph of a close-up of a flower, one habit shot, and four of inflorescences at different magnifications, three of these taken at the same locality.

Nevertheless, the book, which is the second of a two-volume work (the first on the orchids of Florida), is quite valuable as well as very beautiful. Every species and variety north of Florida is represented. Most treatments include a short, technical description, a list of synonymous names, a distribution map, line drawings of floral details, a full-page color plate, and a generally informative and quite readable text usually concerned with anecdotes or various aspects of the plant's biology. Accounts of the genera include keys to

the species. Introductory material includes a discussion of orchid biology and rather technical keys to genera and higher categories. The book is actually quite technical in general, but the photographs can be enjoyed by anyone.

The author must be given considerable credit for having photographed every single native orchid species in the wild. A minor part of the book, but one that deserves mention, are the often whimsical sketches, also by the author, scattered throughout. Some are unusually clever, particularly those which are of flowers exaggerated so as to conform more closely to the objects whose supposed similarity gave the genus or species its common or Latin name, e.g. Dragon's Mouth, Ladies' Tresses, etc.

RICHARD E. WEAVER, JR.

**Dried Flowers.** From Antiquity to the Present. Leonard Karel. Metuchen, N.J.: The Scarecrow Press, Inc. 1973. 192 pages. \$6.00.

Flowers are not the only dry things in this book. The prose is rather dull and so littered with indigestible facts that beginners are likely to be overwhelmed. A great deal of information on the history of dried flowers and various drying techniques is presented at the outset, but the uneven writing style and the somewhat excessive use of quotations make it difficult and tedious reading. A section on definitions written in lengthy paragraph style would best be presented in a more succinct glossary at the end of the book. Simple line drawings of the plant parts, at the very least, would be an aid to the beginner, for whom this book is intended.

*Dried Flowers* is the work of a professional scientist whose hobby is preserving flowers. More than anything else, this book is a diary of his personal experience with various desiccants and preservation techniques. A 77-page table details his results with over 300 flowers, arranged alphabetically by common name. This, together with an interesting bibliography, is the most informative part of the book.

MARGO W. REYNOLDS

**Garden Pests and Diseases of Flowers and Shrubs.** Mogens Dahl and Thyge B. Thygesen. New York: Macmillan. 1974. 223 pp. illustrated. \$6.95.

Many European-based works are unsuited to America, but this reasonably-priced book translated from the Danish for readers in the U.K. can be quite useful in our area. True, there are some vocabulary differences (what we call Ladybug, the English call Ladybird, for example), and some of the ailments pictured are rare in the American scene. However, these disadvantages are more than compensated for by excellent colored drawings of various organisms, disease symptoms, signs of such injuries as cold and wind damage in leaves, illustrations of lawn-grass pathologies, and so forth. An excellent index with both popular and technical names follows the text.

ELINORE B. TROWBRIDGE

**Fundamentals of Horticulture.** J. B. Edmond, T. L. Senn, and F. S. Andrews. New York: McGraw Hill. 1964, 3rd edition. 476 pp., black and white photographs and line drawings. \$10.50.

This is a textbook divided into 3 parts. The first deals with theory; the second, with basic problem-solving in horticulture; and the third, with practical horticulture technocracy — i.e. crop-growing.

As the work is intended to furnish all necessary background material to students undertaking the practice of horticulture as a vocation, the treatment of crop-raising is, expectedly, economic in its orientation. Crops both in greenhouse and on large out-door acreages are dealt with; floriculture has only a few pages.

This is a revision of a 1951 work and some of the cited researches are dated in the 1940s. Most carry no dates and there is no bibliography. The appearance of the text has been brought up-to-date by numerous photographs of mechanized field equipment — spraying by plane, and the like; however, the student will need to modernize his information on plant pathology, and the efficacy and government status of various chemical controls.

ELINORE B. TROWBRIDGE

**Sacred Narcotic Plants of the New World Indians.** Hedwig Schleiffer. New York: Hafner Press. 1973. 156 pages, paperback. \$5.95.

The rather astonishingly high number of hallucinogenic plants in this anthology are comfortably arranged according to families, with plants from Agaricaceae, Cactaceae, Convolvulaceae, Erythroxylaceae, Leguminosae, Malpighiaceae, Myristicaceae and Solanaceae included, plus a selection of plants of uncertain origin, as well as indices of the Latin names of genera and species, and of the vernacular names of plants and plant products.

Hedwig Schleiffer has made an acknowledged attempt to present a cross-section of moral viewpoints wherever possible. These seem somewhat repetitious at times, but I believe this is the result of the lack of cultural background for the descriptions. The few times cultural depth and metaphysical positions are bared, the sources truly take on credibility — as in the explanation of why the Desano Indians of the Columbian northeast Amazon use viho (*Piptadena* spp. of the Pulse Family), written in 1968 by Gerardo Reichel-Dolmatoff. In each case, the sources have been carefully documented to facilitate further research of the excerpted texts which date from the 16th century to the present.

In a time when plants have often become little more than another luxurious strip of chrome around outsized human economic endeavors, this anthology also provides refreshing perception as to just what life is all about, and its bearing upon human-plant associations.

EDWARD H. FLAHERTY, III

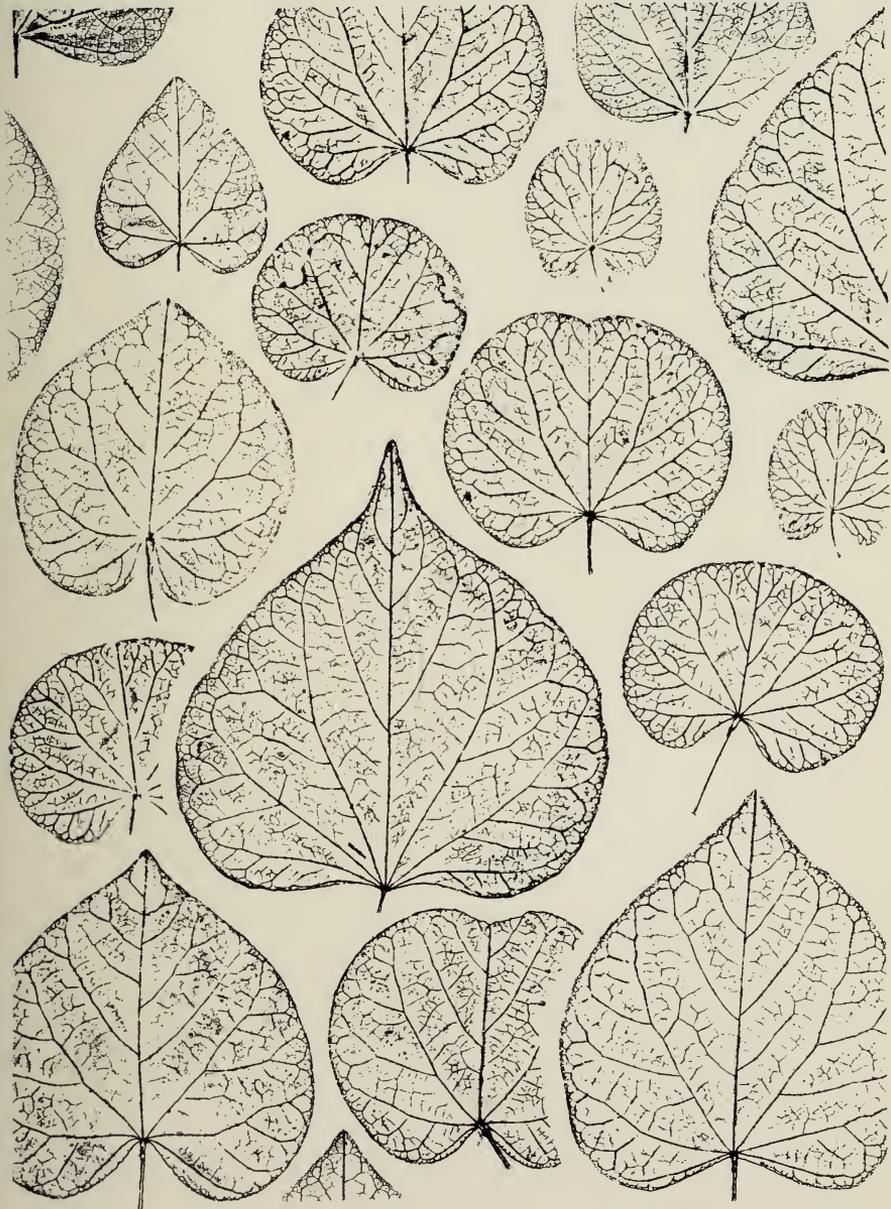
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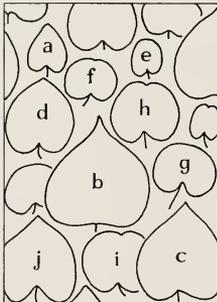


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Rubbings of *Cercis* leaves by R. Lefberg.  
a-c, *C. canadensis* var. *canadensis*; d, *C.*  
*canadensis* var. *texensis*; e-g, *C. occidentalis*;  
h, i, *C. Siliquastrum*; j, *C. chinensis*. All  
× 1/2. (From herbarium specimens of  
plants collected in the wild; each lettered  
rubbing from a different collection.)

# Cercis: The Redbuds

by KENNETH R. ROBERTSON

One of the few woody plants native to eastern North America that is widely planted as an ornamental is the eastern redbud, *Cercis canadensis*. This plant belongs to a genus of about eight species that is of interest to plant geographers because of its occurrence in four widely separated areas — the eastern United States southwestward to Mexico; western North America; southern and eastern Europe and western Asia; and eastern Asia. *Cercis* is a very distinctive genus in the *Caesalpinia* subfamily of the legume family (Leguminosae subfamily Caesalpinioideae). Because the apparently simple heart-shaped leaves are actually derived from the fusion of two leaflets of an evenly pinnately compound leaf, *Cercis* is thought to be related to *Bauhinia*, which includes the so-called orchid-trees commonly cultivated in tropical regions. The leaves of *Bauhinia* are usually two-lobed with an apical notch and are clearly made up of two partly fused leaflets.

The eastern redbud is more important in the garden than most other spring flowering trees because the flower buds, as well as the open flowers, are colorful, and the total ornamental season continues for two to three weeks. In winter a small bud is found just above each of the leaf scars that occur along the twigs of the previous year's growth; there are also clusters of winter buds on older branches and on the tree trunks (Figure 3). In early spring these winter buds enlarge (with the exception of those at the tips of the branches) and soon open to reveal clusters of flower buds. Each flower bud is composed of two parts: a bright magenta calyx tube and, protruding through the tube, five unopened, lavender-pink petals. A magenta stalk supports each flower bud. These flower buds do not open immediately, but their color and sheer number on otherwise bare stems make redbud plants very conspicuous at this time of the year.

Whoever coined the common name "redbud" must surely have been colorblind, but "redbud" is certainly more euphonious than "magentabud." In any case, the name "redbud" has been around for a long time. George Washington referred to the



Fig. 1. Young flowering tree of *Cercis canadensis* var. *canadensis* (eastern redbud). Photo: Arnold Arboretum.

planting of redbuds around Mt. Vernon, and later Thomas Jefferson described them at Monticello. Some people use the name "Judas-tree" for this plant, although that name rightly belongs to the European species *Cercis Siliquastrum*.

After a period of one to two weeks, the flower buds open into flowers that suggest those of a pea. The petals are a delicate, but still rather intense, shade of lavender-pink, which harmonizes well with the magenta calyx tubes. There are also forms in cultivation with pale pink to white flowers. With a little practice, one can tell from a considerable distance when a plant has open flowers by its overall pinkish rather than magenta color.

Close examination of the open flowers shows that there are five petals of three different sorts (Figure 2). The upper "banner" petal is innermost and is enclosed in bud by the two lateral "wing" petals and the two "keel" petals. The transfer of pollen from one flower to another is usually done by various long- and short-tongued bees, which are guided to the center of the flower by lines (nectar guides) on the "banner" petal. The two "keel" petals, which enclose the stamens, form a landing platform for the insect visitors. When an insect lands on a flower, the "keel" petals are pushed downward and the stamens spring upward, depositing pollen on the insect's abdomen. At this time the stigma is exposed so that it can receive the pollen already present on the abdomen. The insect meanwhile feeds on nectar produced by special tissue at the base of the stamens. This "papilionaceous" (pea-like) flower, which is unusual in this subfamily, is a good example of convergent evolution, for this flower functions like the flowers of another subfamily (the Faboideae) of the legume family. In flowers of that subfamily, the banner petal is outermost, the keel petals are innermost, and the wings and keel together function as a landing platform.

Not all flowers within a cluster (inflorescence) open at the same time, but the "life span" of the flowers that open first is long enough so that they have not withered by the time the younger flower buds open. Since all flower clusters on a tree mature nearly simultaneously, there is a period when most of the flowers on an individual tree are open at the same time and the branches appear to be covered with flowers (Figures 1, 3). At this stage, redbud trees are spectacular! However, the plants do not remain this way for very long, as the older flowers soon begin to fade and wither.

At about this time the winter buds at the tips of the branches enlarge and open, sending out the new growth of the year. Suddenly the plant becomes quite unsightly, with the remains of the flowers scattered along the branches and only immature

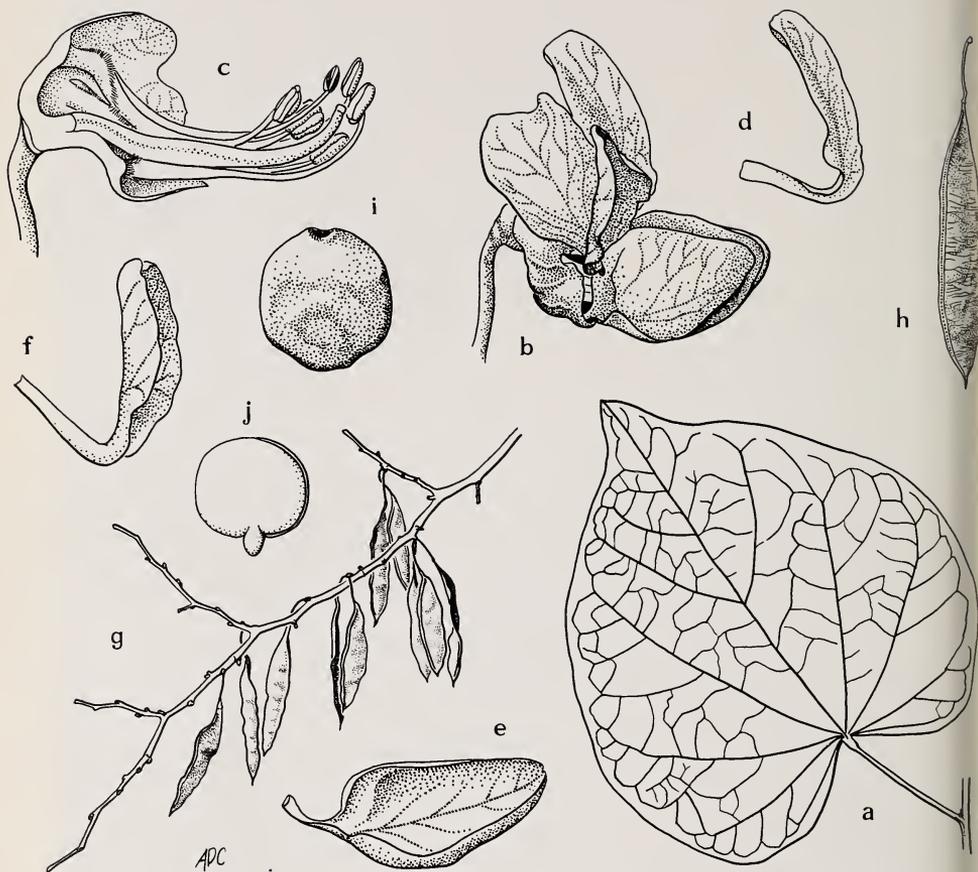


Fig. 2. *Cercis*. a-j, *C. canadensis* var. *canadensis*: a, leaf — note swollen pulvinus at tip of petiole,  $\times 1/2$ ; b, flower, the uppermost (banner) petal innermost,  $\times 3$ ; c, flower in partial longitudinal section, the petals removed,  $\times 4$ ; d, wing petal,  $\times 3$ ; e, keel petal,  $\times 3$ ; f, banner petal,  $\times 3$ ; g, branch with fruits after fall of leaves,  $\times 1/4$ ; h, mature fruit,  $\times 1/2$ ; i, seed,  $\times 4$ ; j, embryo from soaked seed,  $\times 3$ . Drawn by Arnold D. Clapman for a *Generic Flora of the Southeastern United States* and reproduced here with the permission of Prof. Carroll E. Wood, Jr.

leaves at the tips. The young leaves, glossy and often reddish, grow rapidly, and in a few weeks the plants develop an attractive summer foliage. The mature leaves are arranged alternately in two rows along the branches of the current year. They are rather thin, dull green on both surfaces, usually three to six inches long and wide (with the largest leaves at the tips of the branches), and heart-shaped with abruptly tapering tips. Five to nine conspicuous veins radiate outward from the notch at the base of the leaf blade. Each leaf is borne on a petiole that is about as long as the blade itself. At each end of the petiole is a swollen area called the "pulvinus" (Figure 2). Changes in the volume of cells in the upper pulvinus bring about the sleep movements of the leaves — the leaf blades are usually held more or less horizontally, but at certain times, such as during the middle of a hot day, they droop. These sleep movements, while distinctly noticeable, are not as pronounced and regular in the redbud as in plants such as the hardy silk tree, *Albizia Julibrissin*, and the sensitive plant, *Mimosa pudica*.

The ovaries of one to several flowers in most flower clusters enlarge and develop into fruits that reach their full size by midsummer. The fruits are elongate, lustrous, deep pink or reddish legumes about  $2\frac{1}{2}$  to 4 inches long and mostly  $\frac{5}{8}$  inch wide (Figures 2, 3). They are strongly flattened laterally with tapering tips and bases and parallel margins, or the upper margin curves downward at the tips. A small wing is usually present along the upper margin. Each fruit contains four to ten compressed, reddish-brown, beanlike seeds. The generic name *Cercis* is derived from the Greek *kerkis*, weaver's shuttle, alluding to the shape of the fruit.

In early autumn, the inner leaves of the eastern redbud turn a clear yellow while the outer leaves remain green, thus creating a contrast of colors that is particularly vivid against a brilliant blue autumn sky. The outer leaves soon turn so that the whole tree is yellow for a brief period. Rapidly, however, the yellow changes to brown and the leaves drop. Thus, while attractive for a short time in autumn, the redbud is not as effective as some other native plants (such as the witch hazels or dogwoods) in contributing to fall color. The fruits remain on the trees after the leaves have fallen. By autumn, they have lost the reddish pigment and are dry, very light, and tan or brown in color. Dispersal of the seeds takes place primarily during the fall and winter as the wind periodically blows most of the fruits from the branches. Late in the season, after the

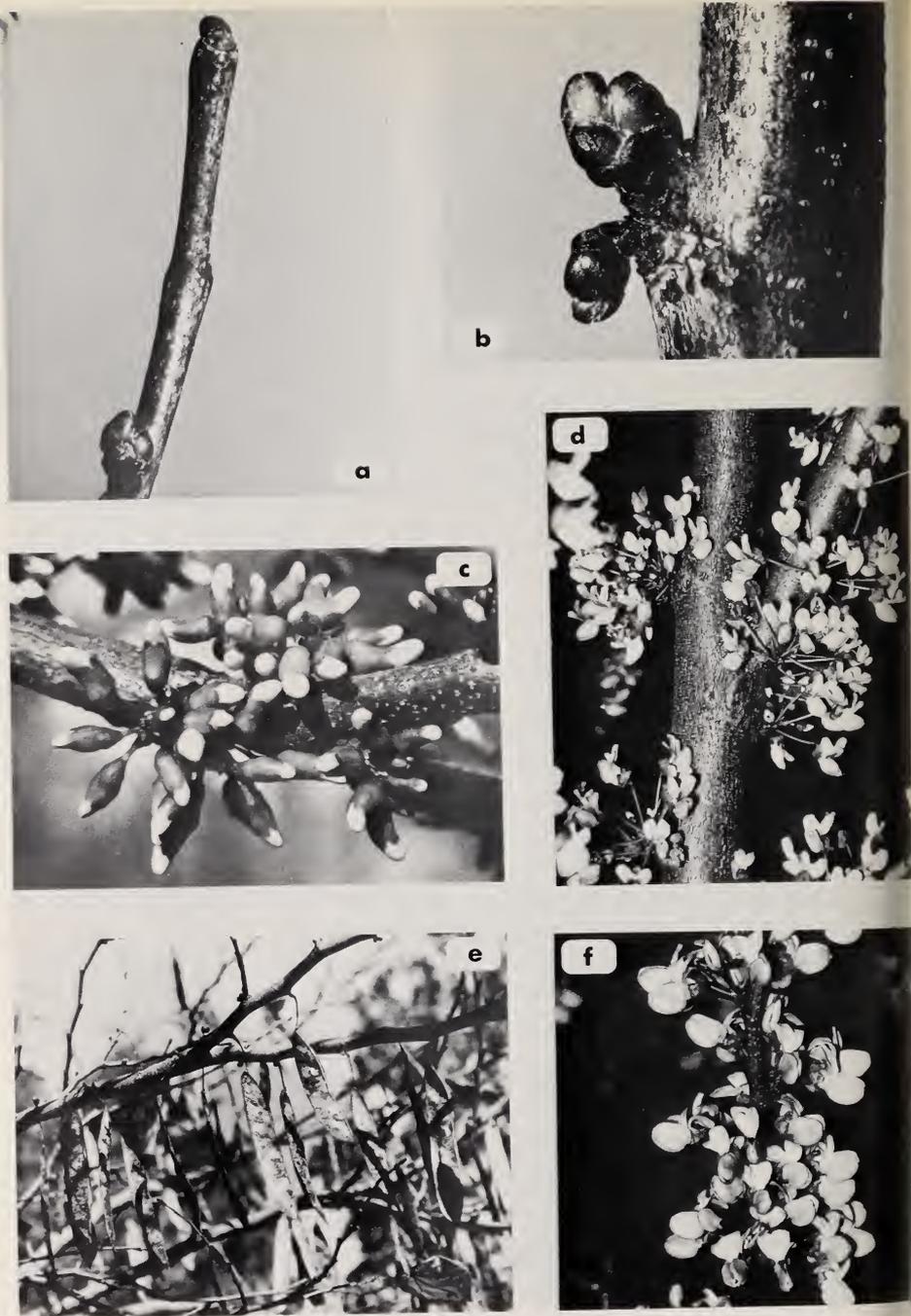


Fig. 3. *Cercis*. a-e, *C. canadensis* var. *canadensis*: a, tip of winter twig with vegetative bud above and floral buds below; b, close-up of winter twig with buds of 2 inflorescences (flower buds clusters); c, inflorescences with flower buds; d, stem with numerous inflorescences and open flowers; e, branch with mature fruits. f, flowering twig of *C. chinensis*. Photos: K. R. Robertson (from colored slides).

fruits have fallen or while they are still on the plants, the sutures on some of the fruits open, releasing the seeds; in the case of those fruits that do not open, seed release is effected by the decay of the fruit walls.

The eastern redbud is most often seen these days as a small tree or tall shrub. Mature specimens, however, can be moderate-sized trees with broad, rather flat-topped crowns, the largest being more than fifty feet tall, with a crown spread of over forty feet and a trunk diameter at breast height exceeding thirty inches. The natural range of the eastern redbud is from southern Connecticut and New York, south to central Florida, and west to Michigan, southern Wisconsin, Iowa, eastern Nebraska and Kansas, much of Oklahoma (except for the panhandle), and eastern Texas. In Canada, only one plant has been reported outside of cultivation — a tree that grew formerly on Pelee Island in Lake Erie, Essex County, Ontario. The eastern redbud is most abundant to the west of the Appalachian and Alleghany mountain ranges. It has a rather wide tolerance of environmental conditions, preferring strong sunlight and soils that have good drainage and are derived from limestone or acidic sandstone. In the northern and eastern part of its range, it is mostly found in open woodlands, limestone glades and openings, and thickets and along the borders of woods, rocky streams, and bluffs. Toward the south and west, it occurs in deep woods, ravines, bottomlands, and rich soil along streams.

Eastern redbud and flowering dogwood (*Cornus florida*) have similar geographical distributions and often occur together. Although the flowering season of the redbud is usually almost over when the dogwood begins to bloom, there are exceptional years when the trees flower simultaneously and produce a memorable show of spring color. I was raised in southwestern Missouri at the edge of the Ozark Mountains and vividly remember excursions into the countryside to admire the spectacle of the redbuds and dogwoods. Both of these species thrive in a border habitat, and, as a result of the many roads constructed in this century, they are probably more abundant now than ever before. In some places, redbud also flowers at about the same time as some of the shadbushes and wild plums (*Amelanchier* and *Prunus* species).

The type of redbud that has been discussed thus far corresponds technically to *Cercis canadensis* var. *canadensis*. It is native to the eastern United States and is distinguished from other North American redbuds by its tapering-acute leaves that at maturity are thin and dull green on both surfaces. Southward from the Arbuckle Mountains of Oklahoma, some or all of the wild redbuds are shrubs, instead of trees, with rather

thick, rich deep-green and waxy-shiny leaves that have blunt tips. Plants of this kind that lack hairs on the young branchlets and the petioles are known as the Texas redbud, *C. canadensis* var. *texensis* (or *C. reniformis*), which ranges from the Edwards Plateau to north-central Texas and the Arbuckle Mountains. Those plants with densely hairy branchlets and petioles are called the Mexican redbud, *C. canadensis* var. *mexicana*, and they occur from Crockett and Val Verde counties, Texas, to the Trans-Pecos and northeastern Mexico. Finally, the California or western redbud, *C. occidentalis*, distinguished from the eastern redbud by its larger flowers and fruits, occurs naturally from the Siskiyou Mountains of northern California southward through the Coast Ranges and the Sierra Nevada to San Diego County, California, eastward to southern Nevada, southwestern Utah, and northwestern Arizona (particularly along the canyons of the Colorado River). The Texas, Mexican, and California redbuds are commonly cultivated in the areas to which they are native. They are seldom grown in the eastern U.S., however, except as curiosities in botanical gardens.

Isely, in a very recent paper that appeared since the preceding discussion was written, while officially adopting the classification scheme established by Hopkins and modified by Turner, recognized six types of redbuds in the United States: (1) the eastern redbud, (2) the Texas redbud of east-central Texas and adjacent Oklahoma, (3) the Mexican redbud of Trans-Pecos Texas and south into Mexico, (4) the Intermountain redbud, *Cercis occidentalis* pro parte, of northern Arizona, adjacent Utah, and contiguous southeastern Nevada, (5) the San Diego redbud, *C. occidentalis* pro parte, of the Laguna Mountains of California, and (6) the Sierra redbud, *C. occidentalis* pro parte, that occurs on the inner Coastal Ranges and eastern slopes of the Sierra Nevada from Kern to Siskiyou counties, California. Two hypotheses were advanced by Isely to accommodate these phases in a taxonomic scheme. Following the first hypothesis, two species would be recognized, with *C. canadensis* including only the eastern redbud (*C. canadensis* var. *canadensis* of this paper) and *C. occidentalis* including all the forms with thick rounded leaves that occur from Texas to California. Isely's second hypothesis would treat all the redbuds of the United States (and probably Mexico) as a single species constituted of a number of regional varieties (approximately as outlined above).

In addition to the redbuds found in North America, several other species of *Cercis* are found in the Old World. The Judas-tree, *C. Siliquastrum*, is commonly seen throughout the Mediterranean region and southern Europe. According to legend, Judas Iscariot hanged himself from a branch of this plant, and



Fig. 4. Young flowering plant of *Cercis chinensis*. Photo: Arnold Arboretum.

its white flowers then turned red with either shame or blood (Figure 5). The Judas-tree is so widely cultivated and naturalized that it is difficult to ascertain its original geographical distribution; a good guess is that it is native only from Turkey eastward to Afghanistan. This species is quite variable both in nature and in cultivation, and many of the variants have been recognized as botanically different varieties or species. Just as the eastern redbud, *C. canadensis*, does not do well in cultivation in Europe, so the Judas-tree is not adaptable to gardens in eastern North America; each species is at its loveliest in the areas in which it grows spontaneously.

Five additional species of *Cercis* have been described from central and eastern China. One of these, *C. chinensis*, commonly called the Chinese redbud, is hardy in the Boston area (Figure 4). The flowers of this plant are larger and of a deeper color than those of the eastern redbud. In cultivation, the Chinese redbud is a moderate-sized shrub, but in the wild it can be a tree up to fifty feet tall with a trunk three to four feet in diameter. Another Chinese species, *C. racemosa*, is unique in the genus in that the flowers are borne in elongated racemes rather than in umbels. This species was collected in the wild and distributed to botanical gardens in 1907 by E. H. Wilson of the Arnold Arboretum, who said that of all the flowering trees he introduced into cultivation this was one of the very best and most beautiful. Unfortunately, *C. racemosa* is not hardy in Boston, but it would be worth trying on Cape Cod, Martha's Vineyard, and Nantucket Island. Apparently no commercial nursery in eastern North America currently offers *C. racemosa*. The other Chinese species of *Cercis* are poorly known to science and are evidently not in cultivation.

Our native eastern redbud and the Chinese redbud have much to recommend them for gardens in eastern North America. They are reliably hardy; they are highly ornamental in spring and summer; they flower consistently each year; they stay a nice compact size in a yard; and they are reasonably free of serious diseases, although canker can be a problem, particularly in areas where the summers are hot and humid. Commercially available cultivars of the eastern redbud include 'Alba' with white flowers; 'Flame', with double flowers and a more erect habit; 'Forest Pansy', with bright red new growth deepening to maroon as the season progresses; and several forms with light pink flowers, such as 'Pink Bud', 'Ruby Atkinson', and 'Withers Pink Charm'. The cultivar *Cercis* 'Oklahoma' is a variant of the Texas redbud with rich wine-red flowers and glossy foliage. Artificial hybrids have been obtained between *C. canadensis* and *C. chinensis* at the U.S. National Arboretum in Washing-

ton, D.C., where research involving breeding and selection of *Cercis* is being conducted.

Redbud plants should be transplanted at an early age since large specimens usually die when moved. Propagation is mostly from seed. Ripe seeds must be treated to break the hard water-proof seed coat. This may be done by filing or nicking the seed coat, by soaking the seeds in sulphuric acid for about an hour, or by covering the seeds with hot (180° F.) water and letting them sit overnight. The seeds should then be subjected to a moist cold treatment (40° F. for 3 months).

The following key is presented as an aid to the identification of cultivated redbuds. The use of this key requires knowledge of the flowers, fruits, and mature leaves. The species of *Cercis* are so similar that it is often necessary to observe a plant throughout a season before it can be identified. The overall shape of leaves and of leaf apices mentioned in couplet "2" of the key reflects the usual condition on a plant, rather than that of individual leaves. Flower length is measured from the base of the calyx tube to the tip of the "keel" petal.

### KEY TO THE CULTIVATED REDBUDS

1. Flowers in umbels or shortly elongated fascicles. .... 2.
2. Leaves cordate or more or less triangular in overall outline, some or all with acuminate, acute, or narrowly rounded apices (at least tapering toward the tips); fruits mostly less than 16 mm. wide. .... 3.
3. Leaves without a definite translucent border; flowers 6–12 mm. long; petals light lavender-pink (white to dark pink in cultivars). .... 4.
4. Leaves dull green above and below, thin, not coriaceous, the apices usually abruptly acuminate. ....  
..... *C. canadensis* var. *canadensis*.
4. Leaves rich green, glossy, coriaceous, the apices narrowly rounded or acutish. .... 5.
5. Leaves glabrous beneath. ....  
..... *C. canadensis* var. *texensis*.
5. Leaves densely pubescent beneath. ....  
..... *C. canadensis* var. *mexicana*.
3. Leaves with a narrow translucent border; flowers 15–18 mm. long; petals purplish-pink. .... *C. chinensis*.
2. Leaves orbicular or reniform in overall outline, some or all with broadly rounded, often emarginate apices, not distinctly tapering toward the tips; fruits mostly 15 mm. or more wide. .... 6.
6. Leaves subcoriaceous to coriaceous; flowers 10–15 mm. long. ....  
..... *C. occidentalis*.
6. Leaves thin, not coriaceous; flowers 15–20 mm. long. ....  
..... *C. Siliquastrum*.
1. Flowers in elongate racemes. .... *C. racemosa*.

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This article is dedicated to my late mother, Mrs. Faye Robertson, who loved redbuds.

*Selected References*

- Anderson, E. The story of the white red-bud. Missouri Bot. Gard. Bull. 56(2): 5-7. 1968. [Photographs.]
- Anonymous. Redbud, *Cercis canadensis*. Morris Arb. Quart. 10: 60, 61. 1974. [Illustration.]
- Bagby, M. The white redbud found again. Missouri Bot. Gard. Bull. 26: 82. 1938. [One plant found growing wild near Pacific, Missouri.]
- Bean, W. J. Trees and shrubs hardy in the British Isles. ed. 8, G. Taylor, ed. Vol. 1. xx + 845 pp. 77 pls. on 48 pp. 1970. [*Cercis*, 579-581.]
- Cutak, L. New or noteworthy plants for St. Louis. VIII. A double-flowered red-bud (*Cercis canadensis* var. *plena*). Missouri Bot. Gard. Bull. 23. 77, 78. pl. 11. 1935. [Photograph.]
- Fordham, A. J. Germination of woody legume seeds with impermeable seed coats. *Arnoldia* 25: 1-8. 1965.
- Hopkins, M. *Cercis* in North America. *Rhodora* 44: 192-211. 1942. [Taxonomic revision.]
- Isely, D. Leguminosae of the United States: II. Subfamily Caesalpinioideae. Mem. New York Bot. Gard. 25(2): 1-228. 1975. [*Cercis*, 134-150.]
- Kohl, P. A. The redbud. Missouri Bot. Gard. Bull. 39: 102-104. 1951.
- Krüssmann, G. *Cercis*. In: Handbuch der Laubgehölze 1: 301-303. pls. 92, 93. 1959. [Includes photographs of leaf rubbings.]
- Li, H. L. Taxonomy and distribution of the genus *Cercis* in China. Bull. Torrey Bot. Club 71: 419-425. 1944.
- Plummer, G. L., & A. A. Lindsey. On the occurrence of redbud in Indiana. Proc. Indiana Acad. Sci. 64: 79-87. 1954. [Important information on ecology of *C. canadensis*; photograph of large tree.]

- Robertson, K. R., & Y. T. Lee. The genera of Caesalpinioideae (Leguminosae) in the southeastern United States. *Jour. Arnold Arb.* 56: 1-53. 1976.
- Sargent, C. S. Anacardiaceae-Leguminosae. *Silva N. Am.* Vol. 3. 141 pp. *pls.* 98-147. 1892. [*Cercis*, 93-98. *pls.* 133-135.]
- Small, J. K. *Cercis chinensis*. Chinese redbud. *Addisonia* 6: 33, 34. *pl.* 209. 1921. [Colored illustration.]
- Stephens, H. A. Trees, shrubs, and woody vines in Kansas. vi + 250 pp. Lawrence, Kansas. 1969. [*Cercis*, 144, 145; photographs of flowers, fruits, leaves, twigs, bark.]
- Turner, B. L. The legumes of Texas. xii + 284 pp. *frontisp.* Austin, Texas. 1959. [*Cercis*, 68, 69; interpretations of vars. *texasensis* and *mexicana* different from those of Hopkins.]
- U. S. Department of Agriculture, Forest Service. Seeds of woody plants in the United States. U. S. Dep. Agr., Agr. Handb. 450. viii + 883 pp. 54 colored pls. on 16 pp. 1974. [*Cercis*, 305-308; references.]
- Wood, C. E., Jr. Some floristic relationships between the southern Appalachians and western North America. Pp. 331-404 in P. C. Holt, ed. The distributional history of the biota of the southern Appalachians. II. Flora. Research Div. Monogr. 2. Virginia Polytech. Inst. State Univ. 1971. [*Cercis*, 390; distribution map of genus, fig. 30, p. 348.]
- Wright, S. C. Leaf movement in *Cercis canadensis*. *Bot. Gaz.* 19: 215-224. *pls.* 19, 20. 1894.
- Wyman, D. Wyman's gardening encyclopedia. xvi + 1222 pp. 62 colored pls. on 16 pp. New York. 1971. [*Cercis*, 207, 208.]

SILIQVASTRO.



Fig. 5. *Cercis Siliquastrum*, showing derivation of common name "Judas-tree." From Castor Durante, *Herbario Nuovo*. Venice. 1636. [Arnold Arboretum copy on deposit at the Houghton Library, Harvard University.]

# The Cornelian Cherries

by RICHARD E. WEAVER, JR.

In late March at the Arnold Arboretum the signs of spring are few and subtle. True, the male Red-wing Blackbirds are calling in the meadow, and the meadow itself is beginning to turn green. And the Snowdrops in front of the Administration building have been blooming for some time, as have the Silver Maples along Meadow Road. But most of the trees and shrubs look about as they had during the drab days of winter. Only their swelling buds hint at their preparation for the season to come.

A few woody plants, however, are in full bloom during the last week of the month, at least if the weather has been seasonable. Silver Maples, *Daphne mezereum*, and *Rhododendron dauricum* provide a bit of color in the brown landscape, but the Cornelian Cherries put on the best show. At the Arnold Arboretum, the finest specimens are just behind the Cork Trees along Meadow Road and near the ponds close to the Forest Hills Gate. These members of the genus *Cornus*, the Dogwoods, are poorly known in comparison with some of their relatives, at least in America, but they are first class ornamentals. Forming large shrubs or small trees, they are literally covered with soft yellow flowers at a time when any color is much appreciated. They are also long-lived, relatively disease-free, and tolerant of poor soils; their fruits are attractive and edible, and the bark of one species is among the most attractive of any hardy woody plant.

The Cornelian Cherries, *Cornus mas* and *C. officinalis*, along with two other, little known species, form a distinctive group (*Cornus* subgenus *Cornus*) within a varied and highly ornamental genus. In these species, the flowers appear before the leaves. They are small and greenish or yellow and are borne on slender stalks in dense, rounded clusters or umbels. The clusters are surrounded at the base by a series of bracts similar to, but not nearly so conspicuous as, those in the Flowering Dogwood (*Cornus florida*) or the Kousa Dogwood (*C. kousa*). The fruits, also borne in clusters, are oblong drupes (fleshy fruits with a single, hard stone, as in Cherries), typically red



A fine specimen of *Cornus officinalis* in flower. This plant, growing at the Arnold Arboretum, is about 15 feet tall. Photo: D. Wyman.

in *C. mas* and *C. officinalis*, but black or blue-black in the other two species.

The best known of the Cornelian Cherries, and the one to which the name is most properly applied, *Cornus mas*, has been valued in Europe as a utilitarian plant since classical Greek and Roman times, and was mentioned in the writings of Homer and Virgil. The Latin name now given the plant is derived from the names applied to it in ancient times, and the common name also has been long established. Both are derived from its utilitarian attributes.

The wood of *Cornus mas* has been valued over the centuries for its hardness, durability, and flexibility. Although put to more mundane use in recent times, such as for the manufac-

ture of wheel spokes, ladder rungs, and tool handles, it was favored by the Romans to make the shafts of javelins. The modern generic name *Cornus* is the name they used for the plant, its derivation being from the Latin *cornu*, meaning "horn," because of the hardness of the wood.

The specific name *mas*, meaning "male" in Latin, was also applied to this plant by the Romans, presumably because (according to J. C. Loudon in *Arboretum et Fruticetum Britannicum*, vol. 2, page 1014. 1838) young plants bear only male flowers, and therefore do not set fruit. This would have been of some significance to the Romans, since they used the fruit as food. The common name, Cornelian Cherry, or shortened to "Cornel," was given to the plant because its cherry-like fruits are about the color of the gemstone carnelian. Although seldom eaten today, they were formerly used for various purposes in Europe: to make confectionary, marmalades, and liqueurs; mixed with apples and pears to make cider; and pickled green to serve as a substitute for olives.

#### *Key to the Species*

1. Tree with a single trunk, or with a few main trunks close together, the bark on mature individuals exfoliating, exposing the pale inner bark and creating a mottled effect; leaves usually with 6-7 pairs of veins, and with conspicuous tufts of brown hairs in the axils of the veins on the undersurface; flower stalks and the base of the flowers sparsely covered with short, straight, straw-colored hairs (use a magnifying glass) ..... *Cornus officinalis*.
1. Large shrub or bushy tree, usually with numerous stems from the base (or occasionally with only a few), the bark on mature individuals close, scaly, dark-colored; leaves usually with 4-5 pairs of veins, with often inconspicuous tufts of white hairs in the axils of the veins on the undersurface; flower stalks and the base of the flowers densely covered with short, slightly crinkled, white hairs (use a magnifying glass) ..... *Cornus mas*.

The two related species are rare in cultivation, so they are not included in the above key. They are, however, briefly described below.

*Top left: The flowers of Cornus mas, appearing before the leaves in early spring. Photo: R. Weaver.*

*right: The trunk of Cornus officinalis with its characteristic exfoliating bark. Photo: R. Weaver.*

*Bottom left: Trunks of Cornus mas showing the dark, scaly bark. Photo: P. Chvany.*

*right: Fruits and foliage of Cornus mas 'Flava', about 1/2 life-size. This cultivar is distinguished from the species by its yellow rather than red fruits. Photo: H. Howard.*



*Cornus mas* L. Cornelian Cherry. Native from central and southern Europe into western Asia, and reliably bud-hardy into Zone 4, this is the most frequently cultivated of the species. In this country it generally forms a large, multi-stemmed shrub to 15 feet tall. The largest specimen at the Arnold Arboretum has grown about 12 feet tall and twice as broad in its 93 years. A specimen this size would hardly be suitable for the average sized American yard, but with careful pruning of sucker shoots, the plant can be trained into an attractive, several-stemmed small tree.

As mentioned earlier, the fruits are edible. But, although they may reach the size of a small olive, the stone is large and the flesh relatively scant. Also, fruit set is seldom heavy in this country.

A number of cultivars have been selected, most of them differing from the species in having variegated leaves or white or yellow fruit. A few are described briefly below, a condensation of a more complete list which appeared in *Arnoldia*, Vol. 21, pages 9-18, in 1961 (Registration Lists in Cultivar Names of *Cornus* by R. A. Howard).

*Cornus mas* 'Alba' — fruits white.

'Argenteo-marginata' — leaves with a broad, white edge.

'Aureo-elegantissima' — early leaves golden-edged, but becoming flushed with carmine at maturity.

'Flava' — fruits yellow.

The species is available from a number of nurseries in this country, but I have been unable to find sources for any of the cultivars.

*Cornus officinalis* Sieb. & Zucc. Korean Cornelian Cherry. This is certainly the finest of the hardy species. A native of central and southern Korea and perhaps the Chinese province of Chekiang where it grows into a tree 30 feet tall, it was introduced into cultivation in Europe about 1870. It is not quite as hardy as *C. mas*, being reliable only in Zone 5. The fruits, similar to those of *C. mas*, were thought to possess medicinal properties by Oriental peoples, and the plant has been widely cultivated by them for centuries. At least young individuals of this species are easily confused with *C. mas*, and if only flowers are



A large specimen of *Cornus mas* at the Arnold Arboretum showing the shrubby habit typical of the species. Plant was 86 years old when photographed; now 93, it has a height of 12 feet. Photo: H. Howard.

available, distinguishing between the two species is always difficult. The diagnostic characters separating the two are outlined in the key above. The most obvious differences, and the ones which make *C. officinalis* far superior horticulturally to *C. mas*, are in the bark and the habit of the plants. *Cornus officinalis* is almost always a vase-shaped small tree with a single trunk, or with a few main trunks close together. The finest specimen at the Arnold Arboretum is 62 years old and about 15 feet tall. The bark on mature specimens exfoliates in a pattern suggesting that of a Sycamore or a Stewartia (but not as attractive, I must admit, as the latter). More subtle differences, but also horticulturally significant, are that the flowers of *C. officinalis* are a slightly better yellow, they are borne in larger clusters, and they appear a few days earlier than those of *C. mas*.

A more complete account of this species is to be found in: Wilson, E. H. Rare and Noteworthy Plants. *The Garden* 88: 333. 1924. Although the Korean Cornelian Cherry is certainly a desirable plant, it is rarely offered for sale by nurserymen. It is, however, listed by LaFayette Home Nursery in Lafayette, Ill., and by Greenbrier Farms in Chesapeake, Va.

*Cornus sessilis* Torr. Miner's Dogwood. This species, a native of the mountains of California, is a shrub or small tree to 15 feet tall. The flowers are in few-flowered clusters and the fruits are blue-black. The plant is not showy in flower or fruit, and it apparently is seldom cultivated. It is tender in all but the warmest parts of the northeastern United States.

*Cornus chinensis* Wanger. This is a tree to 40 feet tall in the wild, with flowers in larger clusters than those of *C. mas* and *C. officinalis*. The leaves are also large with conspicuous veins, and have been compared with those of a *Hosta*. It is native to northern India, northern Burma, and western and central China, and is very rare in cultivation. The plants cultivated in England were grown from material collected by Kingdom Ward in northern Assam, and they are tender even in most parts of the British Isles. However, considering the natural range of the species, hardy clones might well be found if botanical exploration would be possible once more in China.

Neither *Cornus mas* nor *C. officinalis* seems to be fussy about soil conditions, nor are they bothered by any serious insect pests or diseases. According to Mr. Alfred Fordham, Propagator at the Arnold Arboretum, the seeds have a double dormancy. His experiments have shown that this may be overcome by a warm treatment for five months followed by cold stratification for three months at 40 degrees F. He also suggests that the seeds may be sown when mature in the fall, with germination to be expected in the spring of the second year hence. The intervening summer and subsequent winter supply the conditions necessary for germination. Both species are also easily propagated from softwood cuttings.

# In Defense of the Rev. Dr. Reuben D. Nevius and the Plant Called *Neviusia*

by RICHARD A. HOWARD

In 1857 Prof. Asa Gray named *Neviusia* as a new genus of the Rose family, based on material supplied by the Rev. Dr. Reuben Denton Nevius. The plant later was grown in the Harvard Botanic Garden in Cambridge, Mass., and sent by Charles Sargent to Kew and to other European gardens; it had a limited native distribution along the Black Warrior River in Alabama near Tuscaloosa.

Although they lacked petals, the flowers were extremely showy in the spring, due to the display of bright, yellowish stamens. An enlarged calyx along with the presence of only a few 1-seeded carpels made the plant of great botanical interest and suggested a relationship with the Asiatic genera *Kerria* and *Rhodotypos* and an association with *Spiraea*.

For many years the tribute to Nevius was acknowledged by botanists, but in 1900 Charles Pollard wrote of a visit to the home of *Neviusia*. "During a recent collecting trip in the south a visit was made to Tuscaloosa for the purpose of seeing this and other rare plants of that region, and I was most fortunate in meeting Prof. W. S. Wyman, who was Dr. Nevius' companion on the trip during which the discovery was made. From his interesting account I learned that Dr. Gray erred in ascribing the discovery of the plant to Dr. Nevius; for it was first observed by Dr. Wyman, who had proceeded some distance ahead of his associate. These facts never have been made public, so far as I am aware, and it is unfortunate that the laws of botanical nomenclature forbid the substitution of *Wymania* for *Neviusia*."

This allegation of error on Gray's part and of a lack of candor on the part of Dr. Nevius have now been accepted in recent floras where the discovery of *Neviusia* is credited to both Wyman and Nevius. In an attempt to understand the true story, I read the correspondence of Dr. Nevius with Prof. Asa Gray. Regrettably, Gray's letters to Nevius on the subject are not available.

The Rev. Reuben Denton Nevius was born in Ovid, New York, in 1827 and received his D.D. from Union College in 1849. He served as rector of the Protestant Episcopal church in Tuscaloosa, Alabama, from 1855 to 1866. Subsequently he served in Mobile, Alabama, and in Portland, Oregon. He is reported to have been a general missionary in Oregon and Washington from 1873 until his death in 1913.

On May 11, 1858, Dr. Nevius wrote to Asa Gray, "I take the liberty of sending you a plant that I have been unable to determine. I cannot think it undetermined as it is not rare, though not common. I found the specimens which I send last year before I procured your valuable Manual and have not been able to procure a specimen for analysis since. Although I cannot think it unknown to you I will take this liberty to affix a description I have made."

Gray apparently replied suggesting the plant was new to science and offering some corrections for Nevius' description. On May 29, 1858, Nevius again wrote to Gray, "I hasten to tell you of my very agreeable surprise in finding that I had made a discovery and to thank you for the kind notice you have taken of the same. Had I not distrusted my own analysis of the plant attributing my failure in it to ignorance, I should have sent it a year ago. Since then I have learned something more by the study of your excellent books, Systematics and Structural Botany and the Manual, for which in my humble way a mere tyro I thank you in the name of the lovers of the herbal craft." He promised to observe whether the plant was evergreen or deciduous and continued, "Two years ago I began with Prof. Tuomey to make a register of the Flora of this neighborhood, but before we had taken our first ramble together he was lost to us and to the scientific world by death. Since then I have pursued the study alone, with many regrets for his loss both as a friend and a teacher."

Gray sent Nevius a copy of the Torrey & Gray *Flora of North America*, and on June 21, 1858, Nevius replied from the Christ Church Rectory, Tuscaloosa, "Immediately on receiving your kind note of the 8th. inst. (for which with your generous offer of assistance in my study and your valuable *Flora North America* I thank you most sincerely) I arranged an excursion to the locality of the new unknown and procured the specimens herewith enclosed. I sent them immediately as the carpels are not fully perfected and would wither in drying. . . . I send also a specimen of the wood. The shrub has the general habit of growth of the *Philadelphus* and resembles it very much except



*Neviusia alabamensis*. From: A. Gray. *Neviusia*, a new genus of Rosaceae. *Mem. Am. Acad. Arts Sci.* II. 6: pl. 30. 1858.

in foliage. In the thickets where many twigs grow from the same root . . . one twig is gracefully bent over another towards the sunny side of the cliff forming a dense mass of foliage almost impervious to the sunlight. The shrub is a very beauty and well worth cultivation. . . . I will still watch the ripening fruit and send it to you when perfected. If the plant proves to be a new genus it would be gratifying to me and to my friends and associates in this study, Prof. Wyman and Dr. Mallett of the University, to be permitted to name the genus in compliment to our old lamented friend Prof. Tuomey — Tuomeya. I have no doubt that the plant was known to him as he studied the flora of this neighborhood very thoroughly and that his sudden death cut short in this instance as in many others, a further investigation. Please inform me if this name will be agreeable to you. If it will I will leave to you if you please the site and form of publication and the pleasure (as it will be such I doubt not) of introducing it formally into the family of known plants and of making it known to science. . . . I beg you will do me the favor to write to me soon letting me know if this plant does establish a new genus and if you concur with me in the choice of a name, for really my interest in it and my desire to call it by its own name and to communicate my designed compliment to Mrs. Tuomey will hardly brook delay.”

Gray received the material Nevius mentioned and on a packet containing fruit wrote the name *Tuomeya alabamensis*. On July 12th Nevius wrote again, “Your kind letter of June is before me and hasten to thank you for your promptness in writing as well as for cordial agreement with me in naming the new genus. Your disposition to do me the unmerited honor of giving it my name was pleasing to me but far less so than my ability to honor the name of a most excellent and deserving man — my friend — in such an enduring monument. One word as to the name. Shall it be written Tuomeya or Tuomara? I think the former with the accent thus Tuo-mey-a. The name you know is Tuomey — Toomay. The name is Irish as Prof. T. was himself from Ireland.”

In this letter Dr. Nevius also refers to two other plants that had been the subject of correspondence between him and Prof. Gray. He obtained and sent material of *Croomia*, which Gray was able to grow in the Botanic Garden. Later Gray wrote a significant paper on the affinities of this unusual genus with *Roxburghia* of Asia. Nevius also wrote, “As to the Sedum, I really hope it is new that I may thus by your favor enter by



Branch of *Neviusia alabamensis* in full bloom. Photo: K. Robertson.

enrollment in a more modest way than you at first designed the honorable and gentle guild of botanists. I think, however, you have mistaken my name, as indeed all people do to whom I do not particularly say, it is Nevius not Nevins. My name you will see is already latinized. Perhaps so long ago as when written Naevius by Horace if so though I may not claim with modesty a descent so eminent. I may with reasonable pride see my name (through your works) incidentally mentioned like his upon a "Monument more lasting than brass."

Gray later was to write in a published paper: "The *Sedum* — a small, white-flowered species, with short and nearly terete leaves, which may be named *Sedum nevii* — cannot be adequately characterized until better specimens shall be obtained." By present rules of botanical nomenclature Gray may have published an illegitimate provisional name. However, Dr. Nevius has been honored by others for his work on mosses and algae, for *Chenactis nevii*, *Mnium nevii* and *Racomitrium nevii* have been published honoring him. In October 1858 Nevius reported to Gray, "I have a few more seeds of *Tuomeya* which I will send enclosed."

On August 12, 1858, Asa Gray read a communication to the American Academy of Arts and Sciences in which *Neviusia* was proposed as a new genus of the Rosaceae. The communication was not published until April 25, 1859.

Shortly after reading the paper, Gray must have written to Nevius that another name must be chosen for the Alabama plant. His paper on *Neviusia* as published noted, "But the publication of the third part of the *Nereis Boreali-Americana* (since the present communication was made to the Academy) shows that the name of *Tuomeya* is preoccupied, Dr. Harvey having dedicated to Professor Tuomey's memory a curious fluviatile alga discovered by the latter in Alabama, as well as by the late Professor Bailey in Virginia." On November 16, 1858, Dr. Nevius lamented to Gray, "You may know how greatly I have been disappointed by being anticipated by Prof. Harvey in choice of a name for my new genus when I say that the discovery itself scarcely gave me more pleasure than the opportunity it afforded for honoring the name of my deceased friend. Prof. Harvey's compliment has given me great pleasure, yet I cannot help wishing that he had been a few months later in publishing his book.

"I do not see what can be done but to accept your kind proposition to give the genus the less honorable name *Nevius* except it would be proper to call it *Toomara* and trust to the usual note to designate the person. I can hardly hope, however, that you will think this proper. I will leave the whole matter entirely in your hands and by your will be godfather to the new genus."

What name Gray used for the genus when he read the paper cannot be clarified. It is clear he modified the printed version to use the name *Neviusia* rather than *Tuomeya*. On February 21, 1859, Nevius wrote to Gray, "I have just received with great pleasure a sheet containing your article upon the new genus *Neviusia* and a few days before a sheet came to me by your kindness containing your notice of Harvey's *Nevius*, etc. I am greatly obliged to you for both and I take pleasure in again expressing my obligation and my thanks for your favor and kindness shown in the matter of *Neviusia* both in bringing it out and in keeping me appraised of its progress. Your kind notice of my first intention in giving it a name and your pleasing tribute to Prof. Tuomey has been peculiarly gratifying to me. Your article is quite an imposing one and it surprises me by its fullness. I am glad to know that there is an importance in its discovery aside from the discovery itself in its bearing upon the affinities of other genera."

With this, the correspondence with Gray lags, judging from the letters retained in the historical files of the Gray Herbarium. On July 11, 1868, Dr. Nevius married Margaret Mercer Tuomey, the daughter of Prof. Tuomey. Dr. Nevius is recorded as a minister in Mobile, Alabama, from 1869 until 1871; on October 22, 1870, Mrs. Nevius died.

Alone then, he moved to Portland, Oregon, and from there wrote in March, 1873, "it is long since I have done anything in botany save with the mosses. But there are so many new plants here and so many interested persons continuously applying to me that I find my old love for the phanerogams returning upon me. And so I find myself turning to you in my difficulties as I used to do. By the way, how does the *Neviusia* thrive in Cambridge? Has it come to you from any other quarter than Tuscaloosa? Can you not have a few roots sent me by mail yet this spring?" Nevius was to write to Gray on November 18, 1883, congratulating him on his birthday, and in December his correspondence with Sereno Watson began. Gray died January 30, 1888.

In the spring of 1891, Nevius asked Watson to send roots of *Neviusia* to a friend in Tacoma, Washington, and in June of 1892 he wrote, "Thank you for securing for my friend a root of *Neviusia*. It will grow very well here. I think that . . . it is not so much climatic difficulties which affects it as a want of loose acid soil. In its native place . . . under a perpendicular rock (long cliff) I could pull up perfect roots by hand by simply pulling and shaking the loose virgin soil from its roots. It spreads from the roots and makes a long hedge-like thicket — which in season is white with bloom."

The role of Wyman as the first to find the original plant cannot be verified. It is clear that Dr. Nevius was not seeking honor for himself in the naming and that the final choice of a name was that of Gray when the suggestion of *Tuomeya* could not be implemented. The material sent to Gray was on the initiative of Dr. Nevius and his acknowledgment of "friends and associates in this study, Prof. Wyman and Dr. Mallett" is in the correspondence with Gray.

The seeds in a packet with the name *Tuomeya alabamensis* in Gray's handwriting and full herbarium specimens preserved in the Gray collections are those of 1858 and 1859 from Tuscaloosa, Alabama. The oldest herbarium specimen from a cultivated plant is labeled Hort. Cantab. Anno 1864, and later specimens are dated 1871 and 1879. Such plants must have been grown from the seed Nevius sent to Gray.

Charles Sargent was the director of the Botanic Garden in Cambridge from 1872-9 as well as director of the Arnold Arboretum. An Arnold Arboretum specimen numbered 430 in our inventory was made from cuttings in the Botanic Garden, Cambridge, in 1876. One cutting from this plant was also established in Holm Lea, Sargent's residence. Other plants from this propagation must have been distributed by Sargent.

J. D. Hooker illustrated *Neviusia alabamensis* and wrote of it in the Botanical Magazine in 1885. "*Neviusia* flowered at Kew in May 1883; the plant was nailed against a wall exposed to the east and presented a very beautiful appearance from the abundance of its snow white heathery blossoms. Considering the climate and position of its native country, I should doubt its being hardy. It has been received at Kew from several contributors, notably a living plant from Prof. Sargent of Cambridge, Massachusetts, United States in 1879 and another from M. Miles, Esq. in 1881."

George Nicholson had made a specimen of a flowering plant of *Neviusia* at Kew on May 31, 1880; a specimen from Zabel at Hannover, Germany, in 1894 bears the annotation of source as Simon Louis Fr. 1882. *Neviusia* has proved to be hardy in England, although L. P. Raffill noted in the Gardener's Chronicle that in sooty London of 1907 the plants failed to achieve a brilliance of flower when grown out-of-doors. An illustration is supplied of a greenhouse plant forced into early bloom which displayed spectacular white flowers worthy of a prize in any exhibition. In the northern hemisphere the flowering is in May or June, while in Sydney, Australia, the shrubs flower in September.

*Neviusia* is reproduced readily from cuttings. Kenneth Robertson has made observations on the Rosaceae growing in the Arboretum and noted in the *Journal of the Arnold Arboretum* that "information on pollination mechanisms is lacking, but the plants are evidently partly self-compatible since the sole plant of the species in cultivation at the Arnold Arboretum produces some fruit." Our propagation records do not indicate that any propagator has tried to germinate the seeds of our plant. In fact, only one seed lot from another arboretum was tried and these seeds were infertile.

The original locale where *Neviusia* was collected has been destroyed by blasting operations, but populations still occur along both sides of the Black Warrior River in the vicinity. Originally it was thought to be restricted to Alabama, but sub-

sequently plants have been found in Arkansas and reported but unverified in Missouri. In any case all locations are on the periphery of the Mississippi embayment of the old Gulf Coastal Plain. *Nevusia* is considered by phytogeographers to be a relatively old relict species rather than a strict endemic of recent origin.

The spring of 1976 affords the opportunity of observing this interesting plant in our collections. What pollinates it? What attracts the pollinators? Do the flowers have an odor or nectar? Are fertile seeds produced? Do the seeds germinate in the same manner as the relatives *Kerria* and *Rhodotypos*?

Perhaps in the future sufficient young plants may be obtained to distribute again the material which Dr. Nevius sent to Prof. Asa Gray over a century ago.



*Close-up of Nevusia flowers. Photo: K. Robertson.*

## Arnoldia Reviews

**Wildflowers and Weeds.** Booth Courtenay and James H. Zimmerman. New York: Van Nostrand Reinhold. 1972. 144 pages, illustrated. \$9.95.

This is a field guide intended for the lay person who is discouraged by technical keys and scientific terms. The authors have emphasized common names and have used habitat and a system of family group charts based on simple structural detail as the "tools" for identification. Each of the 650 plants selected for inclusion is briefly described and represented by a color photograph that could be used alone for identification purposes.

The area covered is the Great Lakes region of the United States and Canada; however, the plants included also will be found growing in similar habitats outside that area. The book should be useful for a large part of the Northern United States, and should appeal to everyone who likes to see his wildflowers depicted in color.

SHEILA MACULLION

**Container Gardening Outdoors.** George Taloumis. New York: Simon and Schuster. 1972. 95 pp., illustrated. \$7.95.

This is an idea book; it shows where and how to use plants in containers, mostly out-of-doors and in warm climates. Gardening procedures and management occupy but a few pages, and virtually no cultural material is included.

The volume has particular application to the needs of designers of shopping malls and municipal parks as well as West Coast residences where money is no object. The rest of us might look at it in a library for fun and inspiration.

ELINORE B. TROWBRIDGE

**The Complete Handbook of Pruning.** Roger Grounds, editor. New York, Macmillan Co. 157 pages, illustrated. American edition 1975. \$12.95.

Originally published in England, this volume retains a few British characteristics in vocabulary, and in references to species grown or for hardiness ranges within the United States. A glossary explains the less familiar terms. The section on grapes, for example, is applicable in its entirety to England and not to the United States. The fundamentals of pruning procedures are described and illustrated with color plates and black and white diagrams and illustrations. The three sections of the book cover the pruning of ornamental plants; the pruning of fruit trees and bushes; hedges, including topiary; greenhouse plants; and the care of old trees. In several sections an alphabetical listing of the plants considered uses interchangeably scientific and common generic and specific names.

RICHARD A. HOWARD



*P. mamei*. From: *Philodendrons*.

**Philodendrons.** Jack Kramer. New York: Charles Scribner's Sons. 1974. 87 pp., illustrated. \$5.95.

This little book covers the selection, care, and propagation of philodendrons and related genera. The fifteen line drawings by Charles Hoepfner are the best part of the book; they are attractive, accurate, and correctly identified except for *Monstera deliciosa* (listed as *Philodendron pertusum*). Unfortunately the text does not live up to the illustrations; it is repetitive and sometimes misleading. For example, the delicate *Monstera Friedrichsthali* is described as "a treelike rampant climber," (p. 62), and dieffenbachias are said to have "large heart-shaped leaves resembling those of caladiums," (p. 68), which is untrue.

The chapters on the care of philodendrons contain useful summaries of the standard horticultural practices. However, the charts on diseases and their control (p. 28-30) recommend in several instances spraying with Malathion, a chemical toxic to humans which should not be used in the home. The description of propagation by air-layering (p. 57) is adequate, but the accompanying illustration by James Carew (p. 83) shows the gardener air-layering a petiole instead of a stem, a procedure certain of failure!

Much of the material presented in the first part of the book is repeated in the last chapter in a question and answer format. An index would have been more to the point, and the remaining pages could have been used to amplify the cryptic two-line descriptions of "forty favorite philodendrons," (Chapter 5).

The volume ends with a list of references. Notably absent is Monroe R. Birdsey's excellent work, *The Cultivated Aroids* (1951), which covers the same subject matter as *Philodendrons* and is still available from the publisher, Eric Lundberg, Ashton, Md. 20702, for a modest \$5.00.

MICHAEL MADISON

**Wild Flowers of the Canary Islands.** David and Zoë Bramwell. London: Stanley Thornes Ltd. 1974. 261 pp., illustrated. £5.00.

The Canary Islands are a paradise for plant lovers. The climate is ideal for growing a diverse group of garden plants from temperate to tropical types, but it is the native plants that are of particular interest. There are approximately 2000 of these; about one-fifth are found nowhere else on earth, and many are restricted to small areas on a single island. A large number are spectacular in a weird or a beautiful sense, particularly the Echiums, which are relatives of the familiar, weedy Viper's Bugloss. Succulents in several families are numerous.

This book is an indispensable aid for anyone interested in the native plants of the Canaries, whether he be a botanist or a more casual observer, as I can attest from firsthand experience. I took the book with me on a recent trip there, and I would have been lost without it.

A total of 205 species are illustrated by means of color photographs, and an additional 109 with reasonably good line drawings; nearly every genus is represented by at least one illustration. The last half of the book contains short descriptions and keys to the identification of a large percentage of the total flora. Although a glossary is provided, this section is most useful to the botanist or the serious amateur. Equally as useful as the identification aids is the excellent section on areas of botanical interest. A map of each of the seven major islands is given, and areas with concentrations of interesting plants are delineated. The plants listed in the accompanying text are usually among those illustrated later in the book. This section is particularly useful in preparing one's itinerary when time is limited.

RICHARD E. WEAVER, JR.

*Galanthus nivalis* — demure harbinger of spring brightens entrance of Administration Building. Photo: P. Chvany.





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# ARNOLDIA

*The Arnold Arboretum* Vol. 36, No. 3 May/June 1976

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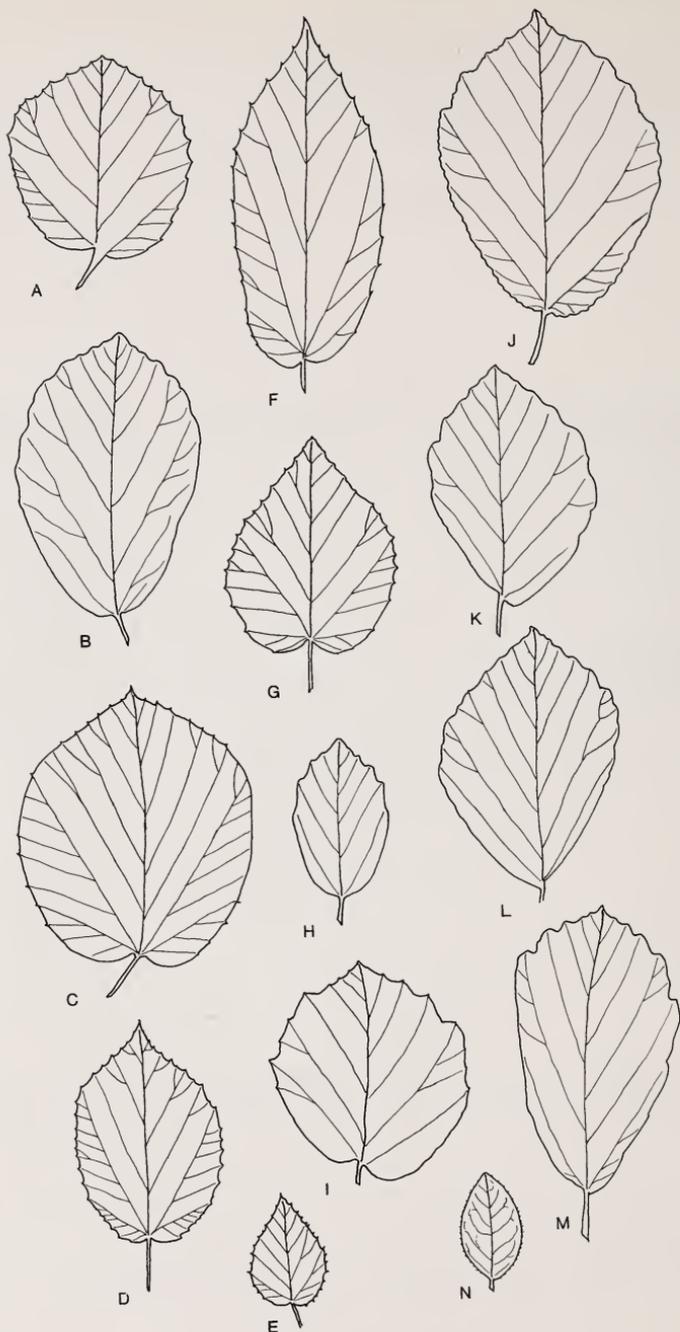
# The Witch Hazel Family (Hamamelidaceae)

by RICHARD E. WEAVER, JR.

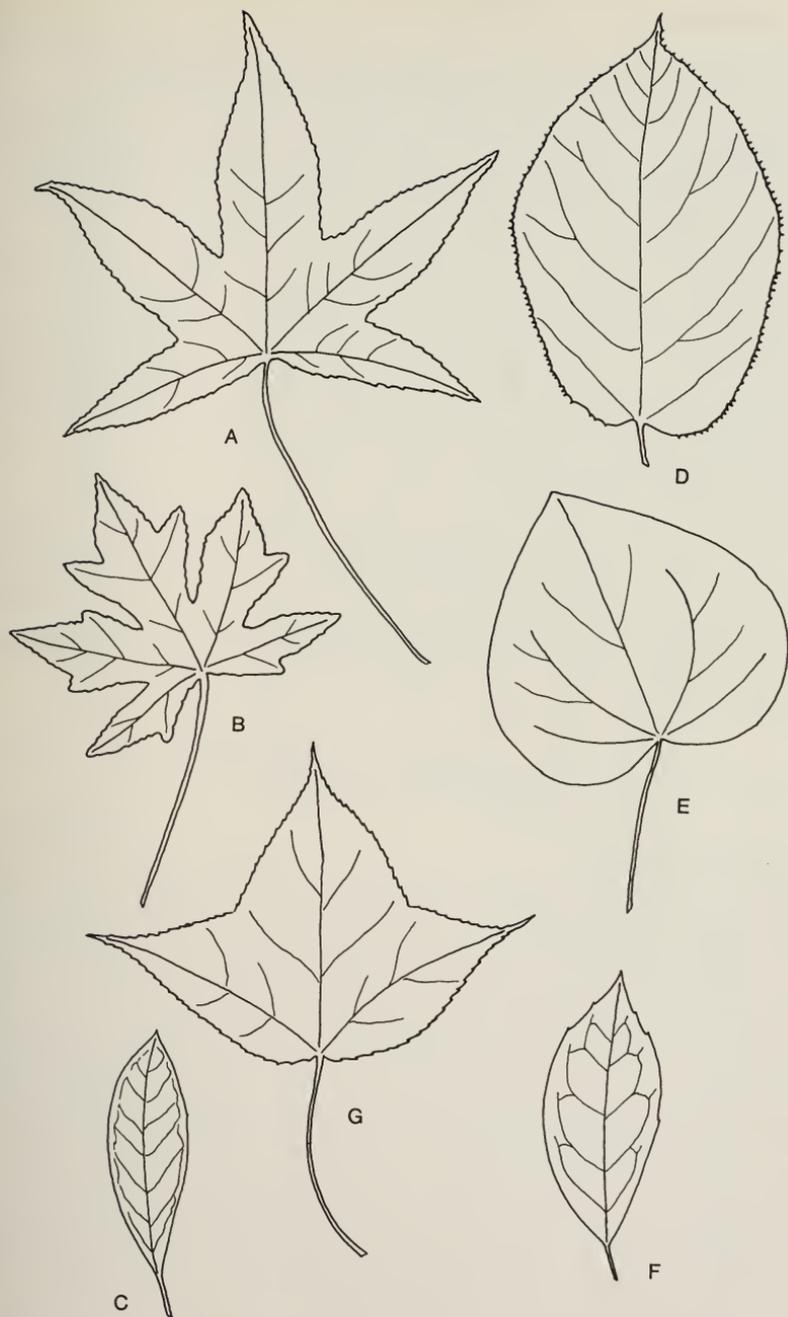
The Arnold Arboretum has claimed that there is a tree or shrub in bloom every month of the year on its grounds in Jamaica Plain, Mass. In many years this assertion is true, but only because of a single genus of plants, *Hamamelis*, the Witch Hazels. As December arrives, the last pale yellow flowers begin to fade on the Common Witch Hazel, *H. virginiana*, a native of the eastern United States. And with the New Year come the fragrant, bronzy flowers of the Vernal Witch Hazel, *H. vernalis*, closely followed by the bright and beautiful yellow blossoms of the Chinese species, *H. mollis*.

The Witch Hazels belong to the Hamamelidaceae, a family of plants which are mostly neglected by the American horticultural public. Admittedly, the family is insignificant horticulturally compared with some others, for example, the Rose Family, as a result of the diversity and sheer number of its genera and species, and the Magnolia Family, because of the universal appeal of some of its members. But a high percentage of the species in the Hamamelidaceae are first class ornamentals, possessing charm, beautiful and often fragrant flowers, unusual blooming times, and brilliant autumnal coloration. Most also are easy to grow if the soil is light and loamy, and they bloom reasonably well in partial shade. In addition, they are not bothered by any serious diseases or insect pests.

This article will present a brief discussion of all of the genera which are hardy in the northern half of the United States. Keys are provided for the identification of genera and species. The references listed are those which were consulted in the preparation of the article, and they are recommended for anyone desiring further information. Many of the species are rarely encountered in the American nursery trade, so sources are given if they exist. Nurseries are listed by name for each species and cultivar, with the addresses at the end of the article. Some, however, may not be current. For those willing to import plants from abroad, Hilliers' Nursery in Ampfield, Hampshire, England, lists all of the species treated here. I am most grateful to Mrs. Ida Burch, of the Arnold Arboretum staff, for preparing the list of the cultivars for the species treated here, for



Leaves of the Witch Hazel Family — 1/3 life-size. A, *Parrotiopsis jacquemontiana*; B, *Parrotia persica*; C, *Corylopsis spicata*; D, *C. platypetala*; E, *C. pauciflora*; F, *C. veitchiana*; G, *C. glabrescens*; H, *Fothergilla gardenii*; I, *F. major*; J, *Hamamelis mollis*; K, *H. virginiana*; L, *H. japonica*; M, *H. vernalis*; N, *Loropetalum chinense*.



Leaves of the Witch Hazel Family — 1/2 life-size. A, *Liquidambar styraciflua*; B, *L. orientalis*; C, *Distylium racemosum*; D, *Sinowilsonia henryi*; E, *Disanthus cercidifolius*; F, *Sycopsis sinensis*; G, *Liquidambar formosana*.

searching out the nursery sources for the species and cultivars, and for helping with the preparation of the leaf drawings.

As they go through this article, many readers will wonder how such seemingly diverse plants could be classified in the same plant family. The basic features which are common to the Hamamelidaceae are: woody plants with simple, alternate leaves which are often uneven at the base; stipules which are deciduous soon after the leaves expand; apparently simplified, but actually very complicated flowers, often without petals or sepals, but with the parts present inserted on the rim of a "floral cup"; a pistil with two separate styles; fruit that is a hard, almost woody capsule splitting with two or four usually slender projections at the apex, these representing the hardened remains of the styles; and seeds usually hard and shiny and usually two per capsule.

General family references:

Bean, W. J. Trees and shrubs hardy in the British Isles, editions 1-8. John Murray, London.

Malmo, B. B. 1958. Hamamelidaceae. The University of Washington Arboretum Bulletin 21: 3-6, 30, 31.

Sargent, C. S., ed. 1913. *Plantae Wilsonianae*. Hamamelidaceae by A. Rehder and E. H. Wilson, vol. 2, pp. 421-432.

#### KEY TO THE CULTIVATED GENERA OF THE WITCH HAZEL FAMILY

- |  |                      |
|--|----------------------|
| 1a. Leaves palmately lobed .....   | <i>Liquidambar</i> . |
| 1b. Leaves unlobed .....   | (2).                 |
| 2a. Flowers with conspicuous petals .....  | (3).                 |
| 2b. Flowers without petals or with inconspicuous ones .....  | (6).                 |
| 3a. Leaves palmately veined, without teeth along the margins; flowers borne back-to-back in pairs .....  | <i>Disanthus</i> .   |
| 3b. Leaves pinnately veined, with teeth along the margins; flowers borne in pendulous racemes or in tight clusters of 3-6. ....                            | (4).                 |
| 4a. Flowers in pendulous racemes; petals as long as broad, or slightly longer than broad; leaves with sharp-pointed, usually triangular teeth .....        | <i>Corylopsis</i> .  |
| 4b. Flowers in tight clusters of 3-6; petals long and slender, much longer than broad; leaves with fine, almost hairlike teeth, or with rounded ones ..... | (5).                 |
| 5a. Petals white; leaves evergreen, with fine, almost hairlike teeth .....   | <i>Loropetalum</i> . |
| 5b. Petals yellow, orange, bronzy, or reddish; leaves with coarse, round teeth .....   | <i>Hamamelis</i> .   |
| 6a. Trees with flaky, exfoliating bark; leaves with coarse, rounded teeth. ....  | <i>Parrotia</i> .    |
| 6b. Trees or shrubs with smooth or ridged bark (but not exfoliating); leaves without teeth along the margins or with sharp-pointed ones. ....              | (7).                 |
| 7a. Leaves evergreen, without teeth, or with a few inconspicuous, scattered ones above the middle .....  | (8).                 |
| 7b. Leaves deciduous, with conspicuous teeth along the margin ....   | (9).                 |

- 8a. Flowers in dense, nodding clusters, the clusters surrounded at the base by fuzzy, brownish bracts ..... *Sycopsis*.
- 8b. Flowers in upright racemes, without conspicuous bracts .....  
..... *Distylium*.
- 9a. Flowers in dense, upright heads or spikes, with conspicuous filaments much longer than the anthers; fruit clusters upright .... (10).
- 9b. Flowers in pendulous catkin-like spikes or in racemes, the filaments not particularly conspicuous, and about the same length as anthers; fruit clusters pendulous ..... (11).
- 10a. Inflorescences surrounded at the base by conspicuous white bracts, as in Dogwoods; filaments threadlike ..... *Parrotiopsis*.
- 10b. Inflorescences with white bracts at base; filaments thickened in upper portion ..... *Fothergilla*.
- 11a. Male and female flowers in the same inflorescence; flowers with inconspicuous petals; at least some of the teeth on the leaves triangular in shape ..... *Fortunearia*.
- 11b. Male and female flowers in different inflorescences; flowers completely apetalous; teeth on the margins of the leaves fine and bristle-like ..... *Sinowilsonia*.

### *Corylopsis* Sieb. & Zucc. Winter Hazels

#### References:

- Bean, W. J. 1910. *Corylopsis veitchiana*. Botanical Magazine 136: plate 8349.
- Li, Hui-Lin. 1962. The cultivated *Corylopsis*. Morris Arboretum Bulletin 13: 63-68.
- Morley, B. and Jew-Ming Chao. The genus *Corylopsis* S. & Z. (Hamamelidaceae). To be published in the Journal of the Arnold Arboretum.

A genus of eight to twelve species native to the Himalayas, China and Japan, this is a group of fine ornamental plants. Their aspect in flower is completely different from that of any other hardy shrubs. The fragrant, soft yellow flowers are borne in pendent racemes from conspicuously zigzagged branches on the graceful, spreading plants. They are not splashy, and their fragrance is not strong, but they are distinctly charming and many of my colleagues here at the Arnold Arboretum place them among their favorite early-flowering shrubs.

The flowers generally appear in early April, before the leaves have expanded. The individual flowers are somewhat bell-shaped with five broad petals, and vary from  $\frac{1}{4}$  to  $\frac{1}{2}$  inch long. The racemes may be as much as 3 inches long. The foliage is attractive through the summer, although not distinguished in its autumn coloration; the individual leaves resemble those of the Hazels (*Corylus*), accounting for the generic name which means "a likeness to *Corylus*."

The species treated here are all hardy at the Arnold Arboretum, although most are planted in one of our most sheltered spots, the Center Street Area. They would not be recommended for a climate any more harsh than ours. Even here the buds are occasionally winter-killed, and the flowers themselves are sometimes nipped by

spring frosts. Cultural requirements would be the same as for Witch Hazels — a good, rich soil and partial shade. They are most effective when planted in an informal situation, such as at the edge of woods or at the base of a large tree. The flowers will hold up well in water, and the form of the twigs and inflorescences are attractive in arrangements.

#### KEY TO THE SPECIES OF CORYLOPSIS

- 1a. Inflorescences (flower clusters) with 2-4 flowers; mature leaves usually less than 2 inches long ..... *C. pauciflora*.
- 1b. Inflorescences with more than 5 flowers; mature leaves usually more than 2 inches long ..... (2).
- 2a. Flowers greenish, small, individually  $\frac{1}{4}$  inch long or less; flower-bearing winter buds slender, with a long tapering point; petioles (leaf stalks) usually with glandular hairs. .... *C. platypetala*.
- 2b. Flowers yellow, larger, individually  $\frac{3}{8}$ - $\frac{1}{2}$  inch long; flower-bearing winter buds egg-shaped, blunt; petioles sometimes hairy, but the hairs not gland-tipped ..... (3).
- 3a. Leaf stalks and twigs with fine hairs ..... (4).
- 3b. Leaf stalks and twigs glabrous (without hairs) ..... (5).
- 4a. Inflorescences with less than 10 flowers ..... *C. spicata*.
- 4b. Inflorescences with 11 or more flowers ..... *C. sinensis*.
- 5a. Stalks and axis of inflorescences glabrous; anthers not protruding beyond the petals; capsules glabrous ..... *C. glabrescens*.
- 5b. Stalks and axis of inflorescences pubescent; anthers protruding beyond the petals; capsule pubescent ..... *C. veitchiana*.



*Corylopsis spicata* in flower, with *Prunus cyclamina* in the background. Photo: H. Howard.

*Corylopsis glabrescens* Fr. & Sav.*C. gotoana* Makino

A native of the mountains of Honshu and Kyushu, Japan, this species was introduced into cultivation from seeds collected by J. G. Jack for the Arnold Arboretum in 1905. It is one of the hardiest species, and at 4 to 6 feet, one of the lowest growing. The flowers are not as large as some of the other species, nor are they very fragrant. It is not commercially available in this country.

*Corylopsis pauciflora* Sieb. & Zucc.

Although native to Taiwan, Korea, and the island of Honshu, Japan, most plants in cultivation are probably of Japanese origin. This species is reputedly not as hardy as some of the others, but in my experience it appears to be about the most reliable for bloom here at the Arnold Arboretum. The pale yellow flowers are in the shortest clusters of any species in the genus, but they are also the largest among those of the hardy species, and they open more fully than most others. Since they also appear in profusion, this is perhaps the showiest species. The plant grows to about 10 feet tall here in New England. It is available from the following nurseries: Gossler Farms, Gulfstream, Hollandia, Malmo, and Tingle.

*Corylopsis platypetala* Rehd. & Wils.

This species, a native of western China, was discovered by E. H. Wilson, who introduced it into cultivation. One of the plants from the original seeds is still growing at the Arnold Arboretum. The species is not vigorous here, although in England it grows to be 20 feet tall. It is the latest blooming of the hardy species, and also the least showy. The racemes are long, but the flowers are small and yellow-green. The species is not commercially available in this country, and is rare even in botanic gardens. Most of the plants grown as this species appear to be either *C. sinensis* or *C. veitchiana*.

A close relative, and another Wilson introduction, *C. wilmottiae* Rehd. & Wils., is apparently not grown in this country, and there seems to be much confusion about its identity in general. A cultivar (the only one in the genus) said to be of this species is offered by Hilliers'. It is called 'Spring Purple' because of the most attractive plum-purple color of the spring growth. As a parent in hybridization, this clone could give rise to some particularly attractive plants.

*Corylopsis sinensis* Hemsl.

Related to *C. platypetala* but more showy, this native of China was introduced by Wilson when he was collecting for Veitch and Son. It is somewhat tender here, and the only specimens at the Arnold Arboretum are still in the nursery. It is offered for sale by Dauber and Gossler Farms.

*Corylopsis spicata* Sieb. & Zucc.

A native of Japan, this is the oldest species in cultivation. It is distinctive because of its non-flaring petals and its projecting red anthers. It is an attractive species, but forms a rather large plant. The largest specimen at the Arnold Arboretum is nearly 60 years old, and is 10 feet tall with a spread of 18 feet. A hybrid between this species and *C. pauciflora* (the only one reported for the genus) is being grown at Winterthur and the Morris Arboretum. From photographs, it appears to be most handsome, and it points out the ornamental possibilities of hybrids between other species. *Corylopsis spicata* is available from Brimfield and Hollandia.

*Corylopsis veitchiana* Bean

Another Wilson introduction for Veitch and Son, this native of western China is a particularly desirable species. In bloom and habit it resembles *Corylopsis spicata*, but the flowers are more open and there are more of them per raceme. In good years it is an attractive plant indeed. It is available in this country only from Tingle Nursery.

*Disanthus cercidifolius* Maxim.

## Reference:

Bean, W. J. 1917. *Disanthus cercidifolius*. Curtis Botanical Magazine 143: plate 8716.

Although it certainly has ornamental attributes, this plant is probably more interesting than beautiful. The curious, faintly ill-smelling flowers somewhat resemble those of the Witch Hazels, but they are more star-shaped, with five tapering, dark red-purple petals rather than four strap-shaped, yellow or reddish ones. They appear in the autumn as the leaves are falling, when few other shrubs are in bloom, but although individually attractive, they are seldom sufficiently profuse to provide much of a show.

The flowers are borne in a most unusual manner — in pairs, back-to-back, on a short stalk — thus obviously accounting for the derivation of the generic name from the Greek *dis*, meaning “twice,” and *anthos*, meaning “flower.” The specific name meaning “leaves of *Cercis*,” the Redbud genus, alludes to a resemblance that has nothing to do with evolutionary relationships, *Cercis* belonging to the Legume Family. The leaves of the two are remarkably similar; but they are completely different from those of all of the other plants in the Witch Hazel Family. In fact, *Disanthus*, with *D. cercidifolius* the only species, is usually classified as a distinct subfamily of the Hamamelidaceae.

*Inflorescences of Corylopsis — Life-size. Upper left, C. veitchiana; upper right, C. spicata; below, C. pauciflora. Photos: P. Chvany.*



In the autumn the foliage of *Disanthus* turns a spectacular blend of reds, purples and oranges, even in the shaded position in which it seems to grow best. This along with its unusual flowers and elegant, spreading form would recommend it for more frequent cultivation.

The plant is native to the islands of Shikoku and Honshu, Japan, and is apparently quite rare in the wild. We have not been able to keep it for more than a few years at the Arnold Arboretum; it is apparently hardy only in Zone 6. The only material offered in this country is seed, available from Schumacher.

#### *Distylium racemosum* Sieb. & Zucc.

##### Reference:

Airy Shaw, H. K. 1937. *Distylium racemosum*. Curtis Botanical Magazine 160: plate 9501.

*Distylium* is a genus of about eight species distributed through much of tropical and subtropical Asia, with extensions into the more temperate zones. This species, a native of Japan, Korea, and Taiwan, is the only one in cultivation in the West. It is more curious than ornamental. The evergreen leaves somewhat resemble those of our native Mountain Laurel (*Kalmia latifolia*), and the flowers are conspicuous only for their large red anthers. Although becoming a small tree in the wild, cultivated specimens form stiff shrubs seldom more than 6 feet tall. Rehder lists the plant as being hardy in Zone 7, and it does survive in Washington, D.C. In this country it appears to be cultivated primarily in California, but no commercial sources have been located.

#### *Fortunearia sinensis* Rehd. & Wils.

Another plant of little ornamental value and therefore rare in cultivation, *Fortunearia sinensis*, the only species, was discovered by Wilson in China and originally described by Rehder and Wilson at the Arnold Arboretum. It is named for Robert Fortune, another great student of the plants of China and Japan. Vegetatively this species resembles *Sinowilsonia henryi*, which will be discussed later. The flowers are in inconspicuous drooping racemes. Rehder gives its hardiness as Zone 5, but the original plants survived here for but a few years. It is probably no longer present in cultivation in this country.

#### *Fothergilla* L.

##### Reference:

Weaver, R. E., Jr. 1971. The *Fothergillas*. *Arnoldia* 31: 89-96.

The two known species of *Fothergilla*, occasionally called Witch Alders, are restricted in the wild to the southeastern United States.



*Disanthus cercidifolius*, taken from Curtis Botanical Magazine, vol. 143, plate 8716.



*Distylium racemosum*, taken from Curtis Botanical Magazine, vol. 160, plate 9501.

They are quite similar in appearance except for stature, and they are among the more desirable ornamentals in the Witch Hazel Family.

The flowers lack petals, the conspicuous parts being the twelve to thirty-two long, creamy-white, narrowly club-shaped staminal filaments. The individual flowers are tiny, but they are massed together into a dense, upright spike resembling a "bottle-brush." The bloom is often profuse in cultivated specimens, so a plant in full flower is quite showy. The flowers are strongly scented, but the odor is of a type that is somewhat unpleasant to some people, myself excepted. Autumn coloration is spectacular, varying from red and orange in some specimens to mostly yellow in others. Bloom and autumn coloration are good even in partial shade, and both species grow well on poor, dry soils.

#### KEY TO THE SPECIES OF *FOTHERGILLA*

- 1a. Flowers appearing with the leaves; leaves usually more than 2 inches broad, the margins toothed to near the base; spikes usually more than 1½ inches long; tall shrub, 3-10 feet tall at maturity ..... *F. major*.
- 1b. Flowers appearing before the leaves; leaves less than 2 inches broad, the margins toothed only above the middle; spikes less than 1½ inches long; low shrub, 1½-3 feet tall at maturity ..... *F. gardenii*.

#### *Fothergilla major* Lodd.

This, the more ornamental of the two species, is native to the southern Appalachians where it typically grows on dry, sunny ridges. In the wild it is generally a straggling, stoloniferous shrub, attaining a maximum size of 20 feet. In cultivation it forms a more compact plant. Two growth forms are prevalent; one more or less erect, the other spreading. These have been considered to be two distinct species, *Fothergilla major* being the upright type, in addition to having leaves which are glaucous beneath, and *F. monticola* Ashe being spreading with leaves which are green on both surfaces. Intensive studies of wild populations have convinced me that *F. monticola* is not a valid species or even a variety. The plants observed in the wild are mostly of spreading habit, with both green- and glaucous-leaved individuals growing side by side. Cultivated specimens are variable in other respects, including size of flowers and autumn coloration, but to date no clones have been selected and named as cultivars.

*Fothergilla major* blooms during the first half of May in New England, about the same time as the Redbuds, and the two planted together produce a most pleasing effect. The finest specimen at the Arnold Arboretum is planted just inside the Main Gate. This plant, 32 years old, is a shapely, rounded shrub 10 feet tall and about as broad. The species is perfectly hardy in Zone 5. It is available from



*Above: Flowering branches of Fothergilla major. Photo: D. Wyman.*

*Right: Foliage and nearly mature capsules of Fothergilla major. Photo: H. Howard.*

the following nurseries: Brimfield, Charles Fiore, Hollandia, Gulfstream, Panfield, Princeton, Weston.

*Fothergilla gardenii* Murr.

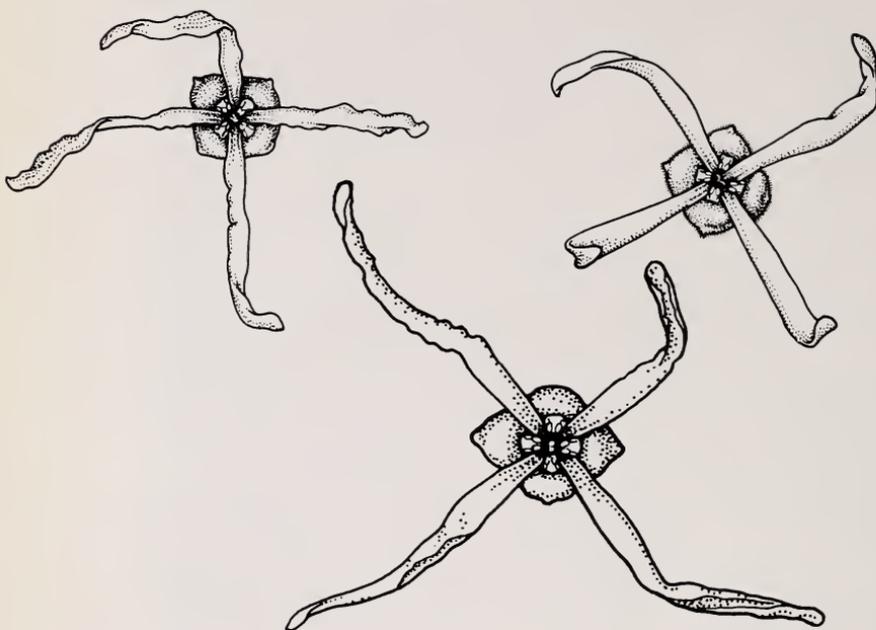
*F. alnifolia* L.f.

*F. parviflora* Kearney

Native to the margins of swamps and pocosins on the Atlantic and Gulf Coastal Plains from Virginia to Alabama, *Fothergilla gardenii* is far less frequently cultivated than its more spectacular relative. Although it is generally less graceful in habit and may not bloom so profusely, it possesses most of the ornamental qualities of *F. major*, except on a smaller scale. In cultivation it is seldom more than 3 feet tall. It is slightly less hardy than *F. major*, and the Arnold Arboretum has lost the species a number of times. The plants presently in our collections are still quite young; they are best observed on Bussey Hill near the Dove Tree.

As in *Fothergilla major*, glaucous-leaved forms of *F. gardenii* occur in the wild. One of these has been given the cultivar name 'Glaucophylla', but it is doubtfully in the trade at present. The species is available only from Hollandia (as *F. alnifolia*), and from Gerard K. Klyn.





Flowers of *Hamamelis* (twice life-size), showing the intermediate nature of *H. × intermedia* 'Arnold Promise' (upper right) compared with its parent species *H. mollis* (upper left) and *H. japonica* (cv. 'Flavo-purpurascens' below). These drawings were prepared by Robin Lefberg and were made possible by a grant from the Stanley Smith Horticultural Trust.

### *Hamamelis* L. Witch Hazel

#### References:

- Lancaster, R. 1970. Complete guide to *Hamamelis* — the Witch Hazels. *Gardeners Chronicle* 167 (21) 32-35; (23) 26-29; (24) 24-27.
- Peattie, D. C. 1966. A natural history of trees, ed. 2. Houghton Mifflin Co., Boston.
- Rehder, A. 1945. Notes on some cultivated trees and shrubs. *Journal of the Arnold Arboretum* 26: 67-78.
- Youngken, H. W. 1936. A textbook of pharmacognosy, ed. 4. P. Blakiston's Sons, Philadelphia.

The genus *Hamamelis*, the Witch Hazels, after which the family takes its name, consists of four or five species. Most of them are outstanding ornamentals still little appreciated by the American horticultural public. Even if they bloomed in the month of May, the

height of the flowering season for woody plants in New England, they would be well worth growing for their visually delicate, fragrant, spidery flowers. But the fact that the various species bloom from September through March makes them indispensable for northern gardeners who want a year-round display from their flowering shrubs.

The flowers of Witch Hazels are borne in tight, usually outward or downward facing clusters of three to six. The four petals, yellow, orange, bronzy, or reddish, are long and strap-shaped and unfold in a most unusual manner — similar to the uncoiling of fern fiddle-heads. It seems almost incredible that such delicate structures can withstand temperatures near 0° F. without damage. But they do this quite well, coiling up on very cold days and uncoiling in milder weather. Equally incredible is the fact that the individual flowers remain fresh for 6 weeks or more. The four sepals are often colored a deep wine red on the inside, presenting a pleasing contrast to the paler petals. They persist after the petals have fallen and are then decorative in their own right. Autumn coloration of the foliage is an added ornamental feature, the color varying from bright yellow to shades of orange and red.

The name "Witch Hazel" is of uncertain origin. Almost certainly the last part is due to the resemblance of the leaves to those of *Corylus*, the true Hazels. But the "witch" probably has nothing to do with those unsavory characters who ride on brooms or were burned at the stake in Salem. It is probably derived from the word *wych*, meaning "to bend," applied because of the tough, limber branches of the plants. Whether the "witching rods," which doubtfully bend toward underground water, or "Witch Hazel," their traditional source, came first is like the proverbial chicken and egg.

A preparation made from the leaves and bark of *Hamamelis virginiana* has long been a standard item in barber shops and bathrooms. Its astringent and antiseptic properties, however, are probably due to the alcohol in which it is extracted, but it does have a nice smell.

Witch Hazels prefer a deep rich soil, and partial shade. Given these conditions they generally live and bloom for many years. The following discussion of the species and cultivars of *Hamamelis* will be brief because of the existence of an excellent article on the subject by Roy Lancaster (cited above), Curator of the Hillier Gardens and Arboretum, Ampfield, England. These plants are much more popular in Europe than here, and many of the fine cultivars are not available in this country. In general, the cultivars here mentioned are those that are in the American nursery trade. All species and cultivars are hardy in Zone 5, with *H. virginiana* and probably *H. vernalis* also in Zone 4. Our collection here at the Arnold Arboretum is somewhat scattered, but the main concentrations are in the Center Street Area and around the moist depression occupied by *Leitneria floridana*, between the Buckeyes and the Tree Legumes.

KEY TO THE SPECIES OF *HAMAMELIS*

- 1a. Plants blooming from September through December ..... *H. virginiana*.  
 1b. Plants blooming from January through March ..... (2).  
 2a. Margins of the leaves with teeth to their base; leaves conspicuously hairy beneath into the summer, feeling soft and felty to the touch ..... (3).  
 2b. Margins of the leaves with teeth only in the upper two-thirds; leaves somewhat hairy beneath when unfolding, but soon becoming smooth ..... (4).  
 3a. Petals crinkled; flowers faintly fragrant ..... *H. × intermedia*.  
 3b. Petals not crinkled; flowers strongly fragrant ..... *H. mollis*.  
 4a. Petals short,  $\frac{1}{4}$ – $\frac{3}{8}$  inch long, not crinkled; densely branched shrub with strongly ascending branches ..... *H. vernalis*.  
 4b. Petals more than  $\frac{1}{2}$  inch long, crinkled; shrub or small tree with spreading branches ..... *H. japonica*.

*Hamamelis × intermedia* Rehd.

This is not a species at all, but rather a hybrid between the Chinese *Hamamelis mollis* and the Japanese *H. japonica*. It was first described from seedlings raised at the Arnold Arboretum in 1929. Seeds had been collected the previous year from the specimens of *H. mollis* on the grounds. None of the resulting plants turned out to be true *H. mollis*, but rather were intermediate between this species and *H. japonica*, also present in the Arboretum collections. Several of these plants are still alive. Only one of them, the celebrated 'Arnold Promise', was propagated and registered as a cultivar.

The plants of *Hamamelis × intermedia* in our collection are large shrubs with several strongly ascending trunks. They begin to bloom in mid- to late February and remain in good condition until the middle of March. Several outstanding cultivars are described below.

'Arnold Promise' — In good years, the original plant of this cultivar is a joy to behold. It is planted to the side of the Administration Building, right outside the window by my desk, and it never fails to lift my spirits during the dark days of February. It is certainly the best Witch Hazel at the Arnold Arboretum. The flowers have stiffly drooping, bright yellow petals and sepals which are mahogany inside. Although produced in abundance, they are only faintly fragrant. The original plant, after 47 years, is 17 feet tall with a spread of 18 feet. The cultivar is available from the following nurseries: Carroll, Hess, Herman Losely, Panfield, Princeton, Weston.

'Jelena' — This cultivar was originally raised in Belgium. The flowers are large, and the petals yellow suffused with copper. Our plants are still small, but they are most attractive. According to Lancaster, the cultivars 'Copper Beauty' and 'Orange Beauty' are identical to this. It is available from Hollandia and West Oregon.



*The original plant of Hamamelis 'Arnold Promise' beside the Administration Building at the Arnold Arboretum. As shown here, the flowers of this February-blooming plant are often covered with snow.*

'Ruby Glow' — Again of Belgian origin, this has the reddest flowers of any Witch Hazel available. The petals are medium red with a tinge of copper. It is often erroneously listed as a cultivar of *Hamamelis japonica*. It is available from the following nurseries: Charles Fiore, Hess, Hollandia, Tingle, West Oregon.

*Hamamelis japonica* Sieb. & Zucc.

This native of Japan is generally a large shrub or small tree, but the cultivar 'Arborea' may reach a height of nearly 40 feet. The flowers appear in late February at the Arnold Arboretum; they are finished about the same time as those of the *Hamamelis* × *intermedia* cultivars and therefore do not lengthen the period of bloom for the genus. The flowers are large and spidery with narrow petals, those in the type of the species being bright yellow. Although some of the European cultivars are apparently quite beautiful, the plants offered in this country are inferior to the *H.* × *intermedia* cultivars. The species is offered by Charles Fiore, and the cultivar 'Rubra' (probably the same as 'Flavo-purpurascens') with yellow petals suffused with red at the base, is available from Tingle Nursery.

*Hamamelis mollis* Oliv.

A native of Central China, this species was first introduced by Charles Maries and was later also collected by E. H. Wilson. Several of our plants originate from Wilson's collections. Although in England plants of this species are often of ascending habit, the specimens at the Arnold Arboretum are widely spreading shrubs or small trees. The largest specimen, a sparse shrub with two main trunks, is 11 feet tall with a spread of 30 feet. The flowers appear here about the middle to the end of January, and individually are the handsomest in the genus, in my opinion. The sepals are mahogany inside and the petals are broad, bright yellow, and not crinkled. The flowers have a strong fragrance, so strong as to be almost overpowering when kept in a small room. Our specimens are never as floriferous as is 'Arnold Promise'.

Following are some of the cultivars which are available:

'Brevipetala' — The flowers of this plant have shorter petals than those of the species, but they are packed in dense clusters. It has the unfortunate attribute of holding its dead leaves into the winter, thus somewhat obscuring the flowers. The plant is available from: Brimfield, Weston, Tingle.

'Superba' — This is probably not a genuine cultivar, but rather a collection of selected clones of the species. It is available from Weston Nurseries.

*Flowers of Witch Hazels — Twice life-size. Above: Hamamelis japonica 'Flavo-purpurascens', a cultivar of the Japanese Witch Hazel with petals that are red at the base. Below: Hamamelis × intermedia 'Jelena', a fine coppery-orange flowered plant. Photos: P. Chvany.*





*Flowering branch of Hamamelis vernalis, the Vernal or Ozark Witch Hazel (twice life-size). Photo: P. Chvany.*

'Pallida' — This is mentioned because it is supposedly one of the finest of all the Witch Hazels, as well as one of the most popular in Europe. The flowers are large, densely crowded, with bright yellow petals. It is not available in this country.

*Hamamelis vernalis* Sarg.

The Vernal or Ozark Witch Hazel is a native of the Ozark Mountains of Missouri, Arkansas and Oklahoma. It was originally described by Charles Sargent, the first Director of the Arnold Arboretum, and the type plant is still in our collections. This is the shrubbiest of the Witch Hazels, and also the one with the smallest flowers; unlike the others previously described, its autumn coloration is a clear yellow. The flowers, with short petals varying from pale orange to bronzy-red, are borne in great profusion and are strongly fragrant. They appear in January at the Arnold Arboretum, often during the first week of the month. Our mature specimens are immense; the 68-year-old plant by the parking lot of the Administration Building is a dense shrub 11 feet tall with a spread of 27 feet.

Alfred Rehder described a number of forms of this species, including f. *carnea*, with dark reddish petals, and f. *tomentella*, with leaves pale and pubescent beneath. The latter is available in the trade, as "*tomentosa*," from Tingle Nursery.

The species is rarely cultivated, but is a desirable plant. Its large size should not be a problem since it is easily restrained. It is available from the following nurseries: Brimfield, Cole, Charles Fiore, Greenbriar, Gulfstream, Lake Co., Princeton, Panfield, Tingle.

*Hamamelis virginiana* L.

This is the familiar Witch Hazel of eastern North America. It is a plant of the understory or the margin of forests from Canada to Georgia, and west to Nebraska. The pale yellow flowers open while the leaves are still green, and then are not conspicuous. As the leaves fall in October and November, the flowers become much more noticeable, and in good years this is a very attractive plant.

Plants in the wild are often sparse and straggling, but in cultivation form shapely large shrubs or small trees. At the Arnold Arboretum an old specimen, probably a spontaneous plant, is 20 feet tall with a spread of 34 feet. The largest of the numerous trunks is a foot in circumference.

A more southern plant with leaves that are more nearly lobed than toothed, and with flowers which appear in November, has been called a separate species, *Hamamelis macrophylla* Pursh. It is similar to *H. virginiana* in other respects, and is perhaps only a variety of that species.

*Hamamelis virginiana* is readily available in the trade. It is listed by the following nurseries: Charles Fiore, Cole, Forest, Greenbriar, Gulfstream, Herman Losely, Lake Co., Mellingers, Princeton, Panfield, Tingle.

**Liquidambar L. Sweet Gum**

## References:

- Collins, W. H. 1964. New trees in the trade. *American Nurseryman* 120 (3): 34.
- Peattie, D. C. 1966. *A natural history of trees*, ed. 2, Houghton Mifflin Co., Boston.
- Santamour, F. S. 1972. Interspecific hybridization in *Liquidambar*. *Forest Science* 18: 23-26.
- Ware, G. 1970. A sketch of the sweetgums. *Morton Arboretum Quarterly* 6 (1): 5-11.

Many readers will be surprised to find that this genus is a member of the Witch Hazel Family. With their palmately lobed leaves and fruits in spherical, spiny, pendent aggregates, the plants bear very little obvious resemblance to the Common Witch Hazel. A number of botanists are also skeptical about the inclusion of *Liquidambar* within the family. They would prefer to classify it and its close Asiatic relative in a separate family, the Altingiaceae. But detailed examination of the flowers and fruits of the Sweet Gums reveals many features basically similar to those of the other plants treated in this article. And Sweet Gum leaves are basically the same as those of *Disanthus*, except that they are lobed. But enough of taxonomy.

The genus *Liquidambar* consists of three species, widely separated geographically. All are handsome trees with maple-like leaves (but those of Maples are opposite) on long, slender petioles. The flowers appear with the leaves and are not decorative. They are borne in dense, spherical clusters, the "males" consisting almost entirely of stamens, in clusters of clusters, like an upright bunch of grapes. The "females" are usually in a solitary, drooping cluster.

The generic name, derived from the Latin *liquidus*, meaning "fluid," and the Arabic *ambar*, meaning "amber," alludes to the aromatic but bitter tasting gum which the trees exude. This substance has long been used by man, primarily as an incense or in perfumes, but also as a hopeful cure for a long series of ills. Historically derived from the Turkish species, *Liquidambar orientalis*, but present in the other species as well, the gum does appear to have some value as an expectorant and in the treatment of bronchial disorders. The aromatic principle is present in most parts of the plants, and the leaves and twigs are fragrant when crushed.

*A magnificent specimen of Liquidambar formosana var. monticola growing wild in China. Photo: E. H. Wilson.*



KEY TO THE SPECIES OF *LIQUIDAMBAR*

- 1a. Mature leaves with 3 lobes; fruit aggregates with long bristles between the capsules, appearing and feeling bristly rather than spiny; winter buds densely silky-hairy ..... *L. formosana*.
- 1b. Mature leaves with 5-7 lobes; fruit aggregates without bristles, appearing and feeling spiny; winter buds not hairy, except on the margins of the scales ..... (2).
- 2a. Main lobes of the leaves with smaller lobes near the apex; branchlets without corky ridges ..... *L. orientalis*.
- 2b. Main lobes of the leaves without secondary lobes; branchlets usually with conspicuous corky ridges ..... *L. styraciflua*.

*Liquidambar formosana* Hance

A native tree through much of central and southern China, as well as the island of Taiwan and parts of Southeast Asia, this species is rare in cultivation in the United States except in California. According to Rehder and Wilson in *Plantae Wilsonianae*, mature trees in the wild often form majestic specimens as much as 125 feet tall with straight trunks and a much-branched crown. The leaves turn red or chestnut-brown in the autumn, and remain on the tree into the winter.

A variety, *monticola*, of this species, discovered by Wilson and introduced by him, differs little from the species except that its young growth is glabrous. However, plants grown from this Wilson material are considerably hardier than others of the species. They succeed very well as far north as Philadelphia, a very fine specimen being among the plantings of the Arthur Hoyt Scott Horticultural Foundation on the campus of Swarthmore College. Unfortunately, the plants from Wilson's collection survived on the grounds of the Arnold Arboretum for less than 10 years; the few subsequent trials have also met with failure. Plants of *L. formosana* are offered by Boething Treeland and Central Nursery Co.

*Liquidambar orientalis* Mill.

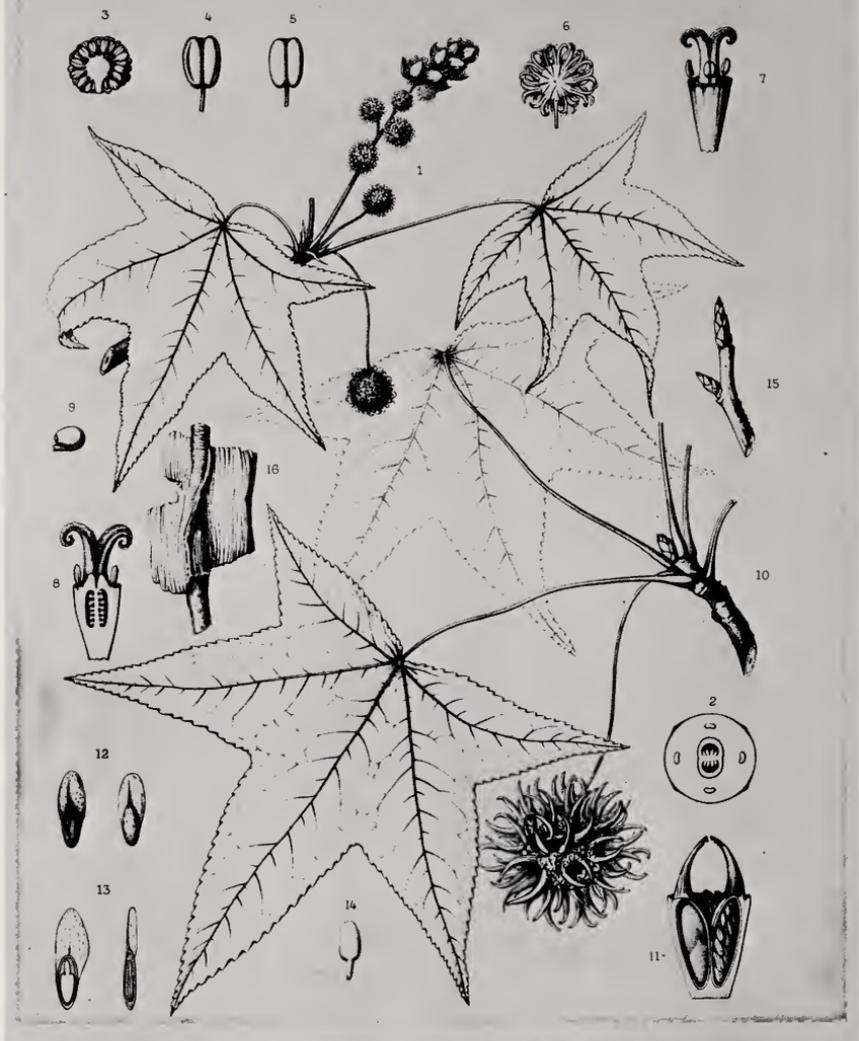
Even rarer in cultivation than the preceding species is this native of the mountains of Turkey. It is slow-growing in cultivation, usually forming a low, bushy tree. Rehder characterizes it as being hardy in Zone 6, and no specimen has lived for more than 9 years at the Arnold Arboretum.

*Liquidambar styraciflua* L.

The Sweet Gum is a native tree in the Ohio and Mississippi River valleys and in the Atlantic Coast states as far north as Long Island and western Connecticut. It typically is a plant of wet lowland forests where it reaches its greatest size. The largest specimen on record, in Richland Co., S.C. (American Forests, Jan. 1971), is 125 feet tall, its trunk more than 6 feet in diameter. However, in much



*A mature specimen of the American Sweet Gum, Liquidambar styraciflua. Photo: H. Howard.*



Detail of *Liquidambar styraciflua*. From Sargent, C. S. *The Silva of North America*, vol. 5, plate 199. Included are: flowering twig (1) with male inflorescences (upright), female inflorescence (pendent); cross-section of former (3); cross-section of latter (6); individual female flowers (7,8); seeds (12); corky ridges on twigs (16).

of the Southeast, Sweet Gum is almost a weed tree, growing commonly along roadsides and in old fields. It is a handsome and desirable tree in cultivation. Most everything about it is attractive: its fragrant, glossy, star-shaped leaves; its spiny, globe-shaped fruit aggregates, remaining on the tree into the winter and a favorite component of "cone wreaths" and other winter decorations; its bark, silvery when young but dark and deeply furrowed with age; its twigs, with their curious, corky ridges; its form, symmetrical and pyramidal when young, but eventually with a tall, rounded crown; its ease of culture and its freedom from pests; and perhaps best, its autumnal coloration. This last feature varies from individual to individual — sometimes a deep burgundy, sometimes a brighter red, but perhaps most commonly, a crazy-quilt pattern of colors from primrose to purple.

The Sweet Gum is one of a number of familiar plants of our eastern forests, including White pine (*Pinus strobus*) and Partridgeberry (*Mitchella repens*), which also occur in disjunct populations in the mountains of Mexico and Guatemala. I had forgotten that fact when, early in my graduate student days, I made a 3-month trip to Central America for course work and plant collecting. By the end of that summer I was anxious to get home, but I needed to stop in Mexico to collect a plant that was important to my research. I was also most anxious to see the great snow-covered volcanoes that lie on the eastern edge of the Valley of Mexico. Luckily, I had a collection locality near the base of one of these mountains, Citlaltépetl or the Pico de Orizaba. I arose early, and from my hotel window in the town of Orizaba I could see the very peak of the mountain over the buildings of the town. I caught a bus that I thought would take me close to my collecting site and the mountain. This time the mountain had priority, because tropical mountains have an annoying habit of covering themselves with clouds early in the day, not to reveal themselves again. I searched out a clearing in the forest, and there before me was the magnificent mountain, framed by, of all things, a Sweet Gum tree. One of my fondest memories to date is that morning — the Sweet Gum and the mountain, my feelings a mixture of awe, exhilaration, strangeness, familiarity and homesickness. But enough of nostalgia.

The Mexican Sweet Gums were the first of their species known to Europeans. The chronicler of Cortez' rape of the Aztecs reportedly recognized the smell of "liquidamber" in the tobacco which Montezuma offered the Spaniards (see the book by D.C. Peattie cited above).

The gum which is the source of "liquidamber" is still harvested from trees in the South and used as an aromatic in soaps, perfumes, and tobacco. According to Peattie, the bark of the trees is peeled off when the leaves have fully expanded. The gum gathers slowly and is scraped off, eventually to be heated and canned.

The wood of the Sweet Gum has become very important in cabinet-making. The heartwood, called Red Gum or Gumwood, has an attractive grain and a pinkish or ruddy color. All of the wood takes a high polish.

All in all, this plant is one of North America's finest trees. Several cultivars have recently been named. Short descriptions of these, with their commercial sources, follow.

'Aurea' — leaves striped and mottled with flecks of gold — Lake County Nursery.

'Burgundy' — at least in California, the leaves turning a uniform burgundy color later than other clones, and persisting on the tree into the winter — Cole, Monrovia.

'Festival' — fast growing, with an upright crown; leaves coloring yellow with tinges of peach — Cole, Monrovia.

'Gum Ball' — slow growing and bush-like — Forest Nursery.

'Palo Alto' — leaves changing simultaneously to a rich orange-red; tree with a uniform pyramidal crown — Cole, Lights, Monrovia, Peters & Wilson.

'Pendula' — habit erect, but with pendent branches — source unknown.

'Rotundiloba' — lobes of leaves rounded rather than pointed; primarily a curiosity — source unknown.

'Variegata' — leaves broad, mottled with yellow — Hess, Scanlon.

Dr. Frank Santamour, of the U.S. National Arboretum, has produced hybrids between all three of the species. These have not been distributed, and their ornamental possibilities are not known.

#### **Loropetalum chinense Oliv.**

##### References:

Creech, J. L. 1960. On the distribution of *Loropetalum chinense*. American Horticultural Magazine 39: 236.

Helmsley, W. B. 1904. *Loropetalum chinense*. Curtis Botanical Magazine 130: plate 7979.

Wilson, E. H. 1911. *Loropetalum chinense*. Horticulture 14: 799.

This plant, which has been called the Chinese Fringe Shrub, is closely related to *Hamamelis*, and the flowers of the two are similar in shape, size, and arrangement. Those of *Loropetalum*, however, have white petals. The two genera are amply distinct in additional features, particularly the foliage. The leaves of *Loropetalum chinense*, the only species known, are usually less than 2 inches long; they have fine, almost hairlike teeth along the margins, and they are evergreen, at least south of Washington, D.C.

Forming a twiggy shrub with horizontal branches, and growing to about 8 feet tall in cultivation with fragrant flowers appearing



*Loropetalum chinense*, taken from Curtis Botanical Magazine, vol. 130, plate 7979.

mostly in the late winter and early spring, but sporadically throughout the year, *Loropetalum chinense* would appear to be a most desirable plant for cultivation in the warmer parts of the United States. At present it appears to be grown mostly in California. None of the plants in cultivation is hardy north of Zone 7, or possibly Zone 6 with protection. The species is native to low elevations in the Khasia Hills of India, throughout much of southern China, and a single locality on the island of Honshu, Japan. It was introduced into cultivation by Charles Maries for the famous nursery of Veitch and Son in 1880 from a collection made in the vicinity of Chiukiang (Kiukiang) in the province of Chianghsi Sheng (Kiangsi), China (Wilson, E. H. 1913. *A Naturalist in Western China*, vol. 2, p. 3.). For years, all plants in cultivation were evidently grown from this material, and since the original collection site is less than 1000 feet elevation (at Latitude 30°N., approximately that of Jacksonville, Florida), they were tender even in most parts of England.

The species was generally grown as a tub plant set outside in the summer and wintered in a cool greenhouse where it would produce flowers from Christmas until March. Ernest Wilson wrote a short article for *Horticulture* (cited above) which outlined the procedure. Wilson also collected the plant in several localities in China, but it is not known whether or not he sent back seeds. At any rate, no plants of Wilson origin ever were displayed on the grounds here in Jamaica Plain.

More recently, plants have appeared in cultivation that are hardy as far north as Washington, D.C. and Baltimore. The original source of this material is not known, but most likely it is Japanese. At any rate, the Japanese plants would be hardier than any known from China or India, and they would show the most promise as the source of plants more amenable to wider culture in the United States.

*Loropetalum chinense* is available from: Hearn, Mitsch.

### **Parrotia persica** C. A. Mey.

#### References:

- Hooker, J. B. 1868. *Parrotia persica*. Curtis Botanical Magazine 94: plate 5744.  
 Mey, E. C. 1967. *Parrotia persica*. Gardeners Chronicle 162 (8): 7.

This species, again alone in its genus, is one of the largest members of the Witch Hazel Family that can be cultivated in the northern United States. Although the species is moderately slow-growing and under certain conditions is almost shrubby in habit, the specimen at the Arnold Arboretum in the Center Street Area is a magnificent tree — perhaps one of the finest specimen plants on the grounds. Started as a cutting from the Harvard Botanical Garden in 1881, it is now 55 feet tall with eight trunks, the largest of which is 3 1/2 feet in circumference. The total spread is 55 feet. Although they



Trunks of the fine specimen of *Parrotia persica* at the Arnold Arboretum, showing the exfoliating bark. Photo: H. Howard.

can be trained to grow with a single trunk, most cultivated specimens of this species in various parts of the world seem to have this multi-stemmed habit. However, Mr. Roy Lancaster reports that the trees that he observed in their native habitat, which is northern Iran and the Caucasus Mountains of the southern U.S.S.R., usually grow with a single trunk unbranched for a considerable distance.

The leaves of *Parrotia persica* are strongly reminiscent of those of *Hamamelis* with an uneven base and shallow but coarse, rounded teeth above the middle; sometimes the teeth are barely discernible, and the margin appears merely wavy. The autumn coloration of the foliage is one of the tree's attractions; it develops the brilliant blend of reds, oranges and yellows so typical of many members of the family.

The flowers are not particularly conspicuous. They appear before the leaves, in late April to early May at the Arnold Arboretum, and are borne in small clusters enclosed by several dark brown, hairy bracts. Petals and sepals are absent, the most conspicuous feature being the numerous, red anthers. Although our specimen rarely blooms profusely, specimens in England have been described as being a haze of red when in full bloom.



*Parrotia persica*, taken from Curtis Botanical Magazine, vol. 94, plate 5744.



*Parrotiopsis jacquemontiana*, taken from Curtis Botanical Magazine, vol. 122, plate 7501.

The bark of the tree and the forms of its trunks are perhaps the most ornamental features of *Parrotia*. The trunks are slightly ridged and tightly covered with a bark that exfoliates in a mottled pattern of shades of grey. These attributes are particularly effective when the tree is allowed to develop several trunks.

The species was apparently introduced into cultivation in the West from several plants sent from Leningrad (then St. Petersburg) to Kew around 1840. It is rare in cultivation in this country, which is a great shame since a well-grown specimen is magnificent indeed. Perfectly hardy in many parts of the country, it has a rating of Zone 5, according to Rehder, although it certainly could be grown in parts of Zone 4.

Hilliars' in England lists a form of this species, 'Pendula', with drooping branches, slow growth, and a maximum height of 10 feet. This clone is unavailable in the United States, but the species is listed by the following nurseries: Brimfield, Daubers, Gossler Farms, Hollandia, Hess, Tingle.

#### **Parrotiopsis jacquemontiana** (Decne.) Rehd.

##### Reference:

Hooker, J. D. 1896. *Parrotia jacquemontiana*. Curtis Botanical Magazine 122: plate 7501.

Again a plant little known in cultivation in the United States, this rather handsome species is related to *Fothergilla*, and was originally described as a member of that genus. It also has been classified as a species of *Parrotia*, although its resemblance to *Parrotia persica* is slight indeed.

The flowers appear before the leaves, in late April or early May in New England. They resemble those of *Fothergilla* in that they are without petals, and they are borne in dense head-like clusters, appearing as tufts of stamens. But unlike *Fothergilla*, the clusters are surrounded at the base by a series of white bracts, and the assemblage, which may be as much as 2 inches across, is similar to the inflorescence of the Flowering Dogwood (*Cornus florida*). The plant is attractive in flower, but unlike many members of the Witch Hazel Family, the coloration of the autumn foliage is not spectacular.

*Parrotiopsis jacquemontiana* is the only species of its genus. Native to the Himalayas and adjacent ranges in India, particularly Kashmir, Pakistan, and Afghanistan, it is locally abundant between 2800 and 9000 feet elevation, forming dense stands. Natives of the area use the tough, flexible twigs in wickerwork and for making rope that is used in the construction of crude suspension bridges. In cultivation in this country it forms a shrub or slender tree to about 20 feet tall.



Portion of a dried specimen of *Sinowilsonia henryi* showing an inflorescence of female flowers.

The plant was discovered in 1838, and was introduced into cultivation at the Royal Botanic Gardens, Kew, in 1879. The Arnold Arboretum received its first plants from Kew in 1910. These survived for 35 years, the longest period of time that we have been able to keep the species alive. Therefore, although Rehder, in his *Manual of Cultivated Trees and Shrubs*, lists it as being hardy in Zone 5, *Parrotiopsis* would require a sheltered position to do well in central New England. There are several specimens thriving at the Arnold Arboretum at present; one by the cold storage unit of the Dana Greenhouses, and another on Bussey Hill, but they have not yet attained flowering size.

Although perhaps more popular in Europe, *Parrotiopsis* is primarily grown in botanic gardens and arboreta in the United States. It is not commercially available in this country.

**Sinowilsonia henryi** Hemsl.

## Reference:

Helmsley, W. B. 1909. *Sinowilsonia henryi*. Hooker's Icones Plantarum 29: plate 2817.

The Latin name of this plant commemorates two indefatigable plant explorers, E. H. Wilson and Augustine Henry. The former introduced it into cultivation for the Arnold Arboretum from material collected in western Hupeh, China, in 1907. Seeds from this collection were distributed to various botanic gardens, and apparently were the ultimate source of all the plants presently in cultivation. The specimens at the Arnold Arboretum survived for about 25 years. Unsuccessful attempts have been made to re-establish the species from seeds obtained from the fine specimen at the Planting Fields Arboretum on Long Island. This plant, more than 20 feet tall with a trunk a foot in diameter, is probably the best specimen in North America.

Although not unattractive, *Sinowilsonia*, again a genus with a single known species, is mostly grown for its botanical interest. The foliage, resembling that of a Linden, is somewhat coarse and does not color well in the fall. The staminate ("male") and pistillate ("female") flowers are borne in separate catkin-like clusters on an individual plant in May and are not conspicuous.



*Sycopsis sinensis* Oliver

Of the five or so species of *Sycopsis*, all of them native to the Himalayas and China, this is the only one in cultivation. It is an attractive evergreen shrub, growing to about 8 feet tall in cultivation. The leaves are dull-textured, oval, narrow and pointed, sometimes with a few inconspicuous teeth along the margin. The flowers are somewhat similar to those of *Parrotia persica*; that is, surrounded by brownish bracts and conspicuous only because of the large reddish anthers. Rehder lists this plant as being hardy in Zone 7, and it does well in Washington, D.C. Plants have never survived here for more than a few years.

Although there are many more attractive broad-leaved evergreens, *Sycopsis sinensis* is worthy of more frequent cultivation. It is extremely rare in this country, but is offered by Hollandia Gardens.

## PROPAGATION

## References:

- Bailey, L. H. 1942. The standard cyclopedia of horticulture, ed. 4. Macmillan Co., New York.
- Fordham, A. J. 1971. The propagation of *Fothergilla*. *Arnoldia* 31: 256-259.
- Schopmeyer, C. S., ed. 1974. Seeds of woody plants in the United States. U.S.D.A. Handbook #450.

Little has been published on the propagation of the members of the Witch Hazel Family. The seeds of *Liquidambar* germinate readily after cold stratification for several months, but those of *Fothergilla* are doubly dormant and must be subjected to warm stratification (optimally for twelve months) followed by cold stratification. It is to be expected that most other members of the family should be treated like *Fothergilla*. Since the seeds of both *Hamamelis* and *Fothergilla* are forcefully ejected from the capsules at maturity, the capsules should be collected just as they are beginning to turn brown.

Layering appears to be an effective means of propagating several genera, particularly if it is done in the spring. Plants of many, such as *Fothergilla* and *Corylopsis*, are readily increased by division. Softwood cuttings of *Fothergilla* root readily, and the other genera are probably similar in this respect, but they have trouble surviving their first winter after transplanting. Therefore, the cutting flats should be moved intact into a cold-storage unit, without disturbing the cuttings, to induce dormancy.

Portion of a dried specimen of *Sycopsis sinensis* showing the conspicuous anthers and the dark brown bracts at the base of the inflorescence.

## ADDRESSES OF NURSERY SOURCES

- Boething Treeland Farms  
23475 Ventura Boulevard, Woodland Hills, California 91364  
Retail
- Brimfield Gardens Nursery  
245 Brimfield Road, Wethersfield, Connecticut 06109  
Retail
- Carroll Gardens  
East Main Street Ext., Westminster, Maryland 21157  
Retail and Wholesale
- Central Nursery Company  
2675 Johnson Avenue, San Luis Obispo, California 93401  
Wholesale
- Cole Nursery Company, Inc.  
30627 Orr Road, Circleville, Ohio 43113  
Wholesale
- Dauber's Nurseries  
1705 North George Street, Box 1746, York, Pennsylvania 17405  
Retail and Wholesale
- Forest Nursery Company  
Route 2, Box 118-A, McMinnville, Tennessee 37110  
Wholesale
- Gossler Farms Nursery  
1200 Weaver Road, Springfield, Oregon 97477  
Retail
- Greenbrier Farms Ltd.  
412 Thrasher Road, Chesapeake, Virginia 23320  
Wholesale
- Gulf Stream Nursery, Inc.  
Wachapreague, Virginia 23480  
Wholesale
- Hearn Nurseries  
Arcadia, California 91006
- Hess Nurseries, Inc.  
P.O. Box 326, Route 553, Cedarville, New Jersey 08311  
Wholesale
- Hollandia Gardens  
10725-39th Avenue N.E., Seattle, Washington 98125  
Wholesale
- Gerard K. Klyn, Inc.  
6784 Hopkins Road, Mentor, Ohio 44060  
Wholesale
- Lake County Nursery Exchange, Inc.  
Box 122, Route 84, Perry, Ohio 44081  
Wholesale
- Light's Landscape Nurserymen  
9153 East D Avenue, Richland, Michigan 49083  
Retail and Limited Wholesale
- Herman Losely & Son  
3410 Shepard Road, Perry, Ohio 44081  
Wholesale
- Malmö Wholesale Nurseries  
14900 Stone Avenue, Seattle, Washington 98133  
Wholesale

- Mellinger's, Inc.  
2310 West South Range, North Lima, Ohio 44452  
Retail  
Wholesale
- Mitsch Nursery  
Route 2, Box 34, Aurora, Oregon 97002  
Wholesale
- Monrovia Nursery Company  
P.O. Box Q, 18331 East Foothill Boulevard, Azusa, California 91702  
Wholesale
- Panfield Nurseries, Inc.  
322 Southdown Road, Huntington, New York 11743  
Retail and Wholesale
- Peters & Wilson Nursery  
East Millbrae Avenue & Rollins Road, Millbrae, California 94030
- Princeton Nurseries  
P.O. Box 191, Princeton, New Jersey 08540  
Wholesale
- Rosedale Nurseries  
Sawmill River Parkway, Hawthorne, New York 10532  
Retail
- Edward H. Scanlon & Associates, Inc.  
7621 Lewis Road, Olmstead Falls, Ohio 44138  
Wholesale
- F. W. Schumacher Co., Horticulturists  
Sandwich, Massachusetts 02563
- Select Nurseries  
12831 East Central Avenue, Brea, California 92621  
Wholesale
- The Tingle Nursery Company  
Pittsville, Maryland 21850  
Wholesale
- West Oregon Nursery  
3550 N. W. Saltzman Road, Portland, Oregon 97229
- Weston Nurseries  
East Main Street, Hopkinton, Massachusetts 01748  
Retail and Wholesale

# The Nikita Botanic Garden, Yalta, USSR

by RICHARD A. HOWARD

Following the International Botanical Congress held in Leningrad in July 1975, Mrs. Howard and I participated in a post-Congress tour to the Crimea, with headquarters in Yalta. The trip was arranged, as is all travel in the Soviet Union, by Intourist, and we were accompanied by an Intourist guide and twin girl interpreters selected by the Academy of Sciences. The girls, English teachers by profession, had received special instructions in botanical and horticultural vocabulary in anticipation of the Congress, and were pleasant, efficient, interested in our fields, and excellent representatives of the Soviet people.

In Yalta our group was met by Nikita Botanic Garden staff members who accompanied us for four days on bus tours to the Botanic Garden; on an exciting mountain trip through conservation lands to the taiga vegetation; to historic houses and gardens, such as those at Livadia Palace where Roosevelt, Churchill and Stalin signed the Yalta agreement; and through many agricultural areas of cereal grains, tobacco and stone fruits. It was an excellent tour, and perhaps the best of those offered by the Congress.

Fortunately we had preplanned our trip to fly from the Crimea to Kiev, instead of returning to Moscow before leaving the Soviet Union. Thus we had two extra days in Yalta, during which time we returned to the Nikita Botanic Garden for additional personal conversations with the director and the staff, and for closer examination of the facilities and collections. We enjoyed the hospitality extended to us and would like to repay the kindness in Boston, although such an opportunity seems unlikely as the Nikita staff does not travel abroad.

The majority of the botanical gardens in the Soviet Union are state-supported and, in their operation, effect a combination of the roles of agricultural experiment stations and botanical gardens in the United States. The purpose of the Nikita Botanic Garden, for example, is to assist the economy of the country, and the direction of the garden was described for us as "agrobotanical." However, of the gardens we saw, including those in Moscow, Leningrad and Kiev, it is the most attractive and best-maintained park for public use.



*Administration building of the Nikita Botanic Garden.*

A primary goal of most gardens is to improve the quality of useful plants, and to distribute as plants or seeds the better selections they produce to appropriate collective farms. The gardens are also repositories for varietal collections to be held as reserves or gene pools, and the economic plant collections are comprehensive. In a new awareness they seek to preserve, as well, the designated endangered species of the area. Colorful flower displays are much enjoyed, especially by the Russian visitors, and portions of every botanical garden are devoted to eye-catching plantings that receive the ultimate in maintenance. Rose gardens were most attractive during the period of our visit. Not one wilted rose was seen; nor were mulches, since the available labor force hoes and weeds continuously.

Northern gardens are open long hours during the extended periods of summer light, and visitors were in the gardens early and late. Baskets for litter were beside the numerous benches and at every path crossing, even though for several reasons litter is not a problem in the Soviet Union.

Most botanical gardens have a natural area, but in many cases these are not open to the public. Greenhouses for display and for propagation are numerous, but surprisingly ancient structures. The Main Botanical Garden, USSR Academy of Sciences, Moscow, has elaborate plans for large geodesic domes with acres of land under glass, but the funding is not yet available for construction. Some indoor collections were meticulously maintained, while others were deplorable as examples of horticultural skills. Statues of Lenin occupy conspicuous positions in every garden, while lesser political or historical figures may be in attractive niches. Display slogans, so common in cities, are pleasantly absent from the gardens. Geographic plots, found often in older European gardens, are exhibits in some Soviet gardens and frequently emphasize the phyto-geographic areas of the USSR.

Independent of the state-supported gardens are a few university-associated botanical gardens whose primary purpose is education. It is in these that the classical systematic beds are maintained as teaching aids.

A Soviet Council of Botanic Gardens is headed by the Main Botanical Garden, Moscow, and its director, Academician N. V. Tsitsin. The presidium of the Council meets two or three times a year to determine the general policy for each state-supported botanical garden, and has control of budget allocations to each area. There are also regional councils of botanical gardens to which the director may take his junior staff members for meetings.

The Nikita Botanic Garden was founded in 1811 by the Duke of Richelieu, a refugee from France during the rule of Napoleon, who became governor of the Crimea. He selected the site for the botanical garden and recommended the appointment of Christian Steven as the first director. His goal was to introduce all plants hardy to the area and, by distribution, stimulate the agriculture and forestry of the area. An assemblage of new fruit trees was achieved by 1817, and the Nikita Botanic Garden became the cradle of viticulture when the southern slopes of the Crimea proved excellent for the growing of grapes. Interestingly, the Nikita Botanic Garden won a special citation for an exhibit of wines at the Philadelphia Exposition of 1872, the year the Arnold Arboretum came into being. For timber trees, an expedition to North America introduced a large collection of conifers, and these introductions today are handsome specimen trees. A college of agriculture and horticulture was founded in 1869 by the garden staff. The publication program of the garden began in 1815, and is noted for its contribution of agricultural and horticultural notes, as well as for its *Flora of the Crimea*.

The Soviet Revolution, which began in Leningrad and centered its new government in Moscow, quickly had an effect in the Crimea. Under Communism the chief gardener became the new director, and



*An entrance to the garden. This has been reproduced on the decorative pins so popular in the Soviet Union.*

great changes were made in the administration and personnel relationships, although the direction of research was unchanged. The college of agriculture became independent of the garden. Research in the breeding and selection of ornamental herbs was introduced, and from this developed a major program on the culture of ethereal oil plants for perfumes. Satellite gardens were established where research was coordinated through the Nikita garden.

When the current director, Dr. M. A. Kochkin, was asked about the administrative organization of the Nikita Botanic Garden, he replied it was complicated and difficult to explain, and pointed to an intricate chart on the wall. The main garden at Yalta comprises 280 hectares, and a steppe and a maritime experimental area, respectively 480 and 200 hectares, total 960 hectares (2,372 acres); all are under his direction. He has two assistant directors who, in turn, supervise the work of 18 subdepartments; these include the



*A guided tour in the Nikita Botanic Garden. The ground cover is a weed-free bed of *Vinca minor*.*



areas of two seed laboratories, ornamental horticulture, floriculture, nut trees, industrial crops, entomology, phytological pathology, podology, climatology, scientific information, photography, printing, biochemistry, cytology, radiobiology, plant quarantine, library and herbarium. The labor staff is approximately 700 people. Student laborers at a given time average 100, and the research staff comprises 120, for a total of about 1,000 employees. Approximately two thirds of the staff are women, and a principle of equal pay for equal work is followed. All department heads are men, but the director admitted that the women do all the hard work; that we observed.

I asked the director a number of questions in our interview, and each was answered with the aid of the interpreters; but then each question was repeated to me for a comparison of our organization and experiences. Employees may or may not belong to the Communist party, but there is no union representing the employees. Each month every department head reports to the director on the progress in maintenance and research, on problems, and on the performance of employees. The outstanding workers may be recommended for a bonus, but this is supplementary income and an actual raise in pay is rare. A poor worker, or one with unexplained or unapproved absences, may be discharged. Attempts are made to place an employee in another position if he or she lacks a "green thumb" or proves inept in an assignment.

The professional staff may be graduates of a botanical institute and apply for open positions which are advertised in newspapers. College students may be assigned to summer work at the garden, and the Ministry of Higher Education decides what institutes need help and which students will be chosen. It was suggested to us that the students "obey the Ministry." When students graduate, the best are invited to accept employment.

Near Yalta is a vacation camp, called Artek, for outstanding elementary students throughout the Soviet Union. The Nikita staff visits the camp and explains the work of the garden; later groups of these children, immaculately uniformed, are given conducted tours of the garden. However, even while on vacation, the children have "working days," and these may be at the botanical garden.

The herbarium of the Nikita Botanic Garden is housed in a modern building, and the specimens are stored in wooden cases with attractive patterned veneer doors made of *Juglans regia*, the English walnut. The Englerian system is followed for families, but the genera are arranged alphabetically. Moth flakes are used as a fumigant, and specimens are affixed with cloth strips or sewed to

*An education exhibit open only to special groups. The balcony exhibit depicts the history of the garden. The lower floor illustrates the crops under study. Hands subtending a flower form the symbol of the Nikita Botanic Garden.*



the sheets. The herbarium was started in 1914 by Eugen Wulff. It was removed from the country by the German forces during World War II, but later recovered. Today it contains 107,000 specimens; about half of these are from the Crimea. Material is exchanged with other herbaria in Russia, and with organizations abroad. No staff member seems particularly interested in the taxonomy of cultivated plants.

The library is in the administration building and has one section for literature in the Cyrillic alphabet, and another section for foreign literature. Two catalogues are maintained, one in Cyrillic and one in the other languages. About 40 percent of the library represents foreign literature, which is obtained only by exchange or gift. The resident staff, we were told, could request books from publishers' lists, but the American literature familiar to me was not apparent. We were shown current issues of four journals, *Botanical Review*, *Phytopathology*, *Genetics*, and the *Journal of Heredity*, which were photocopies prepared in the Soviet Union.

The garden itself has several entrances, and a small admission fee is charged, although a group of children appeared to be admitted without charge. This group, and others we saw, were supervised in their tour. Although we could not understand the comments, the guides (employees of the garden), talked freely in reference to plants. Individual family groups also were enjoying the garden, but without guides.

The garden is on a steep hillside with excellent views of the Black Sea. The paths are exceptionally wide, and the concrete steps between levels are arresting to the eye and contrast to the well-designed, gently sloping paths. All plants appear to be well labeled with scientific and common names, and the Latin was welcome to this visitor. Descriptive labels, some very large and complicated, are numerous, and often include the geographic origin. A large, 35-foot specimen of *Metasequoia*, the dawn redwood, an Arnold Arboretum introduction to cultivation, attracted my attention, and I was told this was an original garden introduction from China in 1952. Although this specimen was sterile, the younger plants we saw were, we were told, grown from seed obtained when plants were kept pot-bound in the greenhouse.

Although the garden has had few American professional botanists as visitors, Mrs. Howard and I were cordially welcomed. We met with seven department heads in a Board Room, at a table set for us with place mats, china and silver, water goblets and wine glasses, bowls of fruit and flowers. Each staff member described his re-

Above: Perennial plant area of the Nikita Botanic Garden with central pool for aquatic plants.

Below: Broad paths meticulously maintained traverse the garden. The palms, yuccas, and succulents suggest the subtropical environment.

search briefly. At intervals they asked questions of us. The pomologist was proud of the variety of peaches, plums, apricots and almonds offered to us, and we had to sample each type. Fruits which were out of season came into the discussion at one point, and suddenly pint canning jars of preserved fruits were brought to the table to be opened and sampled. The wines of the area were evaluated, and the best offered for our enjoyment. Chocolates and sweet cookies were passed many times. I had to report that visitors do not receive such hospitality at the Arnold Arboretum.

*(All photographs in this article are by the author.)*

# *Liriodendron tulipifera* - Its Early Uses

by MARGO W. REYNOLDS

Colonial America was spawned in the forest and it was to the forest the early settlers turned for nearly all their necessities. Each successive group of English settlers to land upon North American soil must have gazed in wonder at the vast primeval wooded areas that stretched before it, their boundaries apparently limitless. It was a very different world from the one the immigrants had left behind, for the England of the late 16th and early 17th centuries was in the throes of a severe timber crisis. Wood was in short supply throughout Great Britain and large areas of forest were rapidly turning into countryside and fields.

Great Britain had shown little interest in the New World in the hundred years following Columbus' discovery. However, with their own forest reserves rapidly dwindling away in the late 1600's, there was sudden impetus to exploit America's untapped wilderness. In 1584, the English geographer, Richard Hakluyt, proposed a scheme for colonization. As he envisioned it, according to Charles Carroll, "men from the treeless English countryside would settle in the forests, set up sawmills, and produce boards for English craftsmen."

Once the operations were set up, craftsmen would begin making pipe staves, bows, "targets of Elme and tough wood, for use against the darts and arrowes of Salvages [and] spades like those of Devonshire, and of other sorts, and shovels from time to time for common use." It was some time, however, before this vision became a reality. There were very few craftsmen among the first settlers and most communities fashioned dwellings and the necessary tools and utensils as best they could. For the most part they were crude but serviceable.

Pine, oak, walnut, butternut, and chestnut were among the preferred woods for colonial furniture making and sundry other purposes, but another wood, less known, served the colonists reliably and well and continues to be of value even today. I refer, of course, to the native American tulip tree, *Liriodendron tulipifera*.

The tulip tree has scarcely any equals in the world of trees. Once seen it is rarely forgotten. Few other specimens can approach it in magnificence, overall beauty or sheer size. Few other trees masquerade under such a variety of common names, either. To the American Indians it was always known as canoe wood, owing to its



*Mature specimen of Liriodendron tulipifera showing stately habit.*

extensive use in the manufacture of their dugout canoes. At various other times it has been called poplar, tulip poplar, Virginia poplar and saddle tree. Whitewood, canary whitewood, Canadian whitewood, yellow poplar and yellowwood all are monikers that refer to the color of the interior wood; depending upon the type of soil in which it is grown, the wood color varies considerably from yellow to a very pale white. No matter what its name, it has, from colonial times onward, proven to be a timber tree of great commercial and utilitarian value.

Several properties have combined to make the tulip tree adaptable for a number of commercial uses. As a wood, it does not easily warp or split and it has a close, fine, uniform grain that is much admired. It is light, elastic and easy to work and so has long been used for carved articles. Tulip wood takes both paint and varnish well and exhibits no odor. This latter property made it ideal for use by the colonists as a container for butter, cheese, lard and other foodstuffs that easily become tainted by external odors.

All manner of other containers also utilized this very adaptable wood. These ranged in size from tiny pillboxes to berry baskets to good-sized tobacco hogsheads. It was a favorite substitute for the more expensive cedar in cigar boxes. Also common throughout the colonies were Bible boxes. Treasured items in the colonial home, these items were often richly carved and ornamented, as befitted a repository for the family's most cherished possession. Colonial boxes such as these are currently quite valuable and much in demand by antique collectors.

The building trade relied on the tulip tree as well. From shingles and clapboards to joists and beams, its wood was a valuable timber in the construction of colonial dwellings. Even the Southern homes, which were generally of brick and in the Georgian style, made use of it in their interiors. For carved moldings, borders and inlays it enjoyed great popularity.

In 1856 a machine that turned nests of trays was invented, and in 1899 a wooden bowl-turning machine appeared on the market. As a result, lathe-turned woodenware for the mass market suddenly became very popular. Tulip, maple, boxwood and lignum vitae were the primary woods employed in the production of such utensils as scoops, spoons, rolling pins, wooden measuring cups and a multitude of assorted kitchen items and small children's toys.

Cherry, mahogany, maple and walnut were the most highly prized woods for fine furniture of high quality, but tulip was commonly used in the manufacture of everyday furniture. One often finds tulip wood used in the legless chests that were so much a part of the colonial home, particularly in Connecticut. Curiously enough, it was usually only the front panel that was made of tulip wood. The frame and other panels were generally made of pine or oak.



*Close-up of Liriodendron tulipifera inflorescence. Photo: P. Chvany.*

No doubt there are two reasons to explain this rather curious use of *Liriodendron* for a single panel only. First of all, it is easily carved and so was a good subject for the ornamentation that was commonly sculpted on the front panel. In addition, tulip wood receives paint well. Painted chests represented nearly the only color in an otherwise drab colonial life and were often very richly decorated. Oak and pine insured that the chests were strong and durable while the tulip wood allowed successful carving and painting; not surprisingly, one of the most popular designs employed on these tulip wood chests was a tulip flower motif.

In addition to the wood, the tree and root bark was of value as well. It has a bitter, pungent taste and when powdered was used

as a tonic or stimulant for chronic arthritis. Not infrequently, it was given to horses as a cure for worms.

Indigenous to North America, the tulip was one of the many new species to greet the Old World explorers upon their arrival in America. *Liriodendron tulipifera* is one of two species of *Liriodendron* in the Magnolia family and enjoys a range that extends from Massachusetts and central New York and Michigan south to northern Florida. Its western boundaries extend as far as Illinois, Mississippi and Arkansas. It reaches its greatest proportions, however, in the lower Ohio valley and in the southern Appalachian mountains.

Under optimum conditions, which include a deep, loose, well-drained soil that is primarily fertile loam, tulip trees have been known to reach heights of 200 feet. What makes these trees so striking is the almost ramrod straightness of the trunk and the fact that they are almost devoid of branches for the first 40 feet or so. Until the trunk exceeds 7 or 8 inches in diameter, it is smooth and even; as the tree grows older the bark becomes deeply furrowed and quite attractive.

Above all, the tulip tree is a highly individual tree. Its leaves have the singular distinction of not really resembling any other leaf in appearance. Once seen, tulip tree leaves are quite impossible to forget. They somewhat resemble the maple leaf, with a lobe on each side, but instead of coming to a point at the tip, they look as though they had been cut off abruptly.

Unfortunately, the unusually lovely and distinctive flowers grow too high to be seen well from ground level. It is the appearance of the flowers that actually gives the tree its most common name, for they closely resemble the garden tulip in form. The large greenish-yellow flowers are marked with orange and often are nearly  $2\frac{1}{2}$  inches long.

The flowers persist quite some time and when they at last go by they are followed by pointed, conelike seed heads which stand upright and regal on the branches. In addition to the appearance of the unusual fruits, fall brings a vibrant touch of color to the tulip tree. It becomes suffused with a delicate yellow overall, making it one of the more visible autumn specimens.

Aside from its many commercial uses, *Liriodendron tulipifera* has long enjoyed popularity as an ornamental of great merit. Where it has the advantage of a lot of open space, it grows to be a handsome tree. Increasingly, it is being used in street plantings and as an impressive shade tree in parks, cemeteries and other public grounds.

Because of its grand proportions and majestic appearance, the tulip tree came to be known as the "tree of liberty" during the Revolutionary War period. Throughout the colonies, cities and towns planted the tulip as a symbol of their quest for independence. As the nation celebrates its 200th anniversary, the Arnold Arboretum



*Characteristic foliage of Liriodendron tulipifera. Photo: P. Chvany.*

is marking the occasion by distributing small tulip trees to cities and towns throughout the state of Massachusetts. What better way to commemorate America's 200th birthday than by planting living reminders of its strength and growth? No tree is more indicative of this than the stately, elegant tulip tree.

# Arnoldia Reviews

**Bibliography of Books and Pamphlets on the History of Agriculture in the United States . . . 1607-1967.** John T. Schlebecker. Santa Barbara, Calif.: ABC-Clio Press. 1969. 183 pages. \$5.50 paperback.

This comprehensive volume is the first major compilation of works relating to the history of agriculture to be published since 1930. As the author states in the introduction, "71% of the titles (in this book) have appeared since 1930, 41% since 1950, and 7.7% . . . since 1965." This book, then, represents a significant updating and offers much of value to the historical researcher.

In order to avoid frequent repetition of each work, a topical breakdown has been abandoned in favor of an alphabetical listing by principal author. An 81-page index listing entries by author, subject and title facilitates the search for a particular work. Brief annotations are provided for those works whose titles are not self-explanatory. All in all, a welcome reference book that ought to prove most useful to sociologists, historians and economists as well as agriculturists.

MARGO W. REYNOLDS

**Trees of the World.** Sandra Holmes. New York: Bantam Nature Guide, Ridge Press. 1974. 159 pages, illustrated. \$1.95.

**Flowers of the World.** Sandra Holmes. New York: Bantam Nature Guide, Ridge Press. 1974. 159 pages, illustrated. \$1.95.

Two remarkably satisfying books for casual reading. Paperback and reasonably priced, the volumes are well illustrated with good color reproduction. *Flowers of the World* is a miscellany of photographs arranged in family groups, these alphabetically. *Trees of the World* has the contents arranged in groupings of conifers, palms, hardwoods, food trees, spice trees, beverage trees, drug trees, other useful trees, ornamentals and unusual trees. Descriptive material is brief but generally accurate. Either book will lift your spirits if you like plants.

RICHARD A. HOWARD

**Plants in the Development of Modern Medicine.** Tony Swain, editor. Cambridge: Harvard University Press. 1972. 367 pages. \$12.50.

This book is a reprint of papers presented at a symposium held in Cambridge, Massachusetts, in 1968. It offers a rapid summary of what is known of plants and plant extracts active in human physiology, as seen from the points of view of anthropologists, phytochemists, biologists and others devoted to drug research. Men have always been experimenting with the effects, whether good or bad, of the plants that grow around us.

Many of the plants that have been consumed, or smoked, or poked into various orifices of the body have been shown to have no effect whatever, but it has slowly been established that others do certainly contain active principles that can change body metabolism.

The discovery and development of penicillin set off an explosion of search for other products of molds, algae, bacteriae and higher plants that might be of use to man in fighting diseases. Thousands of species have been studied but probably these comprise no more than five percent of the plants that still remain to be investigated.

The study of the old Calabar ordeal bean is a fascinating story. This legume grows near the mouth of the Niger river in Nigeria and for many generations of Nigerians it was a convenient method of execution. The victim was caused to swallow a suspension of five or six beans ground up in a little water. If he promptly vomited up the mix, he was deemed to be innocent of all charges. But usually it stayed down too long and he died quite promptly. Analysis of this bean has yielded physostigmine, a very potent alkaloid that is now used to relieve the symptoms of myasthenia gravis.

This book is not light reading. Much of it is highly technical and not easily followed except by specialists, but it is a book which should not be overlooked by any serious student of plants in relation to human physiology.

ALLEN BRAILEY

**Vegetables in South-East Asia.** G. A. C. Herklots. New York: Hafner Press, Macmillan Publishing Co. 1972. 525 pages, 159 drawings. £3.75.

In the preface Dr. Herklots states, "In recent years several practical books have been written on the cultivation of vegetables in the tropics. Is there any justification for yet another?" He continues, "I think so, for in the books I have seen there is little about the tropics of South-East Asia where vegetables are so essential in the diet." Better justification is found in the Introduction. "My object is not to instruct the gardeners of Asia in the art of growing familiar Asiatic vegetables — they know more than I shall ever hope to learn. It is to collect and collate some of the knowledge available in the scientific literature, but not generally accessible to the gardener, in the hope that new ideas may emerge and other crops may be tried." Although the author fails to cite Ochse et al., *Tropical and Subtropical Agriculture* (1961) or Pursglove's *Tropical Crops, Dicotyledons 1 and 2* (1968) he has compiled an interesting and useful volume for anyone interested in tropical vegetables, involved in a course in economic botany, or attempting to identify the vegetables in a Chinese market.

The first portion of this volume concerns the culture of tropical vegetables. There follow chapters on salads, spinaches and other greens; cabbages; beans and peas; cucurbits; bulbs, roots and tubers; and market vegetables. Both major and minor crops are discussed. The correlation of scientific names and local names in English and Chinese is particularly valuable.

The author has sampled the product or observed its preparation in most cases. For the botanist who has only read that *Trapa*, *Lagenaria*, *Psophocarpus*, *Chrysanthemum* and similar plants are "edible," this volume has the answer to "how." The illustrations are particularly useful in the identification of the many varieties of *Brassica*, beans and cucurbits.

RICHARD A. HOWARD

**A Flora of Essex County, Massachusetts.** Stuart K. Harris. Massachusetts: Peabody Museum, Salem. 1975. 269 pages. \$12.50.

Local floras are a labor of love. Their usefulness is generally to local botanically interested individuals, to a college department of botany or local school for teaching purposes, or for details of local geographical distribution of plants. Essex County, north of Boston, represents the northeast corner of Massachusetts. This glaciated area, once heavily cultivated, has interesting pockets of vegetation ranging from coastal marshes to inland quaking bogs. Historic seaports and dumps and ballast areas have been intriguing collecting areas for novelties in the plant world. Nature reserves in Essex County are well-known to ornithologists. This flora, without keys or descriptions, concerns only the native or escaped vegetation and must be used in conjunction with *Gray's Manual of Botany*, 8th. edition, on which the nomenclature is based. An appendix correlates the taxa listed with illustrations in the *Weeds and Wildflowers of Eastern North America* published also by the Peabody Museum of Salem.

Stuart Harris, professor of biology at Boston University, was asked to prepare this volume in 1951. For over 18 years he collected specimens now preserved in the New England Botanical Club. Unfortunately, he died before completing the manuscript; thus the introductory portions have been contributed by his friends. The volume is a fitting memorial and a tribute to his scholarship.

RICHARD A. HOWARD

**The Ivy Book.** Suzanne Warner Pierot. New York: Macmillan. 1974. 164 pages, illustrated. \$4.95.

The first book on ivy in 100 years, this small volume updates nomenclature and describes new cultivars, as well as old favorites. Over 60 indoor and outdoor ivies are included, with notes on general culture and specialized uses in landscaping and indoor topiary.

Unfortunately, the close-up photographs, many of which are not identified, do little to amplify the text which separates ivies into nine categories, primarily on the basis of appearance.

Ms. Pierot is the founder and president emeritus of the American Ivy Society; her modest book should produce many enthusiasts and boost membership considerably.

JEANNE S. WADLEIGH

**Trees for Your Garden.** Roy Lancaster. New York: Charles Scribner's Sons. 1975. 147 pages, illustrated in color. \$8.95.

**Shrubs for Your Garden.** Peter Seabrook. New York: Charles Scribner's Sons. 1975. 144 pages, illustrated in color. \$8.95.

**Conifers for Your Garden.** Adrian Bloom. New York: Charles Scribner's Sons. 1975. 146 pages, illustrated in color. \$8.95.

**Perennials for Your Garden.** Alan Bloom. New York: Charles Scribner's Sons. 1975. 144 pages, illustrated in color. \$8.95.

One will be envious of the British gardens and plants pictured in these spectacular volumes. The text, pictures, publication style and price are a credit to the authors and the publisher. As so often happens in these American editions, the species and varieties mentioned are not available locally or do not do well in the more diverse climates of the United States. By contrast some of our best, such as *Cornus florida*, does not grow well in the British Isles and so is not mentioned. Excellent cultural infor-

mation and directions supplied in each volume and the taxa considered are listed alphabetically for easy reference.

RICHARD A. HOWARD

**Traveler in a Vanished Landscape** — The Life and Times of David Douglas, Botanical Explorer. William Morwood. New York: Clarkson N. Potter, Inc. 1973. 244 pages, illustrated. \$7.95.

"In almost every category of plants to be found between Alaska and the Mexican Border there is at least one species named for Douglas . . ."

Although Morwood does not overlook the measure of Douglas's contribution (the book contains sketches of many of the plants Douglas introduced into cultivation), he dwells more on the human aspects of his career. In 1820 Prof. William J. Hooker of Glasgow University recommended this young Scotsman, who stood out above his fellow trainees, to the Horticultural Society of London. The Society was looking for a talented and steadfast collector to send to the North American West, the horticultural treasures of which had been reported by the recent Lewis and Clark Expedition.

Talented Douglas was, and industrious beyond description, but steadfast he was not. This arresting tale takes an emotionally driven man up and down the West Coast and Coastal Mountains of North America, and finally to Hawaii where he died under extraordinary circumstances in 1834 at the age of 35. It gives a vivid picture of the operation and personalities of the Hudson's Bay Company under whose auspices Douglas travelled. It tells of the Indians, who called Douglas "grassman"; of the Mexicans and Spanish in Monterey, where he was called "Don David El Botanico"; of Dr. Menzies, who had accompanied Vancouver 30 years before; of Banks; of Nuttall; of Lindley; of Coulter; of McKenzie; and of others who brightened the stage of those years. It is good biography and great reading.

RICHARD WARREN

**Introduction to Insect Pest Management.** Robert L. Metcalf and William Luckmann. New York: John Wiley and Sons. 1975. 570 pages. \$19.95.

A text for researchers and students of applied entomology, this book delineates ecologically oriented pest control using a total systems approach that combines biological, natural and chemical control factors to minimize effects on the environment and prevent economic damage. Many of these principles are best applied to wide area pest management such as one to several counties, states, or a region. Many are too complicated for practical application in a small garden or the usual home grounds.

The seventeen authors and contributors cover the concepts in the broad field of pest control management from the basic idea of using all favorable factors to aid in managing pest populations, the ecological aspects and the economics thereof. The tactics from plant resistance, parasitoids and predators, diseases, insecticides, attractants, repellents and genetic control are discussed at length as are the strategies of sampling and measuring, analysis and modeling. Examples discussed in detail are cotton insect pests, forage crop insects, fruit tree pests and insects of man and domesticated animals.

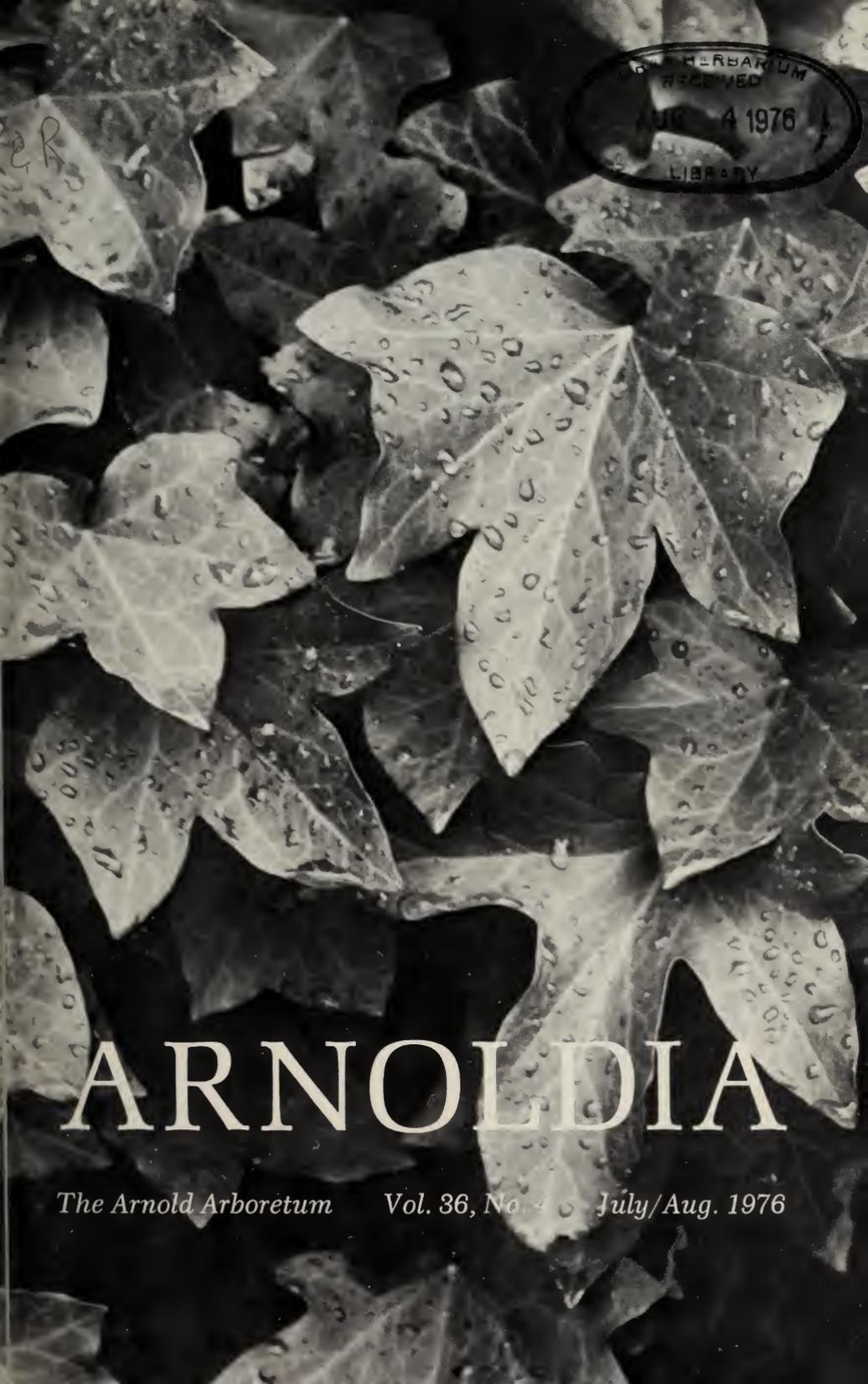
To many to whom these concepts are new, the vision of future pest management that these authors advocate will seem unduly complicated; but for readers with scientific training and interest, the book is well worthwhile.

ROBERT G. WILLIAMS



*Kolkwitzia amabilis*, an Arnold Arboretum introduction. Photo: P. Chvany.

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Cover: *Hedera helix*. Photo: P. Chvany.

# Some Old and New Interspecific Magnolia Hybrids

by STEPHEN A. SPONGBERG

In 1820, John Sims described a new variety of the native American sweet-bay, *Magnolia virginiana*, and presented an illustration of the new plant in Curtis's Botanical Magazine under t. 2164 (Figure 1). Sims named the plant var. *major* due to the larger size of its leaves and flowers, and in a brief discussion he suggested that the plant was similar in several respects to *M. tripetala*, the umbrella-tree, another American species. The plant on which Sims based his new variety was growing and flowering in the nursery of Archibald Thompson (sometimes spelled Thomson) at Mile End, near London, and had been grown from seed collected by Thompson in 1808 from a plant of *M. virginiana* growing in his nursery. Thompson also grew *M. tripetala*, and the intermediate appearance of the new plant obviously suggested that it might be a hybrid or "mule" between the two American species.

Despite this circumstantial evidence and the intermediate appearance of the plant, the English horticulturist J. C. Loudon, in 1838, persisted in considering it as a large-flowered variety of *Magnolia virginiana*. However, he referred to the plant as var. *Thompsoniana*, since Thompson had been distributing propagated plants under that name. Finally, in 1876, C. de Vos was convinced that the plant represented a hybrid between *M. virginiana* and *M. tripetala*, and, as a result, he gave it a species name, *M. × Thompsoniana*. Only recently, however, has the hybrid status of *M. × Thompsoniana* been proven more or less conclusively. Dr. J. C. McDaniel, a noted authority on Magnolias at the University of Illinois, has made deliberate cross-pollinations between the two suspected parental species and obtained viable seed. Plants he has grown from this seed in Illinois are almost identical with the plant Sims described as var. *major*, and photographs of McDaniel's plants in flower match the illustration in the Botanical Magazine.

It may seem somewhat ironic that *Magnolia × Thompsoniana*, a hybrid between two American species of *Magnolia* and the first *Magnolia* hybrid to be suspected and described, originated across the Atlantic in the nursery of an English plantsman. An important as-



Figure 1. *Magnolia* × *Thompsoniana* as it was illustrated in Curtis's *Botanical Magazine*, t. 2164, in the year 1820.

pect of the origin of *M.* × *Thompsoniana*, however, is the fact that the two parental species were growing in close proximity to one another *in cultivation*. Unlike species of numerous genera of flowering plants that are known or strongly suspected to hybridize freely in nature, I know of no reports of *Magnolias* that are considered to represent hybrids that have arisen in nature. More than likely, the absence of natural hybrids in the genus is due to the fact that within any geographical region where species of *Magnolia* occur in the native flora,

the different species occupy different habitats or have developed other barriers to hybridization, such as different blooming periods or genetic blocks that prevent fertilization or that result in inviable hybrid seed.

However, once the ornamental value of *Magnolias* was recognized and gardeners and horticulturists began to assemble collections of these desirable trees and shrubs, the natural barriers of habitat and geography were no longer present, and several spontaneous hybrids have originated in gardens, while horticulturists, anxious to combine characters of one species with those of another, have aided the process with paint brush, forceps, and paper bags.

That species often hybridize in gardens and arboreta is a well known fact, and many of the most highly prized woody ornamentals have originated in cultivation by means of interspecific hybridization. One only need to bring to mind *Daphne* × *Burkwoodii*, *Hamamelis* × *intermedia*, *Platanus* × *acerifolia*, *Rhododendron* PJM hybrids as well as a multitude of other *Rhododendron* hybrids, the large and popular group of hybrid-tea roses, and numerous other examples to realize the importance of interspecific hybridization to modern horticulture. Some extreme examples of hybridization are found in the orchid family where a particular hybrid plant may be the result of a series of crosses that eventually involved species of as many as five different genera. But the object of this article is to discuss briefly and call attention to some of the older and newer hybrids in the genus *Magnolia*.

Before discussing these *Magnolia* hybrids, however, a few comments concerning hybrids in general are appropriate since the terminology surrounding hybrids is potentially confusing. While geneticists may use the term hybrid interchangeably, they usually use it to refer to the progeny that result when any two genetically different organisms are mated sexually. Genetic hybrids can be produced between individuals of the same or different taxa. As an example, the plants resulting from the natural process of reproduction through cross-pollination and seed formation would, to the geneticist, constitute hybrids, since the new plants are genetically different from the two parental plants. In contrast, offspring resulting from self-pollination or matings of genetically identical individuals would constitute non-hybrids or "pure lines."

To the taxonomist and horticulturist concerned with woody ornamentals, plant hybrids consist of offspring resulting from the sexual union of plants belonging to different taxa, and this is the sense in which the term is used in this paper. Thus, *Magnolia* × *Thompsoniana* is an interspecific hybrid because the two parental taxa, *M. virginiana* and *M. tripetala*, belong to different species. Hybrids between two different varieties of the same species, or between a subspecies and a variety of the same species, are referred to as intraspecific hybrids. If

breeding is carried out within a single taxon, such as cross-pollinations between red- and white-flowered plants of the same species or variety to produce a desired pink-flowered plant, the resulting plants are usually referred to as "crosses."

The names that apply to hybrids can also be rather confusing, inasmuch as some have received species names, while others are known by a formula name, and many others of horticultural importance are known chiefly by cultivar names. In general practice, taxonomists refer to interspecific hybrids by a formula that consists of the names of the two parental species linked by the sign of multiplication. The sign of multiplication is used to indicate the hybrid nature of the group, and if it can be determined, the name of the seed parent is given first. Therefore, the *Magnolia* that originated in Thompson's Mile End nursery could be assigned to *M. virginiana* × *M. tripetala* (or more usually as *M. virginiana* × *tripetala*). But, provision is made in the Code of Botanical Nomenclature for giving a hybrid a less cumbersome species, subspecies, or varietal name if, for ease of communication, one is merited. In that case, as in *M. × Thompsoniana*, the generic name and the species epithet (the "*Thompsoniana*" part of the species name) are linked by the sign of multiplication, again to indicate the hybrid nature of the plants. A species name has the advantage of being more easily remembered, yet the formula name has the advantage of indicating the parental species of the hybrid group. If the hybrids are the result of intraspecific cross-pollinations, the group can be recognized as a variety or subspecies, but the rank given the group can be no higher than the highest ranking parental taxon, and the connecting × is not used. Obviously, hybrids between different varieties of the same species can also be indicated by a formula name.

Another provision of the Code of Botanical Nomenclature states that once a botanical name has been given to a hybrid group, that name is a collective epithet and all hybrids, past, present, and future, between the two parental taxa, fall under that name. This provision holds, despite the fact that hybrids between particular plants of two species, subspecies, varieties, etc., may appear quite different than hybrids between other plants of the same two taxa.

In most instances, not all the plants that result from hybridization between two taxa are of horticultural merit, and often only one or two hybrid plants are outstanding additions to the ornamental flora. These plants are often given cultivar or fancy names to distinguish them from their siblings, and if these cultivars are used as stock to propagate clonal offspring, their genetically identical plants carry the same cultivar name. Cultivars may be selected from hybrid groups that otherwise are known by a formula name or by a species, subspecies, or varietal name. But in either case, the formula or other botanical

name is often omitted when reference is made to a particular cultivar. Thus, one often encounters *Magnolia* 'Charles Coates' in nursery catalogs and plant lists without reference to its botanical or formula name. It should be noted that not all cultivars are selected from hybrid groups.

Returning to *Magnolia*, one of the intriguing biological aspects that has been noted concerning interspecific hybrids is the fact that none is known between species of the two subgenera into which taxonomists customarily divide the genus. This phenomenon appears to be maintained despite the fact that in cultivation species of the two subgenera are often grown in the same collection. Apparently, in addition to the geographical and habitat differences that prevent hybrids in nature, strong genetic barriers to compatibility exist between certain species. The fact that hybrids are not known between species of the two subgenera has strengthened the validity and naturalness of the division of the genus. These two groups are briefly characterized as follows:

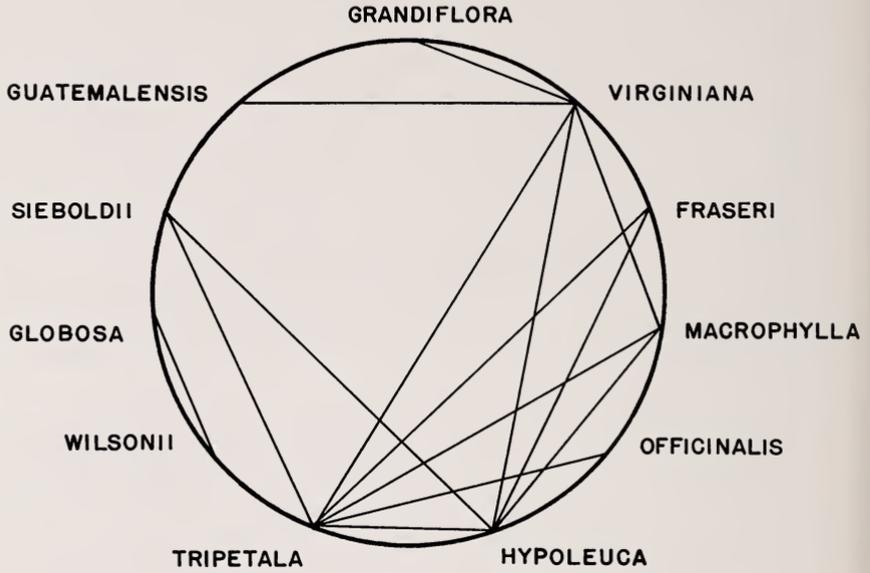
*Magnolia* subgenus MAGNOLIA: Evergreen or deciduous trees or shrubs, the flowers appearing with the leaves; tepals subsimilar, the outer whorl like the inner whorls, never reduced in size and sepal-like; anther sacs introrsely dehiscent.

*Magnolia* subgenus YULANIA: Deciduous trees and shrubs, the flowers appearing before the leaves or with the leaves; the outer whorl of tepals sometimes reduced in size and sepal-like; anther sacs laterally or sublaterally dehiscent.

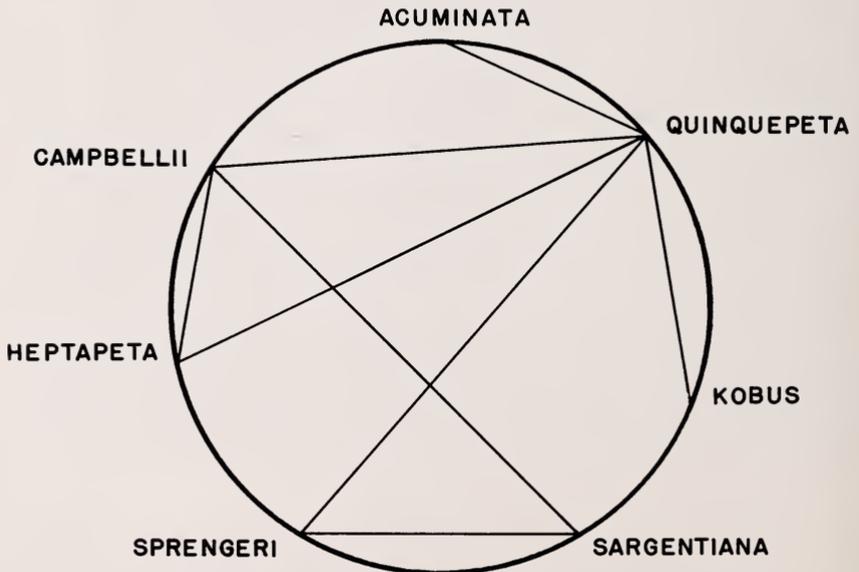
While both of these subgenera are further divided into a number of sections (each comprised of one to several species), within subgenera there appear to be weaker barriers to interspecific hybridization between species of different sections, while within sections hybrids are relatively common or easily obtained by intentional cross-pollinations. Figure 2 presents, in a diagrammatic fashion, the interspecific hybrids that are known or suspected in subgenus MAGNOLIA and subgenus YULANIA, respectively.<sup>1</sup> The lines connecting the species names that appear on the periphery of the circles indicate that interspecific hybrids are known or strongly suspected between the species so linked. Many of these hybrids have been produced in recent years as the results of intentional cross-pollinations by *Magnolia* enthusiasts, and most are currently of very limited distribution in cultivation and are not available commercially. As a result, the

<sup>1</sup> The species and interspecific hybrids indicated in these diagrams are those accepted in my treatment of the cultivated Magnoliaceae that is scheduled to appear in the July, 1976, number of the *Journal of the Arnold Arboretum*. In that treatment the status of several previously recognized hybrid groups that are not included here are rejected and the reasons discussed.

## SUBGENUS MAGNOLIA



## SUBGENUS YULANIA



notes that follow concern some of the interspecific hybrids that are available from nurseries specializing in *Magnolias*, and these notes are followed by a short list of nurseries I know of that offer these plants for sale. Following the discussion of each hybrid, those nurseries offering plants of that hybrid for sale are listed by abbreviations explained in the nursery list.

#### *Interspecific Hybrids of Subgenus Magnolia*

***Magnolia* × *Thompsoniana*** (Loudon) C. de Vos, *Nederl. Fl. & Pomon.* 131. t. 43. 1876.

While most aspects of this hybrid between *Magnolia virginiana* of sect. *Magnolia* and *M. tripetala* of sect. *Rytidospermum* have already been discussed, it deserves mention here that in all probability old plants of this hybrid have been derived from Thompson's original plant by clonal propagation. To my knowledge, Dr. McDaniel's plants have become available commercially only recently and are not widespread in cultivation. While *M. × Thompsoniana* has been considered as precariously hardy in the Philadelphia area, the new plants of this hybrid produced by Dr. McDaniel may prove hardier, since he took great care to use plants of *M. virginiana* and *M. tripetala* from northern populations as seed and pollen parents, respectively.

Usually forming large deciduous shrubs or small trees, often of ungainly habit if not pruned, plants of *Magnolia × Thompsoniana* are noted for their large leaves that are markedly glaucous on the undersurfaces and for their creamy white, fragrant flowers that are showier than those of either of its parents. Most easily confused with plants of *M. virginiana*, plants of the hybrid can be distinguished at any time of year by the incompletely septate pith of its young branchlets. The pith of *M. virginiana* is completely septate while young branchlets of *M. tripetala* have a continuous pith. (GF; H; T.)

***Magnolia virginiana* × *M. grandiflora*** O. M. Freeman, *Natl. Hort. Mag.* 16: 161, 162. 1937.

This is another hybrid group, like *Magnolia × Thompsoniana*, that involves *M. virginiana* as the seed parent and an additional American species, *M. grandiflora* of sect. *Theorhodon*, as the pollen parent. Despite the great horticultural potential of this group, it has never been given a botanical name, although it is often referred to informally as the Freeman hybrids, after O. M. Freeman of the United States National Arboretum, who first produced plants of this parentage. Freeman made cross-pollinations between *M. virginiana* and *M. grandiflora*, the bull-bay that is native to the Coastal Plain of the southeastern United States from North Carolina to central Florida

and west to eastern Texas, in 1930 and 1931. Despite the documented influence of *M. virginiana*, plants of this evergreen hybrid resemble *M. grandiflora* most closely. The overall resemblance of the hybrid plants to *M. grandiflora* is so great that difficulty might be encountered in distinguishing the hybrid plants without resorting to technical botanical characters. The fact that the petioles of *M. grandiflora* lack stipule scars is diagnostic for that species. Petioles of *M. virginiana*, however, have large stipule scars that are prominent along the upper sides of the petioles. The hybrid plants, like *M. virginiana*, also have the stipules attached to the petioles in bud, and as the leaves expand the stipules fall off, leaving scars on the petioles. However, the scars are very small and often obscured by the pubescence of the petioles. Careful observation of the petiole base, however, will indicate the presence of a stipule scar and will distinguish the hybrids from *M. grandiflora*.

Two cultivars, 'Freeman' and 'Maryland', have been selected from the hybrids grown at the National Arboretum and represent the group in cultivation elsewhere. 'Freeman' is a plant of upright, columnar habit, while 'Maryland' is of spreading habit, and both clones are reported to propagate fairly easily from cuttings. At the Arnold Arboretum we have several small plants of *Magnolia virginiana* × *M. grandiflora* in the nursery. While the plants have suffered during some of our recent winters, most of them withstood the rigors of this past winter with little or no die-back. Further testing for hardiness within this hybrid group might eventually provide New England with a *Magnolia* that has the overall appearance and the attributes of *M. grandiflora*. (H; T.)

***Magnolia* × *Wieseneri*** Carrière, Rev. Hort. 62: 406. 1890.

Plants of this hybrid (Figure 3) are currently referred to in nursery catalogs and in the horticultural literature as *Magnolia* × *Watsonii* J. D. Hooker. However, Carrière's name for these hybrids was published a few months before Hooker's name and description appeared in Curtis's Botanical Magazine (117: t. 7157), and under the rule of priority in the Code of Botanical Nomenclature, Carrière's name has precedence and is the correct name for this group. First introduced into western horticulture by the Japanese in 1889 at the International Exposition held that year in Paris, *M. × Wieseneri* is considered to constitute a hybrid of garden origin between two native Japanese *Magnolias*, *M. Sieboldii* of sect. Oyama, and *M. hypoleuca* of sect. Rytidospermum. The plants exhibited by the Japanese were purchased by the Royal Botanic Gardens, Kew, and some plants of *M. × Wieseneri* in cultivation are undoubtedly derived from this original importation. Other plants may have been imported directly into this country from Japan.



Figure 3. *Magnolia* × *Wieseneri*, a hybrid between *M. Sieboldii* and *M. hypoleuca*, of garden origin in Japan.

*Magnolia hypoleuca*, the Japanese white-leaf Magnolia, is a large tree that is closely related to the American *M. tripetala*, and like *M. tripetala*, has its very large leaves clustered in false whorls near the ends of branchlets. This leaf arrangement gives the appearance of an open umbrella, the prominent midveins of the leaves appearing as the supporting ribs, and the blades of the leaves as the fabric. The other presumed parental species, *M. Sieboldii*, is a large shrub or small tree with distinctly alternate, only moderately-sized leaves, and its beautiful white flowers are held nodding or pendent on the branchlets. Moreover, the stamens are a beautiful crimson red and contrast markedly with the white tepals. By contrast, the waxy white flowers of *M. hypoleuca* are held more-or-less upright on the branchlets, and the stamens are red only at the base. Plants of *M. × Wieseneri* known to me are deciduous shrubs that are intermediate in most respects between the two parental species, but they have inherited the crimson stamens of *M. Sieboldii* while the upright pose of the flowers is indicative of the influence of *M. hypoleuca*. The leaves are sometimes

crowded at the ends of branchlets, and the plants usually develop into small, bushy trees. Unfortunately, this beautiful hybrid, which commences to bloom in June, is not known to me to be cultivated outside the collections of one or two botanical gardens and arboreta. It is deserving of much wider planting, particularly since it blooms after the majority of spring-flowering shrubs and because it would be appropriate for small garden areas. (H; T.)

***Magnolia* 'Charles Coates'** R. J. Sealy, Gard. Chron. III. 152: 77. 1962.

*Magnolia* 'Charles Coates' (Figure 4) is a putative hybrid between the Asiatic *M. Sieboldii* and the American *M. tripetala*. Its cultivar name honors Mr. C. F. Coates, former foreman-propagator in the Arboretum at the Royal Botanic Garden, Kew. In 1946 or 1947 Mr. Coates discovered three small, self-sown seedlings in the *Magnolia* collection at Kew and suspected that they might prove to be hybrids. He removed the seedlings to the nursery, and when they first flowered in 1958, the hybrid nature of the plants was confirmed.

Like *Magnolia* × *Wieseneri*, *M.* 'Charles Coates' has inherited from *M. Sieboldii* the beautiful crimson stamens that contrast with the creamy-white tepals of the flowers, while in vegetative aspects the plants most closely resemble the sect. *Rytidospermum* parent, *M. tripetala*. The large leaves are somewhat smaller than those of *M. tripetala*, but, like the leaves of that parent, they are often clustered in false whorls at the ends of branchlets. The most attractive feature of *M.* 'Charles Coates' are the large, upward-facing flowers; the creamy-white tepals, unlike those of other *Magnolias*, are wavy margined. The plants I have seen form small trees or large shrubs that bloom in May and June, and judging from the hardiness of the two presumed parents, *M.* 'Charles Coates' should prove hardy at least as far north as the Boston region. (H; T.)

#### *Interspecific Hybrids of Subgenus Yulania*

***Magnolia* × *Soulangiana*** C. E. Soulange-Bodin, Mém. Soc. Linn. Paris 1826: 269. 1826; Ann. Soc. Hort. Paris 1: 90. 1827.

The saucer *Magnolias*, *Magnolia* × *Soulangiana* (Figure 5), are to many people synonymous with *Magnolia*, and because of their widespread use in ornamental plantings probably need no description here. This hybrid group, which was first raised by Chevalier Soulange-Bodin at Fromant, near Paris, between 1820 and 1840, is undoubtedly the most widely cultivated and popular of all *Magnolias* in temperate regions. Moreover, it serves as a good example of the variability characteristic of some hybrid groups. The plants classed under *M.* × *Soulangiana* include a complex array of hybrid plants



Figure 4. *Magnolia* 'Charles Coates', a chance hybrid discovered at the Royal Botanic Gardens, Kew.

between two Asiatic species, *M. heptapeta* (syn. *M. denudata*) of sect. *Yulania*, and *M. quinquepeta* (syn. *M. liliflora*) of sect. *Tulipastrum*, which are also widely cultivated, both in China and Japan as well as in western gardens. Soulange-Bodin's original plants of *M. × Soulangiana* were produced as a result of intentional pollination of *M. heptapeta* flowers with *M. quinquepeta* pollen.

Undoubtedly, part of the reason that plants of *Magnolia* × *Soulangiana* are variable is because the parental species themselves exhibit variation. But the situation within this hybrid group is complicated

by still another factor. The *Magnolia* hybrids that have been discussed under subgenus MAGNOLIA represent first generation plants that have been maintained by asexual propagation. As a result, the plants in cultivation exhibit only minor differences that are associated with local environmental or climatic factors. The situation in *M. × Soulangiana*, however, is more complex. Despite the fact that most plants of the group are partially sterile, seed is occasionally produced and it appears that a hybrid "swarm" has developed in cultivation that includes not only first generation plants but plants of succeeding generations as well. Plants of the succeeding generations display variation due to genetic segregation, a phenomenon first explained by Gregor Mendel based on experiments he conducted with the common garden pea. Still other variants of *M. × Soulangiana* have undoubtedly resulted from crosses between hybrid plants and both parental species; this type of cross is known as a backcross. The consequence is a continuum of variation between *M. heptapeta* and *M. × Soulangiana* on the one hand and *M. × Soulangiana* and *M. quinquepeta* on the other.

Because many of these crosses between hybrid plants as well as the backcrosses to the parental taxa are undocumented, precise knowledge of the origin or genetic background of most plants of *Magnolia × Soulangiana* is lacking. However, numerous individual plants of horticultural value have been selected from the array of variability, and they have been given cultivar names. One hundred and three cultivars of *Magnolia × Soulangiana* are listed by Fogg and McDaniel (1975) in their checklist of *Magnolia* cultivars, and since those available commercially from reputable nurseries are propagated asexually, the gardener is assured of obtaining the particular variant he wants to grow.

*Magnolia × Veitchii* W. J. Bean in Veitch, Jour. Roy. Hort. Soc. 46: 321. 1921.

More widely grown in England, the country of its origin, than in the United States, *Magnolia × Veitchii* (Figure 6) combines *M. heptapeta* and *M. Campbellii*, both of sect. Yulania. Peter Veitch of the Royal Nurseries, Exeter, attempted a series of cross-pollinations between *M. Campbellii* and *M. heptapeta* in 1907, yet only one cross resulted in a fruit cone with viable seed. The successful cross had employed *M. Campbellii* as the pollen parent and *M. heptapeta* as the seed parent.

The resulting hybrid plants proved variable in flower color. Of five plants raised from the seed obtained, four eventually produced white flowers, while the fifth plant produced pink flowers, and two cultivars have been designated, 'Peter Veitch' with pink, and 'Isca' with white flowers. Plants of *Magnolia × Veitchii* are extremely vigorous trees that have attained over 80 feet in height in Cornwall in



Figure 5. *Magnolia* × *Soulangiana*, the saucer *Magnolia*, the most widespread *Magnolia* hybrid in cultivation. Photo: P. Chvany.

southwestern England; in this country the plants are hardy at least as far north as the Philadelphia region (Zone VI), but the plants I know of have not yet attained great heights.

Aside from the abundantly produced large flowers that have the inner whorl of tepals held somewhat erect, partially enclosing the stamens and carpels in the center of the flowers, the plants are noted for their large, glossy green leaves. Both of these characteristics are indicative of the genetic influence of *Magnolia Campbellii*. For eastern areas of the United States, where the spectacular Himalayan *M. Campbellii* unfortunately has not proved, except in rare instances,



Figure 6. The beautiful large flowers of *Magnolia* × *Veitchii*, a hybrid between *M. Campbellii* and *M. heptapeta*.

to adapt to the climatic conditions, *M.* × *Veitchii* is an alternative plant that deserves wider use in ornamental plantings. (GF; H; T.)

***Magnolia quinquepeta* × *M. kobus* var. *stellata*** T. R. Dudley & W. F. Kosar, *Morris Arb. Bull.* 19: 26-29. 1968.

Often referred to as the Kosar hybrids, plants of the above parentage are represented in cultivation by a series of eight cultivars ('Betty', 'Susan', 'Pinkie', 'Jane', 'Ann', 'Judy', 'Randy', and 'Ricki') that were selected from the F<sub>1</sub> generation. The results of intentional cross-pollinations made by William Kosar and Francis de Vos, the hybrid plants were produced at the National Arboretum in 1955 and 1956 using the early-flowering star Magnolia, *Magnolia kobus* var. *stellata*, and two of its cultivars as pollen parents and the later-flowering *M. quinquepeta* 'Nigra' and 'Retroflorans' as the seed parents. One of the objectives of this hybridization program was to produce plants that

bloom later in spring than the star *Magnolia* in order that the flowers might escape damage by hard spring frosts.

Like other members of sect. *Buergeria*, of which it is a member, *Magnolia kobus* var. *stellata* is a diploid with 38 chromosomes, while *M. quinquepetala*, the Asiatic species of sect. *Tulipastrum*, is a tetraploid with  $2n=76$ . As a result of crossing diploid with tetraploid plants, the hybrid progeny are triploids with 57 chromosomes in somatic cells, and because of this unbalanced chromosome number, the hybrid plants are sterile.

Generally intermediate between the two parental taxa, plants of *Magnolia quinquepetala*  $\times$  *M. kobus* var. *stellata* are erect, multiple-stemmed shrubs of rounded or conical form that grow to six to ten feet. Like both parents, the hybrid plants are deciduous, but the leaves are most similar to those of the seed parent, *M. quinquepetala*. At the Arnold Arboretum the eight cultivars have bloomed while still young, opening their flowers after the star *Magnolia*, depending upon the season, about the first or second week of May. The greatest variability encountered in the hybrids, and the major reason eight selections were made, is in flower color and in the number of tepals comprising the perianth. Tepal color ranges from dark reddish-purple through varying shades of light purple or magenta to pinkish, while in number, the tepals vary from six to nineteen per flower. These excellent shrubs, which are as hardy as both parents, should be welcome additions and useful spring-flowering plants in small gardens where space is limited. (GF; H.)

*Magnolia*  $\times$  *brooklynensis* G. Kalmbacher, Newsl. Am. *Magnolia* Soc. 8(2): 7. 1972.

*Magnolia*  $\times$  *brooklynensis* is the name that has recently been given to hybrids between *Magnolia acuminata*, the native American cucumber-tree, and *M. quinquepetala* (syn. *M. liliflora*), a species widely cultivated in China and Japan and judged to be native to the former country. These two species are the only species that comprise sect. *Tulipastrum*, and the hybrids between the American and Asiatic members of the section were originally produced by Mrs. Evamaria Sparber at the Brooklyn Botanic Garden. Both parental species are tetraploids with 78 somatic chromosomes, and the hybrids, produced by pollination of *M. acuminata* flowers with *M. quinquepetala* pollen, are fertile and produce viable seed.

Two cultivars of *Magnolia*  $\times$  *brooklynensis* have been named. The first, 'Evamaria', honors Mrs. Sparber, but it has not yet become available commercially. The second cultivar, 'Woodsmen', was named by Dr. J. C. McDaniel and was selected from plants of *M.*  $\times$  *brooklynensis* that he produced through cross pollinations in Illinois. This cultivar has recently become available commercially.

Although I have not seen plants of 'Woodsman', Dr. McDaniel (1975) reports that it has inherited the tree habit of *Magnolia acuminata*, as well as the hardiness of that species. The seed parent, *M. acuminata*, is widely distributed in eastern North America and is the only *Magnolia* native to Canada. Although the flowers of 'Woodsman' are similar in shape to flowers of *M. × Soulangiana*, their coloration is unique for a *Magnolia*. The tepals grade from dark purple through pink and yellow to green. Another asset of this hybrid is the fact that the unusual flowers appear late in spring and thereby avoid being damaged by frosts. Inasmuch as the hybrids are fertile, future generations of gardeners and horticulturists may enjoy variation that will assuredly become apparent as succeeding generations of *M. × brooklynensis* (as well as yet unknown backcrosses to the parental species) are raised, selected, and grown more widely. (GF.)

A cursory glance at Figure 2 will indicate that the interspecific *Magnolia* hybrids that have been discussed above are but a few of those that have been obtained. Moreover, it is obvious that not all of the possible hybrids that might be synthesized have been achieved. Undoubtedly, some crosses have been attempted and have failed, but others remain to be tried, and there is always the possibility of new hybrids arising in cultivation without the interference of the hybridizer, and many may prove to be of horticultural significance.

While this article has been limited to those hybrids between two species available commercially, another group of *Magnolia* hybrids already exists that consists of some spectacular ornamentals. These plants are tri-hybrids, involving some of the di-hybrids discussed above as one parent and other species (other than species involved as a parent of the di-hybrid) as the second parent. Thus, these hybrids are combinations of three species. These tri-hybrids are largely unknown in the United States, and most are of limited distribution in the nurseries or gardens where they originated. We all can look forward to these tri- and new di-hybrids becoming better known in American gardens and arboreta.

#### *Nurseries Selling Magnolia Hybrids*

Unfortunately, two of the nurseries listed below are in England, and importation of plants will be necessary. Nurseries other than those listed below may offer plants of these hybrids for sale, and omission of their names from this list is unintentional. No sources are listed for *Magnolia × Soulangiana* since it is almost universally available in all sections of the country.

The nurseries are:

Gossler Farms Nursery, 1200 Weaver Road, Springfield, Oregon, 97477.

Abbreviated GF; catalog available for small charge.

Hillier & Sons, Winchester, Hampshire, England.

Abbreviated H; price lists available.

Treseders' Nurseries (Truro) Ltd., Truro, Cornwall, England.

Abbreviated T; special *Magnolia* catalog available.

### References

Fogg, J. M., Jr., & J. C. McDaniel, eds. Check list of the cultivated *Magnolias*. vii + 54 pp. + 12 pp. Am. Hort. Soc. Pl. Sci. Data Center. Mt. Vernon, Va. 1975.

Loudon, J. C. Magnoliaceae. Arb. Frut. Brit. 1: 259-291. 1838.

McDaniel, J. C. A new-old *Magnolia* hybrid. Illinois Research, Ill. Agr. Expt. Sta. 8, 9. Fall, 1966.

———. Some Asiatic-American *Magnolia* hybrids. Am. Horticulturist 54 (1): 10-13. 1975.

# Selected Maples for Shade and Ornamental Planting

by RICHARD E. WEAVER, JR.

Few hardy genera of plants are as diverse and desirable horticulturally or as valuable economically as *Acer*, the Maples. Several species are among the most important forest trees in eastern North America, and they are largely responsible for the spectacular blaze of color that covers the landscape of that region during the fall of the year. One of these, the Hard, Rock, or Sugar Maple, is particularly dear to the hearts of New Englanders, as its sap is the primary source of maple sugar — a regional specialty.

The most familiar Maples are perhaps those few large species that are grown as shade trees — primarily utilitarian plants with little thought given to their ornamental value except for the color of their autumn foliage. Others, particularly the Japanese Maples, are universally admired as accent plants for their graceful form and delicate foliage. But some extremely decorative aspects of Maples — namely their flowers and their bark patterns — are largely ignored by the American horticultural public. And many of the intermediate-size species, including some of the handsomest of the genus, are almost entirely unknown to most people.

In this article, the various decorative and utilitarian aspects of Maples hardy in Zone 5 are discussed. Under each of these characteristics, some good and not-so-good species are described. Finally, there is a list of the nursery sources for most of the species and cultivars mentioned. Culture, pests, diseases and propagation in general will not be discussed because of the existence of excellent articles on the subjects (see references below).

Hopefully, my basic enthusiasm for these plants will persuade some of my readers to grow a few of the more unusual types. Hopefully also, my warnings will save other readers a lot of aggravation.

## REFERENCES

- Bean, W. J. 1970. Trees and shrubs hardy in the British Isles, ed. 8. Sir George Taylor, ed. *Acer*, vol. 1, pp. 185-240. John Murray Ltd., London.
- Dirr, M. A. 1975. Manual of woody landscape plants. Stipes Publishing Co., Champaign, Ill.

- Holmes, F. W., C. S. Chater and W. B. Becker. 1969. Culture, diseases, injuries, and pests of Maples in shade and ornamental planting. Publication 443, Cooperative Extension Service, College of Agriculture, University of Massachusetts.
- Mulligan, B. O. 1958. Maples cultivated in the United States and Canada. The American Association of Botanical Gardens and Arboreta.
- Murray, E. 1967. A key to the cultivated Maples. *Morris Arboretum Bulletin* 18: 43-47.
- Rehder, A. 1940. Manual of cultivated trees and shrubs. ed. 2. Macmillan Co., New York.

## FOLIAGE

A typical leaf of a Sugar or Norway Maple is an object familiar to most people, whether they are interested in plants or not, and the leaves of most other species are basically similar to these. They are always opposite and, in the great majority of species, simple, with palmate veins and lobes; the margins are variously toothed. There are exceptions to the general rule, however, and some of the species displaying them might not be immediately recognizable as Maples unless fruits were present. A few tender Maples are evergreen, and a considerable number of species, including hardy ones, have compound leaves, these usually with three leaflets, but with up to seven in the Box Elder. A few species have leaves with inconspicuous lobes; the Hornbeam Maple has leaves that are pinnately veined and lack lobes completely.

Maples are well known for the spectacular coloration of their autumnal foliage. In fact, they are among the most showy of woody plants in this respect. But other aspects of Maple foliage are decorative as well. Forms and cultivars of several species have colored leaves during the growing season, and the texture of the foliage of many is of unusual interest. All of these aspects will be considered in this section.

**Red Maple (*Acer rubrum*).** This species turns swamps and low woodlands throughout eastern North America into a blaze of scarlet in the fall. The brilliant color of the foliage and the abundance of the species make this Maple certainly one of the most conspicuous trees in our autumn landscape. The foliage of the Red Maple is also of interest during the growing season. The leaves are whitish on their undersurfaces, and the tree appears silvery when the leaves are rustled by a breeze.

A number of cultivars have been selected for their unusually good autumn coloration. Those available in the trade are briefly described below.

'Autumn Flame' — foliage turning a brilliant scarlet about two weeks before most other Red Maples.

'Bowhall' — foliage turning a brilliant scarlet; also attractive for its pyramidal habit.

'Morgan' — foliage color consistently brilliant, even on young plants.

'October Glory' — foliage turning brilliant red and persisting on the tree longer than in most others of the species.

'Red Sunset' — brilliant red-orange foliage lasting well into the season.

'Scanlon' — dark green foliage during the summer, turning bright red and orange in the fall; a compactly branched, conical tree.

'Schlesingeri' — foliage coloring rather a darker red at least two weeks before most other Red Maples.

**Sugar Maple (*Acer saccharum*).** Like the preceding, this is a common native tree in the eastern United States, although in the Southeast it is primarily a mountain species. The foliage is similar to that of the Norway Maple during the growing season, but the individual leaves are a brighter green, and they are somewhat more slender. The crown is also less densely branched, so the Sugar Maple casts a lighter shade than does the Norway Maple. The foliage is quite delicate and is susceptible to sunscald and spray damage.

Autumnal coloration is somewhat variable, but most commonly the foliage turns golden orange with a tinge of red. A mature specimen tree in full color is about as magnificent a plant as we can grow here in New England.

The two cultivars selected for their outstanding foliage characters are as follows:

'Green Mountain' — autumnal coloration about average for the species, but leaves waxy, dark green during the growing season and reasonably resistant to sunscald.

'Sweet Shadow' ('*Laciniatum*') — leaves deeply cut, turning bright orange in the fall.

**Silver Maple (*Acer saccharinum*).** Although its yellow autumn coloration is less spectacular than that of some of its relatives, the texture and color of the summer foliage of this species are outstanding among the Maples that grow to be large trees. The deeply cut leaves show their silvery undersides in the slightest breeze, accounting for the common name. The cultivar '*Laciniatum*' ('*Wieri*') has more deeply cut leaves than the species, in addition to its somewhat pendulous branches.

**Norway Maple (*Acer platanoides*).** Although this is one of the most frequently encountered trees of foreign origin in the eastern United States, its shallow root system and the deep shade cast by its dense, dark green foliage usually destroy the lawns in which it is most commonly planted. Its clear yellow autumn coloration is desirable,



*The foliage of the Silver Maple, showing the whitish undersides of the leaves.*  
*Photo: R. Weaver.*

however, because it appears late in the season, after many trees have already lost their leaves.

A number of cultivars of this species are available in the American nursery trade. Those with colored or "improved" foliage during the growing season are described below. It must be pointed out, however, that these generally carry the same liabilities as the species. Further, the foliage of the red-leaved forms is coarse and characterless in my opinion. Although much cheaper and faster growing, these could never be a reasonable substitute for the Purple Beech, the only other large tree with similarly colored foliage.

'Crimson King' — foliage deep red-purple throughout the growing season.

'Drummondii' — leaves with a broad, fairly regular, white or yellowish margin.

'Emerald Queen' — foliage dark green and of heavy texture — probably a liability.

'Faassen's Black' — similar to 'Crimson King'.

'Royal Red' — foliage a clearer red than 'Crimson King' and 'Faassen's Black'.

'Schwedleri' — foliage red when emerging, turning rusty, then brownish and finally green.

'Summershade' — leaves large, dark green, with a heavy cuticle; quite resistant to sunscald.

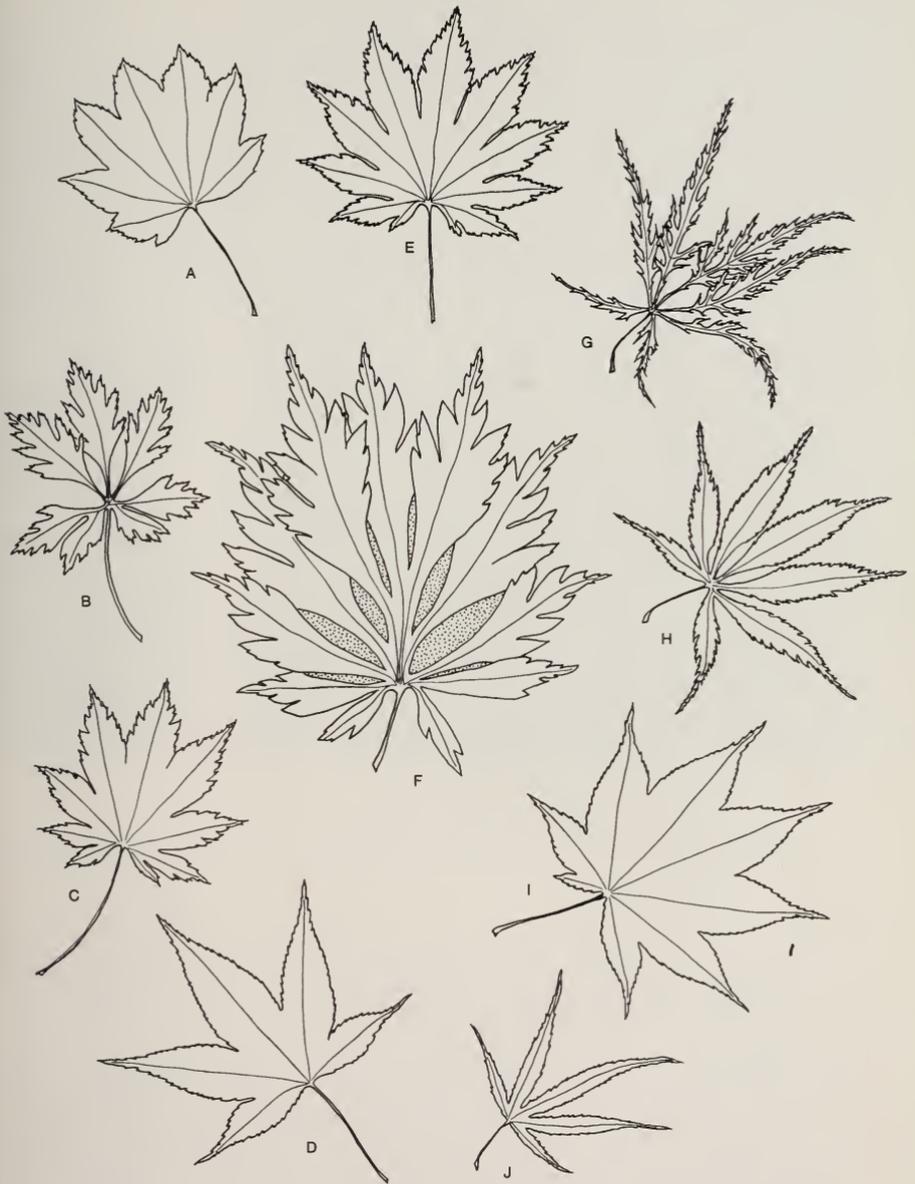
**Paperbark Maple (*Acer griseum*), Manchurian Maple (*A. mandshuricum*), Nikko Maple (*A. nikoense*) and Three-flower Maple (*A. triflorum*).** The foliage of all four species is similar during the growing season. The leaves are compound, with three leaflets, and appear loose and airy in comparison with those of most other Maples. In the autumn the foliage of *A. griseum*, *A. nikoense*, and *A. triflorum* turns bright red or orange, that of the first being perhaps the least spectacular. The real standout in the group is *A. mandshuricum*, the foliage of which turns a unique and most attractive rose-red. It is also the hardiest species, surviving quite well in Zone 4.

**Japanese-type Maples.** These wonderful small trees need little introduction. The foliage is outstanding in all of the species; each of them is distinctive, and each will be treated separately below. The descriptions of the cultivars are largely condensed from those in the catalogue distributed by Greer Gardens, where more than 80 forms of *Acer palmatum* are listed.

**Vine Maple (*Acer circinatum*).** This native of western North America, and the only species indigenous to this continent, is infrequently cultivated here in the Northeast. Although listed by Rehder as being hardy in Zone 5, it has not proved vigorous at the Arnold Arboretum. The leaves are broad, almost circular, with 7 to 9 shallow lobes, and the texture of the foliage is perhaps not as good as that of its relatives. Its autumn coloration, in shades of brilliant red, orange and yellow, is spectacular, however, even when grown in the shade of evergreens. The cultivar 'Monroe', the only dissected form yet described, has leaves that are finely cut in a most unusual manner. Its autumn coloration is as good as that of the species.

**Siebold Maple (*Acer sieboldianum*) and Purplebloom Maple (*A. pseudosieboldianum*).** These species are quite similar except for their flowers. The foliage of both is outstanding throughout the growing season, being a fresh green and of fine texture, although the individual leaves are not as deeply lobed as those of *A. palmatum*. Autumn coloration is bright red and yellow.

**Fullmoon Maple (*Acer japonicum*).** The leaves of this species are among the largest in the group, and their autumn coloration is about as spectacular as that of any woody plant. Being precariously hardy in Zone 5, the specimens at the Arnold Arboretum are rather poor and small. But they are still magnificent in the fall. The coloration is brilliant red and yellow, without a hint of purple, and the plants appear as if they were on fire at the height of the season. Two outstanding cultivars are:



Leaves of "Japanese-type" Maples,  $\frac{1}{2}$  life-size. A, *Acer circinatum*; B, *A. circinatum* 'Monroe'; C, *A. pseudosieboldianum*; D, *A. palmatum*; E, *A. japonicum*; F, *A. japonicum* 'Aconitifolium'; G, *A. palmatum* 'Dissectum'; H, *A. palmatum* 'Burgundy Lace'; I, *A. palmatum* var. *heptalobum*; J, *A. palmatum* 'Linearilobum'.

'Aconitifolium' — leaves large, so deeply cut as to appear almost compound; autumn coloration as good as the species.

'Aureum' — leaves of medium size, yellowish during the summer.

**Japanese Maple (*Acer palmatum*).** This native of Japan is certainly one of the finest of all small trees, with its spreading habit, somewhat "layered" branches, and elegantly formed, deeply lobed, almost star-like leaves. Many cultivars have been selected for their outstanding foliage; all of them are beautiful. The few described below are grouped according to the character of their leaves. It should be noted that all of them develop their best form, and best colors, when grown in full sun.

**A. palmatum var. *heptalobum*.** Since this type occurs commonly in the wild it has been designated a botanical variety as opposed to a cultivar. The plants in general have leaves that are larger than normal, usually 7-lobed and with fine teeth. Many plants of this type develop a bright red autumn coloration, and the cultivar 'Osakazuki' is outstanding for its intense crimson display.

'**Atropurpureum**' group — leaves more or less of normal shape, but red during the summer.

'Bloodgood' — leaves perhaps the deepest red of any of the forms, and holding the color well throughout the summer; autumn foliage bright red.

'Burgundy Lace' — leaves deeply lobed, holding their deep red color well during the summer.

'Oshio-beni' — leaves more orange-red, the color lasting well.

'Sherwood Flame' — similar to 'Burgundy Lace', but holding its color better.

'**Dissectum**' group — leaves deeply divided, the 7 to 11 lobes deeply cut and separate almost to the base of the leaf; color green or red; form of the plant generally low and weeping.

'Everred' — one of the best red-leaved forms.

'Filigree' — leaves green with tiny flecks of white or cream.

'Garnet' — leaves a transparent garnet-red throughout the summer; a vigorous grower with bright red autumn coloration.

'Viridis' — leaves green, turning to gold in the fall; habit gracefully drooping; twigs green.

'Waterfall' — one of the most graceful of the green-leaved types; leaves divided into long segments.

'**Linearilobum**' group — leaves deeply lobed; lobes straplike and not cut; color red or green.



*The lacy foliage of Acer palmatum 'Burgundy Lace'. Photo: P. Bruns.*

'Atrolineare' — leaves blood red.

'Linearilobum' — leaves green.

'Red Pygmy' — a round-headed shrub with red leaves.

**Variegated group** — leaves with regular or irregular white, yellowish or pinkish markings.

'Butterfly' — leaves tiny and blue-green with cream or pink margin.

'Roseo-marginatum' — leaves dark green with a pinkish margin and with irregular white streaks.

'Sagara-nishiki' — leaves dark green with scattered golden spots.

'Tsumagaki' — leaves green with purple tips and borders during spring and early summer.

Other Maples of interest for their foliage:

**Amur Maple (*Acer ginnala*).** This is one of the hardiest of all the species, and it is also tolerant of poor, dry soils. It is recommended for its brilliant red, scarlet or orange autumn coloration particularly in the Plains States where such a display is especially desirable.

**Box Elder (*Acer negundo*).** Although this is a rather weedy, weak-stemmed tree, it is almost as hardy as the preceding species, and it is recommended only for cold, dry areas. The autumn coloration of the species is a good yellow, and the following cultivars have colored leaves during the growing season.

'Aureum' — leaves golden-yellow, the color persisting through much of the summer.

'Variegatum' — leaflets and fruits with an irregular white border, in many becoming almost totally colorless.

**Mountain Maple (*Acer spicatum*).** Again a very hardy species, the autumn foliage turns shades of red and orange. Although the color is not as good as in *A. ginnala*, this tree has somewhat more character.

**Painted Maple (*Acer mono*).** A relative of the Norway Maple, this medium size tree is outstanding for its low, rounded crown. The foliage is fine-textured, the individual leaves being bright green, small and more or less star-shaped.

**Striped Maple (*Acer pensylvanicum*).** An elegant small tree with large 3-lobed leaves, this species is hardy in Zone 3. The foliage is attractive during the summer and turns bright yellow in the fall. Its Asiatic relatives (mentioned elsewhere) are equally desirable.

#### BARK AND TWIGS

Maples are variable in the texture and color of their bark. In most species it is quite thin, making the plants vulnerable to mechanical injury and therefore adding to their limitations as street trees. But on the other hand, the bark of many species is unusually decorative, adding greatly to the ornamental value of the plants, particularly during the winter. Following is an enumeration of the species with the most handsome or distinctive bark; most of them are illustrated on pages 157 and 159. The descriptions, except where noted, pertain to the mature trunks and larger branches.

*The foliage and flowers of Acer pensylvanicum, our native Striped Maple.  
Photo: P. Bruns.*



**Paperbark Maple (*Acer griseum*).** This is perhaps the most celebrated species as far as decorative bark is concerned. The bark has a waxy sheen, and on old trunks is smooth and mottled in shades of rich red-brown; that on less mature growth peels off in thin papery strips. The pattern and texture are exceptionally attractive, and they make this species one of the most desirable of all deciduous trees for winter interest.

**Three-flower Maple (*Acer triflorum*).** The bark of this species is a blend of cream, buff, and pearly gray-brown, with a waxy sheen, and splits into thin, irregularly shaped vertical plates. Although very different in appearance from that of its close relative, *A. griseum*, the bark of the Three-flower Maple is almost equally decorative.

**Trident Maple (*Acer buergerianum*).** The bark on mature trunks is basically buff with pale gray-brown patches and from a distance resembles that of the preceding species. The flakes or plates are thicker, however, more irregular in shape, and not oriented vertically.

**Snake-bark Maples (*Acer pensylvanicum*, *A. davidii*, *A. tegmentosum*, *A. rufinerve*, *A. grosseri*).** The bark is much the same in all of the species, being smooth and tight and basically dark olive-green, with vertical stripes of bright green and white, particularly on the branches. The common names "Snake-bark" or "Striped" Maples are derived from this bark pattern. The best species in the group are *A. davidii* and *A. grosseri*, both of which are precariously hardy in Zone 5; in these, the stripes are most pronounced. A cultivar, 'Erythrocladum', of our native *A. pensylvanicum* is also outstanding in that the twigs turn bright red after the leaves have fallen.

**Japanese-type Maples (*Acer palmatum* and *A. pseudosieboldianum*).** The bark on the trunks and the main branches is similar to that of the Snake-bark Maples, except that the basic color is medium gray and the stripes are dark gray. The twigs of the above species and several of their cultivars are decoratively colored. Those of *A. pseudosieboldianum* are an unusual gray-lavender, while many green-leaved *A. palmatum* have bright green twigs. A selection, 'Aoyagi', of the latter species is particularly outstanding in this respect, while another, 'Sango-Kaku' ('Senkaki'), the Coral-bark Maple, has bright red twigs in the winter.

**Red Maple (*Acer rubrum*).** The bark on the branches and the upper part of the main trunk is smooth and silvery gray. That on the older parts of the trunk becomes dark with thick plates, presenting an interesting contrast.

*The bark of Maple species. Upper left, Three-flower Maple; upper right, Trident Maple; lower left, Paperbark Maple; lower right, Red Maple. Photos: R. Weaver.*



**Sycamore Maple (*Acer pseudoplatanus*).** The bark somewhat resembles that of a Sycamore, hence the common name. It is darker in color, however, and basically in shades of gray rather than brown. The exfoliating plates also are thicker, tighter, and smaller.

**Norway Maple (*Acer platanoides*).** The bark of this species is about the thickest of any hardy Maple. It is dark gray-brown with a conspicuous network of tight, crisscross ridges.

**Devil Maple (*Acer diabolicum*).** "Elephantine" would be the best adjective to describe the bark of this tree. It is dark gray with a "pebbled" texture, resembling the skin of pachyderms.

## FLOWERS AND FRUITS

Most everyone is familiar with the fruits of maples. They are certainly the most distinctive feature of the genus. Although their shapes vary considerably, the fruits (technically termed samaras) are always borne in pairs, the members tightly fused together, each with a broad, elongate wing and a single seed. They drop from the tree in pairs, and as they fall they spin like the blades of a helicopter, often landing a considerable distance from the parent plant. While the large and abundant fruits of species such as the Norway Maple are often considered a nuisance, those of other species are brightly colored and add to the decorative value of the trees.

Few people would think of growing Maples for their flowers. However, while none could actually be called showy, the flowers of most species are distinctly charming, and those of a number of species are, at least in my opinion, quite beautiful. Individually they are small, seldom exceeding  $\frac{1}{2}$  inch in diameter, and they are borne in rounded or elongate clusters which may be erect or drooping. The flowers are generally unisexual, with "males" and "females" present in the same cluster in many species, or on separate trees in others. The petals are red, whitish, or greenish, or occasionally absent; in many species they persist in good condition while the fruits are maturing.

The flowers are most conspicuous when they appear before the leaves, a normal occurrence in several common native and introduced Maples. The most attractive species, however, are those in which the flowers appear with the expanding foliage. Viewed with or against the foliage, the dark flowers of some produce a lovely contrast, while the greenish ones of others complement its already elegant texture. The best species for flowers and/or fruits are described below.

*The bark of Maple species. Upper left, Norway Maple; upper right, Sycamore Maple; lower left, Striped Maple (*Acer tegmentosum*); lower right, Devil Maple. Photos: R. Weaver.*



**Silver Maple (*Acer saccharinum*).** This species is included because it is one of the first plants to bloom in the spring. The flowers, which are borne in dense, tight clusters, and the expanding bud scales cast a reddish haze upon the trees in late February or early March — a time when any flower is a treasure.

**Red Maple (*Acer rubrum*).** Appearing later than those of the preceding species but still before the leaves are evident, the bright red flowers of the Red Maple contrast beautifully with its silvery gray branches. The young fruits are about the same color as the flowers, and due to their size are more conspicuous.

**Sugar Maple (*Acer saccharum*).** The delicate, yellowish, somewhat bell-shaped flowers gracefully drooping on long, slender stalks are almost superfluous on what is already one of the most elegant of large trees.

**Norway Maple (*Acer platanoides*).** The soft yellow-green, delicately fragrant flowers that cover this species just as the leaves are expanding help greatly to soften the curse of the monster that bears them, at least for a week or two. Individually quite large, and borne in clusters as much as 4 inches broad, the flowers make this species about the showiest Maple in bloom. Their contrast against the red leaves of such cultivars as 'Schwedleri' and 'Crimson King' is particularly striking. This species bears fruit prolifically, and the large samaras are a bit messy when they fall. The equally prolific seedlings that inevitably follow are a further annoyance.

**Japanese-type Maples (*Acer circinatum*, *A. japonicum*, *A. palmatum*, *A. pseudosieboldianum*).** The flowers are quite similar in all of these species, with conspicuous dark red to purple sepals and/or petals. They are borne in drooping or pendent, loosely globose clusters, each of these containing both "males" and "females." The combination of the dark flowers and the fresh green, beautifully shaped leaves is truly exquisite, although this quality admittedly cannot be realized when the plants are viewed from a distance. In my opinion, the Vine Maple (*Acer circinatum*) is the most beautiful of the species in bloom, although the flowers of *A. japonicum* are by far the largest. In the red-leaved forms of *A. palmatum*, the leaves and the flowers are about the same color, and the latter therefore are not so effectively displayed. However, the fruits of these forms have reddish wings and provide a pleasing contrast with the darker foliage. The fruits of *A. circinatum* and *A. pseudosieboldianum* are also red, at least when young.

*The flowers and expanding foliage of (above) the Schwedler Maple (Acer platanoides 'Schwedleri') and (below) the Sugar Maple. Photos: R. Weaver, P. Chvany.*



**Hornbeam Maple (*Acer carpinifolium*) and Snake-bark Maples (*A. capillipes*, *A. davidii*, *A. grosseri*, *A. pennsylvanicum*, *A. tegmentosum*).** The Hornbeam Maple is quite a different species from the Snake-bark types, but its aspect in bloom is similar, and therefore it is included with them here. To me these are among the most beautiful of the Maples, in bloom or otherwise. The pale yellow-green flowers are borne in long, slender drooping or pendent racemes. They are seen to best advantage from beneath, looking up into the canopy of the tree (see page 155). Although the individual flowers are delicately beautiful, the form of the inflorescences is more so, particularly in conjunction with the foliage. The young fruits produce about the same effect as do the flowers and therefore prolong the show. It must be pointed out, however, that these species are basically dioecious (separate "male" and "female" trees) and therefore only the "females" bear fruit.

**Amur Maple (*Acer ginnala*), Mountain Maple (*A. spicatum*), Tatarian Maple (*A. tataricum*).** Although related to the other two species included here, the Mountain Maple stands out in flower and fruit. The yellow-green flowers are borne in erect racemes as much as 6 inches long. They are followed by red fruits borne in the same manner. Both flowers and fruits are decorative. Like the preceding species, the Amur and Tatarian Maples bloom after the leaves have almost fully expanded. Their white flowers and red fruits are held in shorter clusters, and are conspicuous against the foliage.

#### FORM AND SIZE

The species and cultivars treated here are divided into three groups according to their size and form. Good and bad types are discussed in each group, as are appropriate or inappropriate planting situations. The form of trees is somewhat difficult to describe, except in terms of the ratio between the height and the width of the crown. The table below presents this ratio for representative specimens at the Arnold Arboretum. If the ratio is more than 2, the tree is columnar; if it is less than 1, the tree is more or less spreading. The trees are listed from the highest to the lowest height/width ratio; actual dimensions are given in parentheses.

#### HEIGHT/WIDTH RATIOS OF REPRESENTATIVE MAPLES AT THE ARNOLD ARBORETUM

- 3.6 *Acer saccharum* 'Temple's Upright' (54 x 15 feet)
- 2.5 *Acer platanoides* 'Erectum' (42 x 17 feet)
- 2.2 *Acer saccharum* 'Newton Sentry' (60 x 27 feet)
- 2.1 *Acer rubrum* 'Columnare' (63 x 30 feet)
- 1.5 *Acer saccharinum* (103 x 88 feet)



*The flowers of the Red Maple appear before the leaves have begun to expand.*  
Photo: H. Howard.



*The flowers and expanding foliage of "Japanese-type" Maples. Above, *Acer pseudosieboldianum*; below, *A. palmatum* 'Burgundy Lace'.  
Photos: M. Rosenfeld, P. Chvany.*





*The flowers and foliage of Acer pensylvanicum (above) and A. ginnala (below). Photos: P. Chvany, R. Weaver.*



- 1.3 *Acer tegmentosum* (44 x 35 feet)
- 1.2 *Acer platanoides* 'Schwedleri' (60 x 51 feet)
- 1.2 *Acer triflorum* (36 x 60 feet)
- 0.9 *Acer griseum* (35 x 39 feet)
- 0.8 *Acer mono* (38 x 45 feet)
- 0.8 *Acer tataricum* (30 x 39 feet)
- 0.7 *Acer carpinifolium* (multiple trunks) (24 x 37 feet)
- 0.7 *Acer palmatum* var. *heptalobum* (28 x 38 feet)
- 0.7 *Acer palmatum* 'Sanguineum' (27 x 38 feet)
- 0.7 *Acer pseudosieboldianum* (18 x 25 feet)
- 0.5 *Acer capillipes* (multiple trunks) (26 x 50 feet)

Large Trees (more than 50 feet tall at maturity):

**Norway Maple (*Acer platanoides*).** In cultivation in this country, this species seldom grows more than 75 feet tall. The crown is typically even, dense and rounded, nearly as broad as tall. Although it is fast growing and cheap, and it has attractive flowers and good autumn color, the Norway Maple is not as desirable as most of the other species in this section. It tolerates air and salt pollution reasonably well, but its shallow roots cause heaving of sidewalks as the tree matures, therefore limiting its use for street planting. Grass cannot compete with a Norway Maple for water, nor can it survive in the dense shade cast by the tree. Therefore this species is also unsuitable as a lawn tree, unless the branches are periodically thinned.

The following cultivars are distinctive for their rapid growth: 'Emerald Queen', 'Jade Glen', and 'Superform'. 'Cleveland', 'Colum-nare', and 'Summershade' are more upright in growth than the typical Norway Maples, all developing a regular, broadly oval crown.

**Red Maple (*Acer rubrum*).** This relatively fast growing native tree develops an open, somewhat irregular crown at maturity. Height and spread seldom exceed 60 feet. The foliage is not dense, and this is an excellent lawn tree, at least in rural or suburban areas where air pollution is not a serious problem. It should be used as a street tree only where salt is not applied during the winter. The cultivars 'Bowhall' and 'Scanlon' are more upright growing and more symmetrical than the species.

**Silver Maple (*Acer saccharinum*).** Typically a tree with a tall, irregularly spreading crown, this is among the largest of all Maple species. Specimens more than 90 or even 100 feet tall are not unusual. Although it is a graceful and very beautiful tree, the wood is brittle, limiting its usefulness for planting along streets or close to buildings. The roots in addition have a reputation for invading water mains and sewer pipes.



*The form of various Maples. Upper left, Acer saccharum 'Temple's Upright'; upper right, A. saccharum 'Newton Sentry'; lower left, A. rubrum 'Columnare'; lower right, typical A. rubrum. Photos: D. Wyman, M. Rosenfeld, H. Howard, H. Howard.*

**Sugar Maple (*Acer saccharum*).** A stately tree with a regular crown typically somewhat taller than broad, this species occasionally reaches a height of 100 feet. It makes a magnificent specimen tree for lawn planting. Although it casts quite a dense shade, grass generally does well beneath it. Sugar Maples cannot tolerate air pollution and they are unsuitable as street trees in areas where salt is applied during the winter.

**Sycamore Maple (*Acer pseudoplatanus*).** This European plant is similar to the Norway Maple in its mature size and form, but its crown is less dense. It is a stately tree with attractive bark, but its foliage is somewhat coarse. Perhaps this tree's outstanding attribute is its salt tolerance, thus it is one of the best deciduous trees for seaside planting.

#### Columnar or Fastigiata Forms :

Several upright growing cultivars have already been mentioned, but these still have a rather broad crown. Those briefly described here are distinctly narrow, with the crown less than half as broad as tall. All of the following are more or less formal in aspect. They grow about as tall as their normal counterparts, but their spread will be less than half; they are also somewhat slower in growth. The number in parentheses following the names of the plants below is the height/spread ratio of the specimens at the Arnold Arboretum.

#### **Norway Maple (*Acer platanoides*).**

'Erectum' (2.5) — a narrowly upright form of rather graceful aspect; far superior to normal Norway Maples for street planting.

#### **Red Maple (*Acer rubrum*).**

'Columnare' (2.1) — less formal than many columnar forms because of its somewhat irregular outline; autumn coloration more orange than scarlet.

'Armstrong' — slightly narrower and more symmetrical than the preceding.

#### **Sugar Maple (*Acer saccharum*).**

'Newton Sentry' (2.2) — a beautifully shaped tree with a symmetrical, conical crown; very formal in appearance.

'Temple's Upright' (3.6) — the narrowest of all the Maples discussed here; the branches very stiffly erect, the crown broadest at the top.



An old specimen of the Paperbark Maple. Photo: P. Bruns.

Medium Size Trees (30 to 50 feet tall at maturity):

**Painted Maple (*Acer mono*).** An exceptionally attractive plant, with a symmetrical, broad, low, umbrella-shaped crown, this species is unfortunately rare in cultivation. Maximum height is about 40 feet with a spread of slightly more. The texture of the foliage is similar to that of the Japanese Maples, but more dense. Casting a moderate shade, this is a fine specimen lawn tree.

**Paperbark Maple (*Acer griseum*)** and related species (*A. mandshuricum*, *A. nikoense*, and *A. triflorum*). All of these have unique ornamental features which were mentioned earlier, but they are similar

in size and form and therefore are treated together. They are certainly among the most desirable of all medium size trees for specimen planting. The crown is open, somewhat irregularly rounded or broad oval, and many specimens branch a few feet from the ground. Maximum height and spread is approximately 40 feet.

**Snake-bark Maples** (*Acer capillipes*, *A. davidii*, *A. grosseri*, *A. pennsylvanicum*, *A. rufinerve*, *A. tegmentosum*). These again are fine lawn trees where a specimen of intermediate size is desirable. All are occasionally multi-trunked trees, and then they are spreading and umbrella-shaped. More typically, perhaps, they grow with a single trunk, and then the crown is irregularly rounded or oval. Maximum height and spread is generally 30 to 40 feet (but see *A. capillipes* in table above.)

Small Trees (12 to 25 feet tall at maturity):

**Amur Maple** (*Acer ginnala*) and **Tatarian Maple** (*A. tataricum*). Both of these occasionally grow larger than 25 feet tall. Young specimens are bushy in habit, but as they mature they assume a broad moundlike or umbrella-shaped crown, with several trunks. They can be grown with a single trunk, however, and then might be useful for street planting when small trees are desirable. Suckers,



however, would have to be kept under control. Both of these species are quite hardy and tolerant of dry soils and would be good screen plants for colder areas.

**Hornbeam Maple (*Acer carpinifolium*).** Normally a spreading tree with several small trunks, this tree is very rare in cultivation. Its form and its unusual (for a Maple) foliage are most graceful, but autumn coloration is poor. It would be a fine tree for a patio where an informal effect is desirable.

**Japanese-type Maples (*Acer circinatum*, *A. japonicum*, *A. palmatum*, *A. pseudosieboldianum*, and *A. sieboldianum*).** These are certainly among the most elegant of small trees, and their landscaping uses are infinite. Most develop their best form in full sun, however, and they do not grow well in dry soil. The first two species listed above are not vigorous in Zone 5 and at least *A. japonicum* is often shrubby in this climate. The dissected forms of *A. palmatum* are also shrublike, the weeping branches forming a red or green mound at maturity. The remaining forms of *A. palmatum*, and typical *A. pseudosieboldianum* and *A. sieboldianum* form gracefully spreading small trees, with multiple trunks or with a single trunk branched close to the ground. The habit of all three is similar, except that the crowns of the last two are typically more open with the branches in more horizontal planes.

#### HARDINESS

All of the Maples mentioned in this article are hardy in at least Zone 5, although *Acer davidii*, *A. grosseri*, and *A. japonicum* are not vigorous there. A number of species are perfectly hardy further north. The hardiest species, and their hardiness zone according to Rehder are listed below.

##### Zone 2

- Acer ginnala* (Amur Maple)
- Acer negundo* (Box Elder)
- Acer spicatum* (Mountain Maple)

##### Zone 3

- Acer pennsylvanicum* (Striped Maple)
- Acer platanoides* (Norway Maple)
- Acer rubrum* (Red Maple)
- Acer saccharinum* (Silver Maple)
- Acer saccharum* (Sugar Maple)

##### Zone 4

- Acer campestre* (Hedge Maple)
- Acer mandshuricum* (Manchurian Maple)
- Acer tataricum* (Tatarian Maple)
- Acer tegmentosum* (Manchurian Striped Maple)

The low, weeping growth typical of the 'Dissectum' types of *Acer palmatum*.  
Photo: D. Wyman.



*The habit of some small to medium-sized Maples. Above, Acer pseudosieboldianum; below, A. palmatum 'Sanguineum' in front of A. mono.*  
Photos: R. Weaver.



NURSERY SOURCES

Following is a list of the Maple species and cultivars discussed in this article which are in the American nursery trade, together with the nurseries which have listed them in recent years. Addresses of the nurseries are at the end; those nurseries printed in capital letters are exclusively wholesale. The Maples with no sources given are generally available at any large nursery.

- A. *buergerianum* — Gossler, Greer, HOLLANDIA, Mellinger's, MONROVIA, SCANLON, Silver Falls, VIEWCREST.
- A. *capillipes* — Greer, GULFSTREAM.
- A. *circinatum* — COLE, Eddie, Fiore, Greer, Light's, MALMO, Robin, Rose-dale, Silver Falls, Siskiyou, TEUFEL, Wild Garden.  
'Monroe' — Greer.
- A. *davidii* — GREENBRIER, Greer, Gossler, HOLLANDIA, MELLINGER'S.
- A. *ginnala* — too many sources to list.
- A. *griseum* — too many sources to list.
- A. *grosseri (hersii)* — Eddie, Greer, Gossler, HOLLANDIA.
- A. *japonicum* —  
'Aconitifolium' — Brimfield, Greer, Raraflora, TEUFEL.  
'Aureum' — Brimfield, Greer, Palette, Raraflora, Spingarn, VERMEULEN.
- A. *negundo* — too many sources to list.  
'Variegatum' — Raraflora, TEUFEL.
- A. *nikoense* — Girard, Gossler, HOLLANDIA, Robin.
- A. *palmatum* — too many sources to list.  
'Aoyagi' — Greer.  
'Atrolineare' — Greer.  
'Atropurpureum' — too many sources to list.  
'Bloodgood' — BOYD, GREENBRIER, Greer, HESS, HILL'S, LAKE COUNTY, MONROVIA.  
'Burgundy Lace' — COTTAGE, Greer, HESS, MONROVIA, Park, Raraflora, TEUFEL.  
'Butterfly' — Greer.  
'Dissectum' — too many sources to list.  
'Everred' — Brimfield, Greer, TEUFEL.  
'Filigree' — Greer.  
'Garnet' — Greer.  
var. *heptalobum* — Greer.  
'Linearilobum' — Greer.  
'Oshio-beni' — Comerford's, Greer, HESS, Jackson & Perkins, MONROVIA, Park, Raraflora, TEUFEL, VERMEULEN, Weston.  
'Red Pygmy' — Greer.  
'Roseo-marginatum' — Greer, HESS.  
'Sangara-nishiki' — Greer.  
'Sango-kaku' ('Senkaki', 'Corallinum') — Brimfield, Comerford's, Greer, HESS, HOLLANDIA, TEUFEL, Tingle.  
'Sherwood Flame' — Greer.  
'Tsumagaki' — Greer.  
'Viridis' — Brimfield, Greer, HESS, Jackson & Perkins, TEUFEL.  
'Waterfall' — Brimfield, Greer.
- A. *pensylvanicum* — Brimfield, Dutch Mountain, Gardens of the Blue Ridge, Greer, Sinclair.

- A. platanoides* and cultivars — too many sources to list; the following nurseries offer a large selection of cultivars: COLE, Fiore, LAKE COUNTY, Lafayette, PRINCETON, SCANLON, Sheridan, TEUFEL.
- A. pseudoplatanus* — Fiore, HILL'S, Littlefield-Wyman, PRINCETON, Weston.
- A. rubrum* — too many sources to list.  
 'Armstrong' — BOYD, COLE, COTTAGE, Lafayette, LAKE COUNTY, Light's, Sheridan, TEUFEL.  
 'Autumn Flame' — Atlantic, BOBBINK, BULK'S, COLE, Lafayette, Weston.  
 'Bowhall' — COLE, Lafayette, LAKE COUNTY, TEUFEL.  
 'Columnare' — COLE, Dauber's, Fiore, Lafayette, PRINCETON, Sheridan, TEUFEL.  
 'October Glory' — too many sources to list.  
 'Red Sunset' — COLE, COTTAGE, LAKE COUNTY, TEUFEL, Weston.  
 'Schlesingeri' — HESS, HILL'S, Lafayette, TEUFEL, Weston.
- A. rufinerve* — Greer, Gossler, HOLLANDIA, MONROVIA, Tingle.
- A. saccharinum* — too many sources to list.  
 'Laciniatum' ('Wieri') — Fiore, Hinsdale, Robin, Sheridan, TEUFEL.
- A. saccharum* — too many sources to list.  
 'Green Mountain' — Bachman's, COLE, Corliss Bros., Lafayette, LAKE COUNTY, Light's, MILLCREEK, PRINCETON, SHENANDOAH.  
 'Newton Sentry' ('Columnare') — BOYD, Dauber's, Fiore, Lafayette, PRINCETON, SCANLON.  
 'Sweet Shadow' — Weston.  
 'Temple's Upright' ('Monumentale') — Brimfield, Cole, Dauber's, Fiore, HILL'S, PRINCETON, Raraflora, TEUFEL, Weston.
- A. sieboldianum* — Greer.
- A. spicatum* — Dutch Mountain, Gardens of the Blue Ridge, Sinclair.
- A. tataricum* — COLE, COTTAGE, Dauber's, HILL'S, Valley.
- A. tegmentosum* — Greer, Tingle.

## ADDRESSES

- Atlantic Tree Service, Inc.  
 2 Church Street, Tariffville, Connecticut 06081
- Bachman's, Inc.  
 6010 Lyndale Avenue South, Minneapolis, Minnesota 55423
- Bobbink Nurseries, Inc.  
 P. O. Box 124, Freehold, New Jersey 07728
- Boyd Nursery Co., Inc.  
 P. O. Box 71, McMinnville, Tennessee 37110
- Brimfield Gardens Nursery  
 3109 Main Street, Rocky Hill, Connecticut 06067
- Bulk's Nurseries, Inc.  
 610 West Montauk Highway, Babylon, L.I., New York 11704
- Cole Nursery Co.  
 R. D. #1, Route 1, Circleville, Ohio 43113
- Corliss Bros. Garden Center  
 Essex Road, Ipswich, Massachusetts 01938
- The Cottage Gardens, Inc.  
 Rt. #3, South Waverly & Bishop Roads, Lansing, Michigan 48910
- Dauber's Nurseries  
 1705 N. George Street, Box 1746, York, Pennsylvania 17405

- Dutch Mountain Nursery  
Augusta, Michigan 49012
- H. M. Eddie & Sons  
4100 S. W. Marine Drive, Vancouver, British Columbia, Canada
- Charles Fiore Nurseries, Inc.  
Prairie View, Illinois 60069
- Gardens of the Blue Ridge  
Ashford (McDowell County), North Carolina 28603
- Girard Nurseries  
#4 North Ridge East, Geneva, Ohio 44041
- Gossler Farms Nursery  
1200 Weaver Road, Springfield, Oregon 97477
- Greenbrier Farms, Ltd.  
412 Thracher Road, Chesapeake, Virginia 23320
- Greer Gardens  
1280 Goodpasture Island Road, Eugene, Oregon 97401
- Gulfstream Nurseries  
Wachapreague, Virginia 23480
- Hess Nurseries  
P. O. Box 326, Route 553, Cedarville, New Jersey 08311
- Hill's Nurseries  
Warsaw, Kentucky 41095
- Hinsdale Nurseries  
7200 S. Madison Road, Hinsdale, Illinois 61257
- Hollandia Gardens  
10125 37th Avenue NE, Seattle, Washington 98125
- Jackson & Perkins Co.  
Box 1028, Medford, Oregon 97501
- Lafayette Home Nursery  
Box 148, Route 17, LaFayette, Illinois 61449
- Lake County Nursery Exchange  
Box 122, Route 84, Perry, Ohio 44081
- Light's Landscape Nurserymen  
9153 East D. Avenue, Richland, Michigan 49083
- Littlefield-Wyman Nurseries  
227 Centre Avenue, Abington, Massachusetts 02351
- Malmo Wholesale Nurseries  
4700 25th Avenue, Seattle, Washington 98901
- Mellinger's, Inc.  
2310 W. S. Range Road, North Lima, Ohio 44452
- Millcreek Nurseries  
Corner Ketch, Route 3, Newark, Delaware 19711
- Monrovia Nursery Co.  
Box Q, 18331 E. Foothill Blvd., Azusa, California 91702
- Palette Gardens  
26 W. Zion Hill Road, Quakertown, Pennsylvania 18951
- George W. Park Seed Co.  
Greenwood, South Carolina 29646
- Princeton Nurseries  
Box 191, Princeton, New Jersey 08540
- Raraflora  
Fred W. Bergman, 1195 Stump Road, Feasterville, Pennsylvania  
19047
- Clyde Robin  
Box 2091, Castro Valley, California 94546

Rosedale Nurseries

Saw Mill River Parkway, Hawthorne, New York 10532

Edward H. Scanlon & Associates

7621 Lewis Road, Olmstead Falls, Ohio 44138

Shenandoah Nurseries

Box 99, 301 Wabash Avenue, Shenandoah, Iowa 51601

Sheridan Nurseries

100 Sherway Drive, Etobicoke, Ontario, Canada

Silver Falls Nursery & Christmas Tree Farm

Silver Falls Highway, Star Route, Box 55, Silverton, Oregon 97381

Siskiyou Rare Plant Nursery

522 Franquette Street, Medford, Oregon 97501

Francis M. Sinclair

R. F. D. 1, Newmarket Road, Exeter, New Hampshire 03833

Joel W. Spingarn

1535 Forest Avenue, Baldwin, New York 11510

Alfred Teufel Nursery

12345 N.W. Barnes Road, Portland, Oregon 97229

Tingle Nursery Company

Pittsville, Maryland 21850

Valley Nursery

Box 845, 2801 N. Montana, Helena, Montana 59601

John Vermeulen & Son, Inc.

Box 267, Woodfern Road, Neshanic Station, New Jersey 08853

Viewcrest Nurseries

9617 N. E. Burton Road, Vancouver, Washington 98662

Weston Nurseries

Hopkinton, Massachusetts 01748

The Wild Garden

George Schenk, 8243 N.E. 119th, Kirkland, Washington 98033

## Arnoldia Reviews

**Color In The Sky. Flowering Trees In Our Landscape.** Edwin A. Menninger. Stuart, Florida: Horticultural Books, Inc. 1975. 260 pp., illustrated. \$14.95.

This book is deceptive in title and as a result may be disappointing to the unwary. The subtitle might have read more properly, "Flowering Trees In A Florida Landscape." There are 211 numbered black and white photographs, many of poor quality, and but six colored plates to document the title. Within the first seven illustrations are *Aesculus*, *Eucryphia* and *Magnolia*, not otherwise mentioned in the text and species not grown in Florida. All others are of tropical or subtropical plants. With the exception of the foreword written in 1971 by George Lawrence and the acknowledgements, prologue, and possibly the single page on *Barklya*, the material has been published previously and in this volume reproduced by offset, retaining the original one- or two-column format.

Dr. Menninger's contributions have been enjoyable and worthwhile, descriptive and, often provocative, reading. This might be considered an anthology of many of his articles issued between 1951 and 1974. If so, it is regrettable that an effort was not made to correct the errors in nomenclature perpetuated here. *Canangium*, for example, is not correct in spite of the impression one derives from a forceful footnote, for *Cananga* (A. DC) Hooker & Thompson, is a conserved name. *Stenolobium stans* cannot be used since *Bignonia stans* L. is the type of *Tecoma juss.* and of *Tecoma stans* (L) Juss. as indicated in all recent tropical floras. *Peltophorum pterocarpum* (DC) Heyne is the correct name for *P. inerme*. Woody species of *Datura* are now generally recognized in the genus *Brugsmannia*. Plates 146 and 147 are used twice, while the plates and text of many of the *Bauhinia* species are not in agreement, etc. The author states the chapters "are printed here just as they originally appeared, including many inconsistencies. Botanical nomenclature has undergone radical changes, word forms and compounds and even meanings have shifted in that time, but no matter." It does matter to many of us. This might have been a useful volume.

RICHARD A. HOWARD

**Handbook of Wild Flower Cultivation.** Kathryn S. Taylor and Stephen F. Hamblin. New York: Collier Books. 1976. 307 pp., illustrated. \$4.95.

First published in hard cover in 1963, this handbook has been an invaluable aid to all who are interested in wild flowers and their propagation. It is a pleasure to see it now in paperback, thus hopefully reaching an even wider audience.

Another review would be redundant, as this book over the years has been such a well-known and essential guide to every aspect of wild flower cultivation.

The excellent presentation, useful appendices on cultural requirements and bibliography, the comprehensive glossary and the lovely, delicate drawings by Catherine R. Hammond are still a delight to the reader.

CORA L. WARREN

**Rhododendrons in America.** Ted Van Veen. Portland, Ore.: Sweeney, Krist and Dimm, Inc. 1969. 176 pp., illustrated. \$20.00.

This marvelously illustrated volume addresses itself to Rhododendron enthusiasts in every climate, whether they be homeowners, landscape designers, or nurserymen. It contains a comprehensive discussion of choosing, planting, and maintaining the plants, with a moderate position in respect to the chemical fertilizer/organic amendment controversy.

The heart of the work is, however, the presentation of more than two hundred color photographs judged by the reviewer to be of the highest quality. For example, the chromatic difference between *Rhododendron elegans* and *R. superbum* is accurately shown. There is a table of selected species and hybrids listing ancestry, plant height, month of bloom, and minimum temperature endured.

The presentation pays attention to the new dwarfs, so useful for foundation planting in the West Coast where the grower-author carries on his work; also considerable space is devoted to the rock garden use of Rhododendrons. This up-to-date treatment even includes material on greenhouse forcing of Rhododendrons, their display indoors, and the use of chemical growth regulators.

ELINORE B. TROWBRIDGE

**Wild and Old Garden Roses.** Gordon Edwards. New York: Hafner Press, Macmillan Publishing Co. 1975. 162 pp., 31 color plates, 38 drawings. \$9.95.

An "American edition" of a successful British publication by the same name. The author has grown 130 of the 240 roses described and reports with pleasing personal impressions. An appendix lists where to see wild and old roses in botanical gardens in the United States. The colored plates are excellent. Regrettably no sources are given for the varieties, and a check of several specialty catalogues failed to list any of the plants sought.

RICHARD A. HOWARD

**The Alaska-Yukon Wild Flowers Guide.** Helen A. White, editor. Anchorage: Northwest Publishing Co. 1974. viii + 218 pp., illustrated. \$7.95.

Travelers to Alaska (and residents of the state) interested in identifying the region's beautiful wildflowers either have had to consult one of the floras that really were compiled for use by trained botanists, or had to try

one of the guide books for the Pacific Northwest or the Rocky Mountains that are not very applicable to Alaska. This book from *Alaska* magazine is designed to fill this void. For each of over 160 species there is a color photograph (more than one in a few cases), a line drawing, and a paragraph of text. At the end of the book is a short article on "Wild flowers in your garden" (throughout this section, it is emphasized that rare and endangered species are not to be molested), a glossary of botanical and ecological terms, a bibliography, and indices of the plants by family name, by botanical name, and by common name. The actual extent of involvement of E. Hultén, S. L. Welsh, and L. A. Viereck with this book is not clear, but if these three authorities on Alaskan plants approved the text and checked the identification of the photographs, then we may be sure that the material presented is accurate.

From a magazine such as *Alaska*, one would expect fine photographs, and, in general, those in the book are very good. The quality of printing is first-rate, and the color balance of most of the plates is tolerably accurate. A few photographs are out of focus and/or overexposed. For some reason, compilers of picture flowers books select the worst possible photographs for double-page spreads, and that certainly is the case with this book, particularly pages 50-51 and 138-139.

The simple line drawings are pleasing, accurate, and appear to have been drawn from living plants. Features not shown in the photographs, such as habit, underground parts, leaves, and fruits, are often depicted in the drawings. This combination of a colored photograph and a line drawing of each species enhances the usefulness of the book.

The paragraph of text associated with the photographs gives the height of the plant (a description is not given), the habitat, the geographical distribution of the species in Alaska and elsewhere, and other useful and interesting bits of information. Particularly noteworthy is the attention given to poisonous plants. Special boxes under *Astragalus*, *Oxytropis*, *Castilleja*, and *Pedicularis* point out the taxonomic complexities of these genera.

KENNETH R. ROBERTSON

**Fern Growers Manual.** Barbara Joe Hoshizaki. New York: Alfred A. Knopf. 1975. 256 pp., illustrated. \$15.

It has been said with reverence and admiration that if the Lord created all plants, then ferns were made to show what could be done with a leaf. This excellent volume displays in text and photographs the range of variation in a significant section of the plant kingdom and the attractiveness and usefulness of non-flowering plants.

Ferns vary in size from a few millimeters to many meters in length and height. They may be floating aquatic plants, epiphytes, climbers or terrestrial in habit. Although most attractive for the variations in texture and division of the leaf, they may have color in pubescence on the stems, in the iridescence of mature fronds. Reproduction is generally by the production of spores in sporangia, or cases interestingly grouped on the backs of the fronds, or only on special fronds. From the spores develops a free living sexual generation. Asexual or vegetative reproduction occurs naturally with the production of "buds" on the leaf surface or at the tip. Several ferns meet the general name of "walking fern" when the arching leaf tip is capable of developing roots and a new plant.

The hardness of the Boston fern, perhaps the most popular Victorian house plant, contrasts with the tenderness of the thin-leaved ferns often grown in bottle gardens. Pots of maiden hair ferns once decorated private banquet tables, and homes had fern rooms. This volume may return the fern to its rightful place in American horticulture.

Mrs. Hoshizaki writes for horticulture under the name of Barbara Joe. The bibliography clearly indicates her experience. Instructions are complete regarding the nature of ferns, their collection, introduction, maintenance and propagation. Genera of the cultivated ferns are treated in alphabetical order with useful species listed, and in summary form data are presented on height, form, and requirements for temperature, light, soil and water. One of the valuable appendices is a classification of ferns and fern allies. The index is excellent. Perhaps all that is missing is reference to botanical gardens that maintain collections of hardy outdoor ferns (e.g. Foster Botanical Garden, Garden in the Woods) or tender ferns in special display houses (e.g. Como Park, Kew, Longwood, Morris Arboretum).

RICHARD A. HOWARD

**The Description and Classification of Vegetation.** David W. Shimwell. Seattle: University of Washington Press. 1972. 322 pp., 70 figures. \$10.50

A technical reference volume that reviews the methods used by ecologists and phytosociologists of North America and Europe to describe and classify the vegetation on the earth. An excellent historical review of a special field of botany.

RICHARD A. HOWARD

#### DIVIDEND PLANTS

During spring of 1976 many members received a plant of *Syringa nancieana* 'Rutilant'. Because of a shortage of plant material, some of you had nothing but an empty mail box. The propagation department is busy rooting cuttings and, barring a crop failure, these will be mailed out during spring 1977 to all members who missed out on this year's mailing.



*Albizzia julibrissin.* Photo: P. Chvany.



*ARNOLDIA* is a publication of the Arnold Arboretum  
of Harvard University, Jamaica Plain, Massachusetts, U.S.A.

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# ARNOLDIA

*The Arnold Arboretum Vol. 36, No. 5 Sept./Oct. 1976*

## *Contents*

E. H. Wilson, Photographer  
PETER J. CHVANY

*ARNOLDIA* is a publication of the Arnold Arboretum  
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President and Fellows of Harvard College.*

*Cover: On his third trip to China (the first for the Arnold Arboretum) E. H. Wilson is shown on his houseboat, "Harvard," with his companion, Zappy, and his native collectors.*

# E. H. Wilson, Photographer

by PETER J. CHVANY \*

The achievements of Ernest Henry "Chinese" Wilson as a plantsman are familiar to countless plant enthusiasts throughout the world. Few temperate areas have been unaffected by his collections and introductions, yet his other activities and interests remain largely obscure. A widely read author, popular public lecturer, and interesting correspondent, Wilson also was an accomplished photographer who produced a body of work that deserves to be viewed not only for its scientific merits, but for its aesthetic qualities as well.

Throughout his travels Wilson carried at least one camera, making a total of over 5000 glass plate photographs for the Arnold Arboretum of the plants and locales to which his journeys took him, plus an estimated 5000 nitrate-base negatives for himself. At one time his photographs, sold as a large collection and as the individual illustrations in his books, carried his view of China and especially her plants across the occident.



*Wilson, his "Boy," or head bearer, and a bag of pheasants after a day's shoot.*

\* Peter Chvany is the producer of the two award-winning films, "The Arnold Arboretum" and "Poisonous Plants." He also is a contributing photographer to Arboretum publications.

It is difficult to assess Wilson's early photographic training. Beyond the evidence that he took photos on the 1899 and 1903 Veitch expeditions, and his friendship with E. J. Wallis, a photographer at Kew, we know little of a substantive nature.

We should note however, that Wilson was not a professional photographer and as far as can be determined never evidenced great concern about the technical side of his photographic efforts. He sent his plates to England for processing, an expediency that may place him beyond the artistic pale in the view of modern photographers; indeed, his work contains its share of plates that are technically of a low quality. But he recognized the value of a camera as an instrument that could, with proper use, record whatever was put in front of it, and he conscientiously used it for this purpose.

Wilson had carried a "snapshot" camera on his first two journeys to China for the Veitch Nurseries. Charles Sprague Sargent, the Director of the Arnold Arboretum, insisted that he make photography an important part of his work during the trips he was to make for this institution. On the 6th of November, 1906, Sargent wrote to Wilson in England:

Dear Mr. Wilson:

I write again to remind you of the very great importance of the photograph business in your new journey. A good set of photographs are really about as important as anything you can bring back with you. I hope therefore you will not fail to provide yourself with the very best possible instrument you can, irrespective of cost, and it ought to be large enough to take pictures  $8\frac{1}{2} \times 6\frac{1}{2}$ , and you ought to get a stout leather case in which to have it carried. It would be well too, to take along a small instrument in case of accident. The large instrument only means another porter, and that is not a very important item. Bring, too, enough plates and films with you as there will certainly be a large amount of material to photograph.

Sargent also wrote to a dear English friend, horticulturist Ellen Willmott, asking her to use her influence and reinforce certain points.

Dear Miss Willmott:

Wilson will be leaving, I hope, about the 1st of December, but before he leaves I think it would be well for you to have a talk with him about those things which you are specially interested in and which you want him to collect. This would stimulate his interest I am sure and would, on the whole, be more satisfactory than if I talked to him more generally on the subject.

I am very anxious that he should take a good series of photographs and I have already written him on the subject. Please impress the importance of his doing this and of providing himself with the very best possible camera without regard to its cost. I wrote him, too, to take lessons in photography, and this is another thing which I hope you will insist on with him. Even if he is to delay starting for a week or two it would be best for him to be thoroughly equipped as a photographer.

In the letters between Sargent and Wilson we never obtain a clear statement of Sargent's wishes for the eventual use of the photos,



*A view of the Yangtze River at Ichang; in the background are the hills in which Wilson collected.*

nor of Wilson's understanding of his photographic goals. We do know that as Sargent was developing the Arnold Arboretum he took care to obtain a photographic record of the activities and to secure botanically interesting photographic prints whenever possible from around the world. The Arboretum collection of that period includes not only the work of Wilson, but also material from Joseph Rock, Frank Meyer, Ernest Palmer, and Herbert Gleason, as well as the prints of many other men.

Wilson in his book, *A Naturalist in Western China*, describes the difficulties he met on his expeditions to the interior of China. From the coast for a thousand miles inland the country was a heavily populated alluvial plain with isolated chains of mountains rising from the agricultural flat; but at the city of Ichang, miles inland on the Yangtze River, the flat land abruptly changed to wilder terrain. The rivers no longer wandered across the plains but ripped their way through cliffs of stone. Here the population thinned, was poorer, and while centuries of Chinese and aboriginal kingdoms had left their marks, much of the land was still wild.

From here Wilson began his explorations. With his Chinese collectors and coolies he traversed the unkempt roads and savage countryside of Szechuan and Hupeh, sleeping in the poor inns and crossing barren mountains past fresh graves of men killed by robbers as he searched for the plants on which his fame would rest.

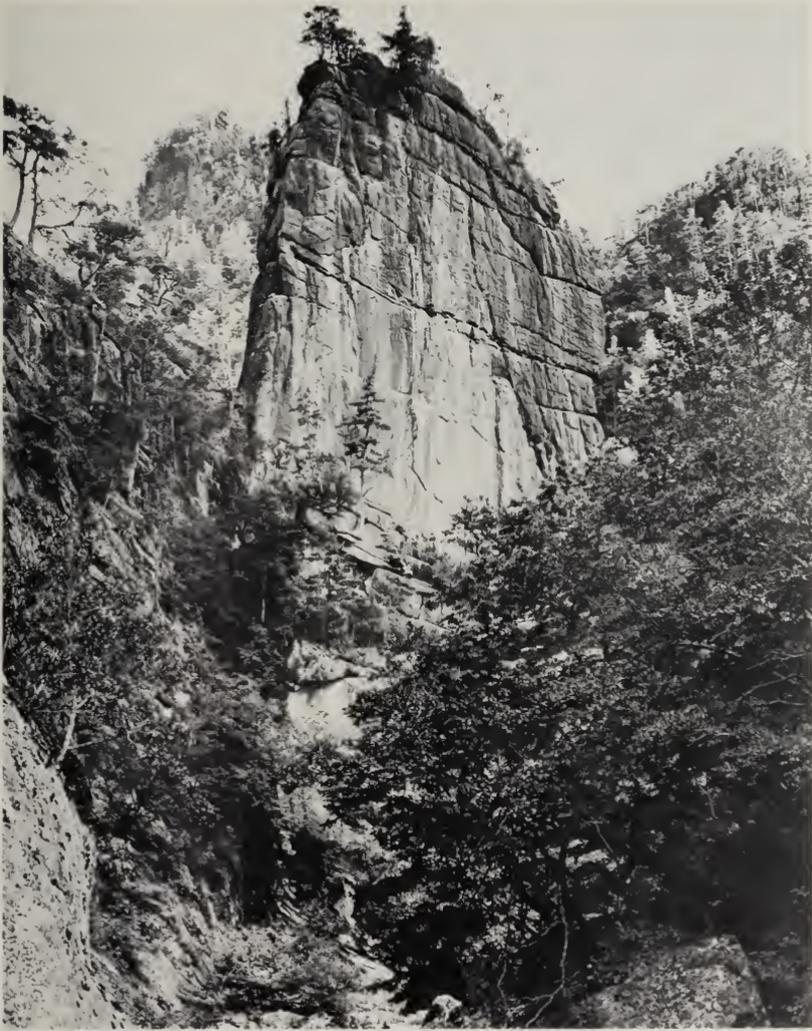


*Wilson's travels took him to the edge of Tibet across high passes where 21,000-foot mountains rose over the path. He skirted the grave of a man recently murdered by bandits (below), and passed through countless narrow though picturesque ravines.*





*This crude log bridge and fast torrent are typical of the back country conditions Wilson faced in China.*



*Towering cliffs, narrow ravines, and trees on Wilson's arduous path.*



*Wilson's sedan chair is seen amidst the bundles and coolies he needed to carry them. The chair was supposed to confer status to a traveler, which was important for foreigners in China. In A Naturalist in Western China, Wilson said he rarely used this chair.*



*Wilson frequently included in his tree photographs enough background to provide secondary areas of interest. This photo of a *Cornus ulotricha* taken beside a trail in western Szechuan helps to give an idea of what travel was like for him and his coolies and collectors.*

We may catalog the incidents of extreme danger only by the most careful examination of Wilson's letters, journals, and books, for he rarely ventured to comment in more than a few words on his personal perils. On occasion he told of the disastrous landslide that broke his leg, leaving him with a lifelong impediment; of the capsizing of his boat in a treacherous Yangtze River rapid with the loss of a

large quantity of his photographic plates; and of his near death on a cliff where only the quick action of one of his coolies saved him from plummeting hundreds of feet.

Except for an occasional glimpse or two, we are not privy to his daily battles to secure good photos. However there is one brief account that is revealing.

"May 30 — Wen-tsaο. On a precipitous slope facing our lodgings a score or more *Davidia* trees occur; they are one mass of white, and are most conspicuous as the shades of night close in. Two large trees of *Pterostyrax hispidus* are growing amongst these *Davidias*, and are laden with pendulous chains of creamy-white flowers."

"May 31 — Go over and investigate the *Davidia* trees and the forests generally. Crossing a narrow neck a wood-cutters' circuitous path leads us down to a narrow defile through a fine shady wood. Ascending a precipice with difficulty, we soon reach the *Davidia* trees. There are over a score of them growing on a steep, rocky declivity; they vary from 35 to 60 feet in height, and the largest is 6 feet in girth. Being in a dense wood they are bare of branches for half their height, but their presence is readily detected by the numerous white bracts which have fallen and lie strewn over the ground. The tree starts up from below when felled; indeed, it naturally throws up small stems after it gets old. The bark is dark and scales off in small, irregular flakes. By climbing a large *Tetracentron* tree growing on the edge of a cliff and chipping off some branches to make a clear space, I manage to take some snapshots of the upper part of the *Davidia* tree in full flower. A difficult task and highly dangerous. Three of us climb the tree to different heights and haul up axe and camera from one to another by means of a rope. The wood of *Tetracentron* is brittle, and the knowledge of this does not add to one's peace of mind when sitting astride a branch about 4 inches thick with a sheer drop of a couple of hundred feet beneath. However, all went well, and we drank in the beauties of this extraordinary tree."

This description is from the Veitch expeditions. Unfortunately, all but a few of the photos taken on these are thought to be lost, although an active search for them is being conducted both here and in England. Not only are we deprived of pictures that could help us trace Wilson's development as a photographer, and of more views of the trees and plants of China, but we are unable to see a very special difference between the dove tree, as Wilson would say, "at home," and as it appears in Europe and America. In China the tree produces its hanging white bracts and flowers before the leaves so that it stands forth with its bracts fully exposed to view. In Western climates, the tree leafs and then flowers so that the bracts are seen partially obscured.

The trails, paths and unmaintained roads Wilson travelled amidst the rough Chinese terrain would not permit carts, so twenty coolies transported his supplies. As a personal camera, he carried a small roll-film type, but for the Arboretum photos he chose a Sanderson whole plate field camera complete in three heavy boxes with bellows and a stout wooden support tripod. This tripod, incidentally, provided the splint when Wilson was injured in the landslide.



*The great majority of Wilson's photos are of single trees seen against a general background, although many of his best pictures include specific secondary details such as the opium poppies and shrine in this picture of a Ficus lacor.*



*Wilson made many plates in other areas, although they are not as well known as his photos of China. This Widdringtonia juniperoides was photographed in South Africa in 1922. It not only shows the tree beautifully but also evokes a feeling for the land in which the tree is found.*



Many photos of single trees also include at least one human figure, usually to provide a sense of scale and the exotic locale of the specimen. This particular photo shows the type of tree on which the species *Ormosia hosiei* is based.



*Wilson's note on this Gleditsia photograph states that "the boards are votive offerings to the healing spirit who is supposed to dwell in the tree."*



*This Sciadopitys verticillata 'Pendula' growing on temple grounds in Japan shows an unusual form. Wilson frequently noted the debt owed the priests of Japan and China who preserved many special trees on their temple grounds when all else was cleared for agriculture.*



*This photo of a Juniperus squamata shows props leaning against the cut-off branches, which have been taken to be used as incense.*



*Rheum alexandrae* with spikes 3 to 3 1/2 ft. tall, together with the low-lying *Primula involucrata* photographed growing near the Tibet-China border at 13,000 ft. elevation.

While awkward and heavy, and rapidly becoming obsolete, this old-style camera met the needs required of it. Each image to be photographed could be accurately composed and focused on the large ground glass screen at the rear of the camera, and it reproduced perspectives and tall objects without distortion.

The heaviest part of the apparatus was its fragile glass plates. They nevertheless had one special advantage: the emulsion permitted the recording of great detail and produced a high level of image quality. It is interesting to note that other photographers working at the same time as Wilson made similar choices; in fact they often utilized cameras with larger plate sizes. These other men, however, rarely were as far out of contact with civilization as he and did not have to carry the quantity of supplies or trek the same distances.

In the photographs of the first expedition, we find some clues to Wilson's approach to photography. As he journeyed from his take-off point at Ichang, he began to photograph the solitary trees that clearly revealed species characteristics. He also on occasion made a plate of an interesting shrub or herbaceous plant in bloom, while taking only a slightly lesser number of views of the Chinese land; its geographical or geological forms, its shrines and exotica. While

initially there are some plates that indicate difficulties with basic photographic techniques — a multiple exposure, some where staining has taken place, or where random and unwanted light has left its mark — the plates are generally of a rather uniform and more than adequate quality.

As the journey progresses, the balance of subjects shifts abruptly near the time that Wilson is moving rapidly back to Ichang to close off his expedition. Now we find more and more photographs of single trees, and while still of scientific merit, their aesthetic quality decreases. There are several possible reasons for this. We can deduce from Wilson's pattern of photography that earlier in his journey he was careful to save his plates, photographing only those trees that he knew he must have, but being prepared to perhaps expend extra effort in order to make each camera set-up and exposure as valuable as was possible. Husbanding his materials, he approached the end of his journey with a surplus of plates and may have begun to work more rapidly and with less selectivity.



*A rich man, his family, and friends.*



*As Wilson traveled he made a large number of photographs of the Chinese landscape. This picture reveals interesting facts about the land.*



*The large scale vistas Wilson photographed often reveal information regarding Chinese agriculture customs. Here the terracing and intensive cultivation of the hillside is of interest.*



A typical village in Western Szechuan.



*As he passed through the countryside Wilson occasionally stopped to photograph artifacts. This memorial arch to a good widow is typical.*



*Crossing and recrossing many bridges in his travels, Wilson photographed several different ones.*



*This bridge made of plaited bamboo is typical of many of the upland river crossings.*



*Wilson often took photographs of tree trunks to show bark patterns, or other interesting characteristics. These are the remains of *Cercidiphyllum japonicum* trees measuring 55 feet in girth — a remarkable size. Unfortunately, the specimens of these Wilson brought to Jamaica Plain from China have not survived.*



Wilson liked to show plants "at home," as he called it. This is a *Primula sinensis* growing on limestone cliffs.



Another "at home" photograph. *Cypripedium tibeticum*.



*Wilson had broad interests and noted not only the horticultural aspects of China, but its agriculture also. This field of *Platycodon grandiflorum* was grown to sell for medicine. Close examination of the photo reveals other crops.*



*The lotus flower, Nelumbo nucifera, growing across a pond.*



*In photos such as this of Primula polyneura, Wilson managed to convey not only a sense of the plant itself, but also of the conditions under which it grew in nature.*

Not only did Wilson perform his appointed tasks as a plant collector, but as a naturalist he made rich note of the surrounding scene in terms of geology, fauna and economic botany. In at least one or two photos we see Wilson himself (travelling at this time with another occidental) posed with his dog, "Boy," and his bag of 57 pheasants, and looking much as if he'd stepped off the English moors after an afternoon of hunting (page 181). There is in this photo a pleasant lack of formality on Wilson's part. Notice how he is looking off and not at the camera, obviously not posing himself in a rigid position until the photo is taken. Without the posturing for posterity we have the feeling that we are in the hands of a man we can trust, and if a contemporary audience would find little sympathy for the hunter with his kill, at least there is no pretension on the part of the hunter.

When Wilson made his expeditions, the circumstances that caused him to take a photograph would vary. In the case of the pictures he made for the Arnold Arboretum, it must be remembered that he had already been to China twice for Veitch and knew of trees whose locale was worth revisiting for pictures as well as seeds, cuttings, and specimens of the plants he needed.

The requirements of this collecting shaped his photographic activities in several ways. Typically, Wilson lived at one central location, making journeys to find plants at appropriate seasons, and often returning to collect again at a different time. Trees observed in flower needed to be seen in fruit. Trees recognized as superlative examples could be revisited on occasion and photographed, with lesser specimens eliminated because of their unsuitability.

Wilson's daughter, Muriel Primrose Wilson Slate, who travelled with her father on his 1914 expedition to Japan, has recently described the way in which he would scout the countryside for the subjects he wished to photograph. Then he would return, often leading a small caravan on foot; his wife in a sedan chair, Muriel on a small Russian pony, the heavy camera, plates, and tripod borne behind them. At the location of his selected tree, Wilson would proceed to circle and study it from different viewpoints, reviewing his initial perceptions, making certain that the tree would reveal itself when photographed. The trunk, the branching structure, the background and other details were checked until he was at last satisfied that one particular vantage point was best; then he would set up the camera.

On occasion the entire expedition would have to be repeated. Wind jostling the branches and leaves might keep the tree in constant motion and even after several hours delay it would not be still for a single exposure. A particular time of day and sun position would be awaited only to have it pass with too much wind, for Wilson preferred to have only the optimum light for his pictures.



*Wilson's photos often included typical architecture of an area. This is a castle of a rich family with woods of Pinus massoniana in the background.*



*The buildings of a farmhouse on the Chentu Plain are shown in this photograph.*



*Wilson and his men spent many nights in hostels and inns along the Chinese roads after long days of hiking. This new rural homestead was one of the inns.*



*As Wilson went deeper into the mountains, his accommodations changed, as can be seen from this hostel.*



*This is one of a series of four photos Wilson made of a European settlement in Central China. The foreign bungalows with Chinese motifs as trim, and the tennis court contrast sharply with the native structures that are closely integrated with the landscape.*



*Some irony occasionally surfaces in Wilson's work. In this photo of the city of Wan Hsien, the gray native structures contrast sharply with the white facades of a Western church and the white sides of a Western gunboat.*



*Many of Wilson's photos of trees not only serve scientific purposes, but are of great aesthetic merit as well. This Ficus lacor with its spreading head over 90 feet wide is simply a beautiful photograph.*



*Pinus tabulaeformis* photographed in the mountains of Western Szechuan.



*Wilson set up his camera wherever he could get a good shot of a tree that interested him. He remarks in a note that these Juniperus chinensis clumps are often found among graves.*



*This photo of Salix babylonica again shows Wilson's ability to combine a tree with the specific details of a locale in an effective and pleasing manner.*



*Wilson's photos sometimes record the surprising size of relatives of commonly known plants. This Senecio kenensis rising to 25 feet is closely related to our familiar ragworts.*



*A grass tree, Xanthorrhoea reflexa, photographed in Australia.*



*The largest tree Wilson found in China, a Cunninghamia lanceolata over 120 feet tall.*



*Many of Wilson's best photos of China are only tangentially, if at all, related to his plant interests. Unfortunately, on his later journeys there are fewer pictures such as this simple yet beautiful scene of boats and nets alongside the Yangtze.*



*Wilson did not make many photos of people; when he did the subject usually was shown in some context with plants or plant products. Here a coolie is carrying approximately 270 pounds of bowls carved from *Pinus massoniana*.*



*This tea coolie and the others Wilson photographed all appear at ease and unaffected before the camera. The men shown here carried about 300 pounds and averaged 6 miles a day over primitive roads from China to Tibet.*



*Wilson says these men are typical of types of Chinese; both served him as collectors.*



*A cultivated stand of *Lilium tigrinum*. This use of an apparently posed model with a plant is rare for Wilson.*

Wilson had a deep respect and love for the beauty of nature. Voracious reading gave him an ever-widening context in which to place his view, yet, as his daughter has commented, he always returned to extolling the infinite variety and eloquence of natural scenes themselves, having found in the plants and views of landscape the greatest pleasure of his life. This quality of deep appreciation and sensitivity towards nature, with his commitment to reveal the best of what he saw, stands as the foundation for his photographic work.

Wilson has been described in plant circles as a man who had the ability to visualize the plants he discovered in the settings where they might finally be placed. This special talent served him well in his selection of materials for introduction, and also affected his photography, aiding him in his selection of trees to be photographed and in his choice of the right vantage point.

A portion of Wilson's photographic work encompasses his journeys through Eastern Asia to Korea, Formosa, Japan, the Linkin Islands, as well as trips to Australia, India and South Africa. These little-known photographs are primarily scientific and serve the research of arborists in institutions around the globe.

Less frequently in these photos do we see individuals or small groupings of people, artifacts, or for that matter, wide and scenic vistas. The absence of such subjects raises a small question of Sargent's reaction to Wilson's photos. Did Sargent ask Wilson to restrict the valuable glass plates to subjects of prime arboreal interest, or was Wilson less enamored of the people and scenes he subsequently visited than of China and the Chinese?

Wilson's photography did not stop when he returned to the home grounds of the Arnold Arboretum in Jamaica Plain. He continued to take photographs of trees in the Arboretum itself, and at other locations around New England as well as an occasional photo in Kew or in France. Some of these photographs were taken of particularly well-known trees; trees which had a historical significance or were notable for their size or age.

Wilson used lantern slides of his Arboretum photographs in his very popular lectures, for which he received \$150, a very good fee in the twenties. He had some of the slides hand-colored in China and Japan, and a few of these remain in the Arboretum's collection.

In the last analysis Wilson achieves with his camera not only the "truth" quotient necessary for science — the proof of existence and the specific nature of the thing in situ — but also an evocation of extraordinary beauty and timeless, universal appeal.



*A log of Tsuga yunnanensis is balanced on a back brace, permitting the man to stop and rest with the weight supported by the ground.*



*Pinus thunbergii* on eroded cliffs of gray sandstone.



*Most of Wilson's photos from Japan show trees in forest situations and do not reflect his skills at composition; however, some of his photos, particularly from the seacoast, reflect his pictorial ability. This is *Pinus parviflora*.*



*Perhaps Wilson's most famous photo, this shows Pinus thunbergii in the background on the small islands and Pinus densiflora in the foreground.*



*Wilson carried a personal camera in addition to the camera he used for Arboretum photos — the difference in subjects is startling. Unfortunately not a great deal of information exists about the circumstances under which these photos were taken. Wilson used Formosan headhunters as guides on his visit to that island.*



*We can only assume that these men being crucified are criminals. It is remarkable that Wilson was able to inspire enough confidence so that he was permitted to get this kind of photo.*



ERNEST HENRY WILSON  
1876-1930

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# ARNOLDIA

*The Arnold Arboretum* Vol. 36, No. 6 Nov./Dec. 1976



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*Cover: Light dusting of snow highlights Rhododendron buds.*

# The Director's Report

THE ARNOLD ARBORETUM DURING THE FISCAL YEAR  
ENDED JUNE 30, 1976

The nation's Bicentennial celebration continued through the spring of 1976, although the expected large number of visitors to Boston, and possibly the Arnold Arboretum, did not appear. In cooperation with the official "Boston 200" program the Arboretum staff supplied new publicity material for many brochures and pamphlets distributed to visitors by the committee. A plant press revealing old newspapers from China was exhibited at the display area of the multimedia exhibit "Where's Boston," and elicited many comments and inquiries. The artifact was associated with the role of the Arnold Arboretum in introducing to the Boston area plants new to cultivation through expeditions to China. The Arnold Arboretum was awarded a special certificate indicating its primary position as an arboretum created for the purpose, another Boston "first."

For our own contribution to the Bicentennial, the staff propagated 300 plants of *Liriodendron tulipifera*, the tulip tree, for distribution to New England organizations for commemorative planting. The trees averaged 6 feet in height and were available in containers. All 300 were accepted and we received much publicity as these were planted. Staff members took part in the dedication plantings in Concord and in Lexington.

From the standpoint of horticultural interest, the year will be regarded as anomalous in its weather conditions and the effects they had on the flowering of the living collections. We experienced a dry summer and fall when we were plagued with vandal-set fires that caused considerable damage. Moderate and above-average temperatures occurred early in the spring, climaxed by one week in April with subfreezing temperatures on a Monday followed by a weekend with temperatures in the nineties, and then cooler weather. For the first year on record a great many lilac inflorescences were aborted; and the flowers were destroyed in several species of plants including all specimens of the dove tree. The inevitable contrast occurred in spectacular flowering of dogwoods, rhododendrons (but not azaleas) and mountain laurels. The situation was so unusual and severe that a committee of the American Association of Botanical Gardens and Arboreta is assembling comparative data from gardens in the north-eastern United States for future reference.



*Paul Mazerall (left), Lexington Superintendent of Parks and Trees, and Dr. Richard A. Howard break ground for planting of the town's commemorative tulip tree.*

The following notes will indicate that the Arnold Arboretum remains an active organization nationally and internationally, in participation in, and contribution to, botanical sciences and to horticulture.

#### *Staff*

Dr. Shiu-Ying Hu reached retirement age during the year and retired officially on June 30, 1976. Dr. Hu came to Radcliffe College for graduate work in 1946, and in 1949 joined the Arnold Arboretum staff to become a specialist in such groups of horticulturally important plants as *Philadelphus*, *Hemerocallis*, *Ilex* and *Paulownia*. In recent years she has spent considerable time in Hong Kong on work directed toward a modern flora of Hong Kong and the New Territories.

Resignations were received from Dr. Gordon DeWolf as horticulturist, Edward Flaherty as record keeper, and Mrs. Thomas Walsh as horticultural secretary. Dr. Eric Lee, a Mercer Research Fellow, completed his appointment and returned to Hong Kong.

New appointments to the staff included John Alexander III as plant propagator, Gary Koller as supervisor of the living collections,

*Constance Derderian and Alfred Fordham enjoy the company of visiting British nurseryman, Harold G. Hillier (right).*



*Dr. Shiu-Ying Hu.*



Robin Lefberg as botanical artist, Donna Lynch as record keeper, Margo Reynolds as a staff assistant, and Jackie Smith as senior curatorial assistant.

Dr. Bernice Schubert was appointed a senior lecturer on Biology within the University during her term as curator of the Arnold Arboretum.

Mr. Alfred Fordham, who has served as plant propagator for the past 18 years, was given a new assignment as research horticulturist. Mr. Fordham received a professional citation from the American Horticultural Society during the annual meeting in Hawaii. He was recognized as "one of the world's foremost propagators and . . . particularly noted for work in the woody plant seed germination and the development of dwarf conifers."

In commemoration of the United States Bicentennial, the Royal Horticultural Society selected 200 American horticulturists as complimentary fellows for the year. Dr. Howard was among those selected. He was also appointed to the ISHS commission for horticultural nomenclature and registration. Stephen Spongberg was appointed chairman of the American Horticultural Society committee on nomenclature and plant registration, and a member of the comparable committee of the American Association of Botanical Gardens and Arboreta. Norton Miller joined Drs. Weaver and Spongberg as an associate editor of the journal *Rhodora* issued by the New England Botanical Club. He also has joined the editorial boards of *Systematic Botany* and the *Journal of the Hattori Botanical Laboratories*.

Dr. Carroll E. Wood, Jr., was honored by Harvard University for 25 years of service to the University. This honor includes the gift of a Harvard chair with a suitable name plate.

Members of the staff traveled widely during the year, specifically for field work or to attend meetings which offered also the opportunity of collecting or of study at other herbaria and libraries. The major meeting of the year was the International Botanical Congress held every four years — the 1975 meeting having been scheduled for July in Leningrad in the Soviet Union. It was preceded by a meeting of the Nomenclature Section in Leningrad and a meeting of the International Association of Botanical Gardens in Moscow. A number of field trips were scheduled following the Congress. Dr. Spongberg represented the Arboretum and cast the institutional ballots at the nomenclature sessions. He visited gardens in England and studied at herbaria preceding and following the nomenclature meetings. Dr. Miller attended the Botanical Congress and presented a paper on Quaternary Fossil Bryophyte Assemblages in North America in a symposium on Aspects of Geography and Ecology of Bryophytes. Following the Congress he participated in a field trip to the north Caucasus region. Dr. Howard, as past president of the International Association of Botanical Gardens, was a member of the presidium



*Turide Palace, Leningrad, center of activities for the twelfth International Botanical Congress. Photo: R. Howard.*

at the Moscow meeting. He also spoke on the use of computers in registration and analysis of plant introductions. As an Honorary Vice-President of the International Botanical Congress, Dr. Howard was a guest of the Academy of Sciences of the USSR and was presented a Congress medal. Following the Congress he was a member of the group that visited the Crimea, where he had a chance to spend extra time in Yalta at the Nikita Botanical Garden. The trip also included a visit to the botanical garden in Kiev in the Soviet Union, and stops were made in Vienna and London for herbarium study on the return route.

The Council of Botanical and Horticultural Libraries arranged a special trip to England preceding their regular annual meeting at Longwood Gardens. Mrs. Dickinson traveled to England for the joint meeting with the Biological Group of the Association of Special Libraries and Information Bureaus which met at the British Museum (Natural History). Visits to other libraries, including that of the Royal Botanical Gardens, Kew, were part of the program.

The annual meetings of the American Association of Botanical Gardens and Arboreta were held on Kauai in Hawaii, followed by the annual meeting of the American Horticultural Society on Oahu. Dr. Howard and Mr. Fordham attended the former meeting where

Dr. Howard presided and completed his term as president of the organization. Mr. Fordham stayed on for the American Horticultural Society meetings.

The Northeast Regional Meeting of the American Association of Botanical Gardens and Arboreta was held at Skylands in New Jersey. Drs. Spongberg and Weaver represented the Arboretum and had the opportunity of special collecting for the herbarium, the living collections, and their own research programs.

Dr. Miller was the sole staff member to attend the meetings of the American Institute of Biological Sciences where he presented a paper on "The Viability of Windblown Bryophyte Fragments in Arctic Canada."

Dr. Hu continued her association as a professor at Chung Chi College in Hong Kong while proceeding with her work toward a flora of the area. She was fortunate to join a group from the college in a visit to the People's Republic of China during the summer. An account of her trip, including observations on botanical gardens, herbaria, botanists and publications, was published last November in *Arnoldia*. In late January Dr. Hu participated in a task force on Indigenous Plants for Fertility Regulations sponsored by the World Health Organization (WHO) in Mexico City.

Dr. Schubert was a participant in the 5th Mexican Botanical Congress at Xalapa, Veracruz, Mexico, and continued field work in her search for material of her specialty, *Dioscorea*.

The Arnold Arboretum was represented by Mr. Pride at meetings of the Hemerocallis Society at Raleigh, North Carolina, and by Mr. Pride and Dr. Weaver at the meetings of the American Rock Garden Society in Boston.

Mr. Fordham has attended meetings of the Plant Propagators' Society regularly; the recent meeting was in Tallahassee, Florida.

Staff members are asked to speak at botanical and horticultural meetings at the Arboretum and elsewhere. Our films on the Arnold Arboretum and on Poisonous Plants are often the basis of lectures to garden clubs and schools. College lectures usually involve a topic representing the individual's research or specialty. Many such requests were filled during the year. Dr. Howard chaired a section of a symposium on Better Trees for Urban Environments held at the U. S. National Arboretum; was the featured speaker at the dedication of the Callaway Building at the University of Georgia Botanical Garden; and spoke also at the annual meeting of the Dallas Arboretum Society. All three occasions were accompanied by invitations to speak at nearby colleges.

The Arnold Arboretum was asked by the National Science Foundation to be the collaborating institution for two projects in Pakistan supported by the foreign currency program. In October Dr. Howard traveled to Islamabad to consult with Dr. Mohammad N. Chaudhri of the National Herbarium, and to Peshawar to meet with Dr. S. M.

A. Kazmi of the PCSIR. Both men are collecting plants of Pakistan and the first set of duplicates will be deposited with the Arnold Arboretum. Drs. Chaudhri and Kazmi, as well as Dr. E. Nasir of the Stewart Herbarium, arranged field trips for Dr. Howard. The fall season also permitted the collection of seeds at higher elevations which may produce useful plants for cultivation in the United States.

An extended field trip completed by Dr. Stevens permitted him to make field observations and collections of the genus *Calophyllum*. One month was spent in herbaria at Edinburgh, London, Paris and Geneva en route to Malesia. Bases for field work were established in Malaya, Sarawak, Sabah, and Papua New Guinea. Fifty species were encountered and studied in the field and 900 numbers collected. Shorter visits were made in Singapore, Java and Australia. The trip was sponsored in part by a grant from the Atkins Fund.

### Horticulture

By terms of agreements with the City of Boston, dated 1882 and amended in 1896, the Department of Parks and Recreation assumed responsibility for the roads, paths, benches, fences and police protection of the Arnold Arboretum. In return the collections were to be open to the public "at reasonable hours," with maintenance of the living collections, by the staff, financed solely by unrestricted and restricted funds of the Arnold Arboretum and by special gifts to the Arboretum. The protection of the collections and the visitors is the responsibility of the City of Boston. We receive excellent cooperation from the Captain and staff of Station 13 of the Boston Police Department in Jamaica Plain. The station supplies occasional patrols of the grounds during the day and at night, and responds effectively to emergency calls. The control of unauthorized cars and motorcycles, of occasional theft, of damages to plants by vandal-set fires and malicious breakage, the accumulation of litter and the thefts from cars, is extremely difficult due to the faulty maintenance of fences and gates at the periphery of the property. Pedestrian gates do not close, driving gates are broken and damaged fences have remained unrepaired for over two years. Several meetings were held during the year with local legislators and with representatives of the Mayor's office in an attempt to obtain some action. There has been no response and the problem remains. Vandals have set fires in the vine collection and in the *Leitneria* and *Hamamelis* plantings, and deliberate breakage was extensive in young *Magnolia* and *Cercidiphyllum* holdings. The director has been refused permission to make the necessary repairs with Arboretum funds. Until the periphery is secured, any admission charges or patrols are not reasonable. The low priority the Arnold Arboretum has in the budget of this city is perhaps understandable, but it is regrettable.

The resignations of two members of the horticultural staff and the appointment of replacements permitted the reexamination of the



*Superintendent Robert G. Williams (center) and Arboretum grounds crew members join forces to extinguish brush fire.*

current work, the goals, and the work to be done on the living collections. A complete inventory of the nursery and the permanent plantings in Weston has been completed, and the identification of the plants is being verified. A detailed survey of the living collections in Jamaica Plain is under way to reaffirm the location of each plant, to check its physical condition, to verify its identification and to determine the need for labels. The loss of labels over the last few years has been disturbing, and their replacement time consuming and expensive. A major effort will be required during the winter months to revise many of the maps of the collections, to prepare new record labels and to redesign the display labels for the major part of the collection. Utilization of a new computer printout of the inventory by geographic areas will make this work feasible. The close cooperation of the Plant Sciences Data Center of the American Horticultural Society is appreciated. Our printouts now give complete data on the origin of each plant within the collection.

In response to requests for material from our collections, 95 shipments of plant material in the form of seeds, cuttings or plants, comprising 272 taxa, were sent to cooperating institutions, nurseries or scientists in the United States and 14 foreign countries. A total of 114 shipments, representing 411 taxa, were received during the year from 22 countries. These ranged from potential taxa for the hardy collections, such as the 40 and 35 kinds of seeds selected from seed lists distributed by the Lu Shan and the Yunnan Botanical Gardens in the People's Republic of China, to materials requested by the staff for individual research projects. During their travels many of the staff members collect plant materials which are accessioned into our records. Some, such as those from Pakistan, may prove hardy in Boston, or will be shipped, after study, to gardens in warmer climates. Some material will be consumed in the course of research efforts, and of course many of the seeds requested do not germinate or survive. Drs. Weaver and Spongberg, in the course of their horticultural studies, acquired new material from the wild in both North Carolina and Pennsylvania. Additional material may be acquired from plants cultivated elsewhere, but an effort is made to have as many plants as possible from wild sources.

Not included in the records of material shared with other arboreta is that obtained by responsible visitors to whom collecting permits are granted. As an example, cuttings of over 300 taxa were obtained by representatives of the Cary Arboretum during one visit. The practice is reciprocal and reduces the demands on the Arboretum staff when such permission can be granted.

As staff members work on the living collections, any plants that are in poor condition or otherwise need attention are noted and called to the attention of the propagator, the superintendent and the record keeper. During the year 222 taxa were propagated to prepare replacements for such specimens. Ninety taxa were processed



*Liriodendron tulipifera* trees are labeled by James A. Burrows preparatory to Bicentennial giveaway.

to acquire or verify propagation data, and 54 were propagated in larger numbers to be tested for hardiness in appropriate areas.

The program to distribute a plant of special interest to contributing Friends of the Arnold Arboretum was implemented this year with the distribution, in mailing tubes, of over 2,000 rooted cuttings of *Syringa* 'Rutilant'. This is a custom in alternate years, with surplus plants from the nursery being distributed to local Friends as the supply lasts. The surplus plants are offered first to the Department of Buildings and Grounds of Harvard for the campus, and to the Business School, and then to other arboreta or universities. Such plants are dug and transported by other than the Arboretum staff. The remaining surplus materials are dug and balled by our staff, and are available on a selected day on a first-come first-served basis. The distribution of 300 *Liriodendron* plants, already mentioned, was completed with the help of Volunteers of the Arnold Arboretum. The Volunteers also were responsible for the mechanics of packaging and shipping the mail distribution.

*Volunteers Allen Brailey, Leslie Oliver, Lucy Richardson, and Louis Segel pack rooted cuttings of Syringa 'Rutilant' for distribution to Friends of the Arnold Arboretum.*



Volunteers also are continuing a program of systematic collecting of herbarium specimens from plants on the grounds and in the nurseries. A set is mounted for addition to the herbarium of cultivated plants, and duplicates are available for distribution, in exchange, to other institutions. We are indeed grateful for this regular help.

The bonsai collection is under the supervision of our honorary curator of the bonsai collection, who obtains staff or Volunteer help as needed. Most of the smaller plants were reported during the year. One old and valuable pot was repaired and essentially restored to its original condition. A special gift made possible the production of copies of two of the older pots. Regrettably, the bonsai collection was the object of two episodes of vandalism. After plants from the outdoor collection were stolen, an alarm system was acquired. The second theft involved subtropical bonsai taken when the greenhouse was entered through a soil bin.

The staff continues to function as registration authority for cultivars of woody taxa not otherwise represented by societies. A request is made for a plant of each registration for testing in the Boston area. Drs. Spongberg and Howard serve on national and international committees associated with this activity. Dr. Howard was a participant in the symposium on computer processing of cultivar registration held at the American Horticultural Society headquarters in Virginia through the auspices of the Plant Sciences Data Center.

The Arnold Arboretum Achievement Award for Botanical and Horticultural Excellence has been offered in the past to outstanding students in high schools or private schools in Massachusetts who receive a certificate accompanied by a gift of books and plants from the Arboretum surplus. Nominations are received from school administrators. The 1976 award was made to Frederick S. Creager, a graduating senior of Jamaica Plain High School.

Assistance was given to Walter Judd, a graduate student, in support of field studies of the genus *Lyonia* in the United States and the Dominican Republic.

### *The Case Estates*

The Case Estates in Weston comprises approximately 110 acres, and serves several important functions in the work of the Arnold Arboretum. Plants from the greenhouses or the small nursery area in Jamaica Plain are grown to larger size in Weston. Plants we wish to preserve, but for which space is unavailable in Jamaica Plain, are maintained in low-maintenance areas. Some display collections have been developed. The area is ample for staff research projects, and the buildings are used for classes and public lectures.

Renovation work continued on an irrigation system for the nursery area. The ground cover display section has been consolidated for more effective display and maintenance. A new inventory and

evaluation has been completed for all temporary and permanent nursery collections.

The Weston location is maintained by a small permanent staff, which is increased by several student horticultural trainees during the spring and summer months. We also are grateful to the Arboretum Volunteers who take the responsibility for guided tours of the Case Estates during the year.

The Arboretum donated 75 trees to the Town of Weston during the year for roadside plantings in the town.

The work to widen Wellesley Street along the Case Estates property, which will create sidewalks and reduce some curvature and visual obstacles, is under way. The Arboretum lost approximately one acre of land to this renovation, but has preserved the historic "hen's tooth" stone wall and the row of *Malus* 'Henrietta Crosby'. The area should be safer for pedestrians and visitors to the Case Estates. New plantings will be established where some vegetative screens were removed.

### *Herbarium*

The crowded conditions of the herbarium in Cambridge, mentioned in previous reports, remain a major problem in day-to-day operations, and relief remains several years ahead. The architects hired by the University to consider the problem concluded that the logical ex-



pansion area would involve an addition to the front of the Harvard University Herbaria building. Preliminary floor plans have been submitted for staff and University consideration. The use of compactors to house herbarium specimens in the new structure appears to be a necessity. An architect's drawing of the facade of the building is under study by the University Planning Office. If all aspects of appearance, floor design and costs are approved, such plans, along with a brochure describing the work carried on in the building, will be used in a campaign to raise money for the construction.

In the meantime, heroic measures are being taken by the herbarium staff to accommodate the specimens added to the collections annually. The use of cardboard storage cartons on top of the regular cases is both an inconvenient and an inadequate storage method. The boxes now total 2,708 with the addition of 312 units during the year, and such additions will increase. The purchase of steel herbarium cases, to be placed in space created by the move of the fern collection, has become a necessity. Some additional space has been provided in the regular herbarium sequence by the removal to a basement storage area of specimens identified only to family. Unfortunately, this reduces the occasions when such material will be consulted by staff and visitors.

The overcrowded storage units have impeded the proper care of the type specimens which have been located at the end of each taxonomic and geographic unit. To offer these specimens better curatorial care, all type specimens are now being placed in an alphabetical generic sequence at the end of each family of plants, and the collection is shifted as required. A program is also under way to examine every folder in the herbarium, divide those that contain an excessive number of specimens and replace worn or outdated folders. This will involve several years of work. Seventy new genus and family boards have been prepared. Procedures have been adopted to photograph routinely all type and authentic specimens on loan to staff members, as well as those belonging to our herbarium. Documentation against possible loss or damage to specimens sent on loan is thus assured. The special collections of fruits and seeds have been receiving care and all collections, excepting the Cactaceae, are now completely protected in plastic bags and catalogued. As a result of all this curatorial work, shifts of specimens have altered locations and require the relabeling of cases and editorial changes on indices.

The curatorial work has been supported in part by a grant from the National Science Foundation to the Harvard University herbarium collections considered of national scientific significance. The staff is grateful for this grant which has been extended for another year, at which time a new long-term application must be submitted. To justify the grant, the organization agrees to make its specimens available on loan to qualified investigators, and to maintain the

financial level of curatorial assistance contributed previously by the recipient. Some record keeping which seemed onerous at the time has revealed interesting figures. All visitors using the herbarium are asked to register, and during the present fiscal year 146 individuals from 87 institutions used the herbarium for periods ranging from a few hours to several months. Records must be kept of requests for information requiring the use of the herbarium or the library, and these numbered over 300 from the office of the director alone. When the information is compiled for all library and herbarium staff members, the service aspect of the work of the Arnold Arboretum is clear.

Volunteers under the supervision of Ida Burch have been hard at work in the herbarium of cultivated plants in Jamaica Plain. Activities include putting the cone collection in order, replacing the labels on the herbarium cabinets and checking the geographic sequence of specimens.

Specimens added to the herbarium during the year totaled 28,365, bringing the total herbarium holdings to 1,054,824 sheets of which 161,661 comprise the herbarium of cultivated plants housed in Jamaica Plain. The Arboretum received 11,292 specimens during the year: 8,473 by exchange with other institutions; 1,838 by gifts from individuals; 916 by subsidy; and 65 sent for identification that were worthy of retention. The largest lots came respectively from Western Malaysia, Papuasia, India, Australia, and the United States, with smaller numbers from other areas. Due to staff involvement in curatorial work, only 3,064 specimens were distributed as exchange.

Requests for our specimens on loan for study came from 50 domestic and 29 foreign institutions, representing 185 and 83 loans respectively, totaling 21,647 sheets. Although it is professional procedure to loan specimens for an indefinite period of time, excluding only types, each institution expects that specimens will be studied and returned as soon as possible. A review of our records during the year indicated that some specimens have been on loan to institutions since September of 1938, and that at present a total of 93,909 specimens are out on loan. Fortunately not all of these will be returned simultaneously, or our crowded conditions would become critical.

The development of federal legislation on threatened and endangered species has involved both staff knowledge and the resources of the herbarium. Congress assigned to the botanists at the Smithsonian Institution the responsibility of assembling a list of plants, and an original list was circulated to botanists at other institutions for comments and additions. Puerto Rico and the Virgin Islands, as well as Hawaii, were included in the area to be covered domestically, but the list also contained many plants of scientific interest in other countries. Some plants listed are used in staff research or teaching programs, and so the wording of the proposed legislation and

the involved cooperation with similar foreign agencies is pertinent to our work. The New York Botanical Garden sponsored a symposium on Threatened and Endangered Species in the Americas, at which Dr. Howard presented a survey and discussion of the plants and problems of the Caribbean area.

The research of the staff is varied, and includes floristic studies, manual preparation, monographs and investigations of single species of plants. The bibliography of published papers indicates the type of projects completed and published during the past fiscal year. Such studies may require initial or continued field work and/or be laboratory or herbarium oriented. The basic resources of the Arnold Arboretum are a living collection, an herbarium and a library, and appropriately equipped offices and laboratories. The use of these facilities is excellent.

### *Library*

The curatorial grant from the National Science Foundation permits the use of some money for retrospective work including cataloguing and binding of older material. One library assistant was assigned to this work during the past year, and in four months 72 titles of the backlog were catalogued and 94 titles completely recatalogued or revised in classification. Current cataloguing by other staff members is done with the assistance of the publication, *Cataloguing in Publication* (CIP), for the majority of books in the English language, as well as through a systematic search of the *National Union Catalog* when orders for Library of Congress cards are not filled. CIP is rapidly replacing the Library of Congress card orders as a cataloguing source. The remainder, including specialized volumes and those of foreign languages, require original cataloguing.

A net increase in volumes and pamphlets during the fiscal year was 748 items, bringing the total holdings to 85,094. A total of 723 periodicals is received.

The entire library staff was closely involved in the reclassification of the reference collection in the Herbaria building. The project could be brought to completion due, in large part, to the excellent searching, organizing and collating of editions by Bernita Anderson and, upon her resignation, by Becky Rohr. Books were catalogued and Library of Congress classification numbers were assigned, replacing the former shelf location numbers for each volume. Then in one day the library staff, assisted by the library committee and a graduate student volunteer, shifted 950 volumes to sequence demonstrating the application of the Library of Congress classification to a botanical reference collection.

The use of the library in Cambridge increased 8% , based on the number of volumes returned to the stacks, as compared with the previous year. Interlibrary loan requests numbered 478, an increase of 12% over the previous year. Although the majority of these are



*Albert Thompson treats leather binding of volume in Jamaica Plain library.*

filled by supplying photocopies of the desired pages, a number of requests were refused due to a "no loan" policy or the inability to photocopy because of age or condition of the volume.

Beginning July 1, 1976, the Harvard College Library is instituting a basic fee of \$8.00 for interlibrary loans, and has indicated a willingness to pay a comparable amount if billed. Although there are exceptions made to cooperating libraries of the Research Library Group, there is the possibility of charges to the staff for interlibrary loan requests. Fortunately our needs for such requests have been few. Photocopying charges are also increased to a minimum charge of \$6.00. This is the method through which most requests made to our library or from our staff are filled. For the present the Arboretum Library will charge a lesser amount.

Binding of current items as well as older items continues on a regular schedule. Volumes that cannot withstand rebinding are placed in boxes lined with acid-free paper. In the case of the first

numbered copy of E. H. Wilson's *America's Greatest Garden, The Arnold Arboretum*, we wished to preserve the original binding; hence, the volume was boxed in its present condition.

A book treatment program recommended by the conservator of the Harvard University Library has begun on the collections in Jamaica Plain. Volunteers were the original helpers during the winter months, and the program has continued as experience for the summer horticultural trainees. Books are removed from the shelves, which are then thoroughly cleaned. The volumes are dusted and the leather bindings treated with a special preservative dressing. Call number labels are being replaced by Identastrips of acid-free paper. A new shelving guide and shelf labels improve the ease of use of the library.

Volunteers under the direction of Margo Reynolds have brought up to date the scrapbooks of clippings pertaining to the Arnold Arboretum, and have prepared an alphabetical list of genera as an index to the collections of Wilson photographs.

### *Education*

The Arnold Arboretum functions as an educational organization at many levels and in many ways. The nearly 400 acres of organized collections, nursery areas and greenhouses of labeled plants offer the greatest educational exposure to botanical and horticultural subjects. The grounds are open to the public for casual visits or for organized tours. The majority of visitors respect the plants and appreciate the opportunity to visit and to learn from the material. Regular classes are offered as tours of the grounds or in the form of lecture series in Jamaica Plain and in Weston. Staff members generally conduct the tours for professional groups, but we are fortunate to have the help of talented and well-trained Volunteers to conduct tours and offer some classes for other visitors.

Questions are received and answered by telephone and by mail, and the staff shares this responsibility. During the year the staff prepared two exhibitions for the display area of the Administration Building. One exhibit focused on the herbarium, explaining the preparation, housing and use of herbarium specimens. While this exhibit was on display the American Begonia Society met in Boston and scheduled some of its meetings at the Arnold Arboretum. A special section of herbarium specimens of *Begonia* species was prepared by Dr. Schubert who has worked on this family for many years; and Dr. Sponberg was a speaker for the participants.

A second exhibit related to the living collections and displayed the methods by which plant material is received, processed and then planted in the collections. The nature of the care and maintenance of the collections was easily documented in the display, as were the records and record keeping, the labeling and finally the use of the collections in staff research or in supplying material for other scien-

tists. The Arboretum staff earlier had prepared an exhibit on the seed propagation of woody plants for display at the New Hampshire Spring Flower Show. When this show concluded the exhibit was added to the horticultural display. The technique of embedding plant material in plastic was used by Volunteer Sheila Magullion to enrich this special display.

The photographic files of the Arnold Arboretum also are used in educational efforts of the staff. The historic collection of the photographs taken by E. H. Wilson, primarily in China, has had much use in recent years. The photographs not only show the life and buildings of China in the early part of the 20th century, but represent the plants that were sources of seed introduced into cultivation.

An attempt is made to have every plant species that flowers or fruits in the Arboretum represented in the photographic collection. During the past year Peter Chvany has added hundreds of pictures to this collection. Prints of specific plants are requested regularly by staff and by others for use in articles. Prints also are supplied regularly to University publications to publicize the collections of the Arnold Arboretum.



The two films developed by the staff are now distributed in sales and rentals by a commercial firm, with royalties returning to the Arnold Arboretum. The film on Poisonous Plants continues to be a popular one. Staff members use the film regularly in speaking to local groups, which have included the Harvard Community Health Center, the New England Medical Center and several universities, among others. The Poisonous Plant film was awarded a Red Ribbon as the second best educational film entered in the American Film Festival in New York City. Using the royalties, special gifts from the Friends of the Arnold Arboretum and a matching fund grant from the Massachusetts Society for Promoting Agriculture, work has been started on a film on plant propagation. This type of educational effort may well become self-supporting and permit the development of less popular but important educational films on such subjects as collection management and herbarium procedures.

The Arnold Arboretum cooperates with the Boston Poison Information Center by handling referral of calls concerning the ingestion of plant material. Calls received at the Center in the Boston Floating Hospital (Tufts-New England Medical Center) are referred to the Arboretum office during the daytime and to various staff members in the evening hours. Although most calls involve nontoxic plants, a sufficient number of potentially toxic plants have been identified to make the service offered worthwhile.

During the year the staff has collaborated with the Massachusetts Horticultural Society in two new programs. One involved joint sponsorship of a distinguished visiting horticulturist who spoke to the Arnold Arboretum audience in Weston and the Massachusetts Horticultural Society members in Boston. Another new program involved tours to distant areas of horticultural interest. Dr. Howard led a plant study tour to Florida, centering in the Miami area. Mr. Pride led a tour to Monaco. In each case the Massachusetts Horticultural Society staff handled the solicitation of participants and the arrangements before and during the trip. Each participant made a financial contribution which was shared by the two organizations. Although many other botanical gardens have sponsored or led such trips, these were the first ventures of the Arboretum and the Massachusetts Horticultural Society into this type of educational program.

The care of the living collections and maintenance of the grounds are the responsibility of a few individuals who supervise a small but skilled crew of employees. This group is supplemented during the growing season with selected students of botany or horticulture who have applied for summer employment. The students are designated horticulture trainees, selected for their abilities and the usefulness of the practical experience to their academic programs. They have represented an average of 14 colleges, universities and high schools. Participants receive student rate wages as approved by the Harvard Personnel Office. Tours and special lectures by the staff

are offered every week so that the students not only receive on-the-job training in caring for the living collections, but have the opportunity to see other aspects of the work of the Arboretum staff, as well as other gardens, businesses and horticultural practices in the Boston area. A few other students are accommodated during the year in cooperation with other colleges in student intern programs. These may be oriented in favor of the library, herbarium or horticulture. Such students are either volunteers or are paid by their own colleges.

Formal courses are taught at Harvard by several staff members. During the year Dr. Wood offered Biology 103, an elementary course in plant taxonomy, and shared the teaching of Biology 18, Diversity in the Plant Kingdom, as well as the Summer School course, Plants of the Tropics, offered in Florida. Dr. Miller offered Biology 138, the Biology of Mosses, Liverworts and Hornworts, and participated as well in Biology 18. Drs. Howard, Miller, Schubert and Wood supervised the work of graduate or undergraduate students in numbered research courses.

### Publications

The two regular publications of the Arnold Arboretum are the *Journal of the Arnold Arboretum*, issued quarterly, and *Arnoldia*, issued six times a year. The four issues of the *Journal* published during the fiscal year comprised 429 pages and 20 articles by 22 authors. The technical editor, Miss Kathleen Clagett, is assisted by an editorial committee. Other members of the staff review manuscripts.

Mrs. Jeanne Wadleigh edited six issues of *Arnoldia* comprising 259 pages and 17 articles by 11 authors. Again staff members may review manuscripts and, in addition, assist with proofreading. Of interest to the staff was a complimentary article in Russian, by T. G. Chubarian and P. I. Lapin, entitled "Through the Pages of *Arnoldia*," which appeared during the year in the *Bulletin of the Main Botanical Garden*, Moscow. The demand for reprints of the *Arnoldia* issue, "Poisonous Plants," remains high, and a recent article on subtropical bonsai also had an enthusiastic audience. The issue on low maintenance perennials was republished as a paperback volume by Quadrangle/The New York Times Book Company, and is income-producing through royalties.

The copyrights have expired on several early publications of the Arnold Arboretum, and commercial publishers have issued facsimiles. In the United States a Dover reprint of the 1930 edition of *Aristocrats of the Trees*, by E. H. Wilson, is now available. The Koeltz science publishers in Germany have reproduced *The Bradley Bibliography* and *The Catalogue of the Arnold Arboretum*. Such reprints do not require permission, nor do we derive royalties from them.

The considerable stock of back issues of various publications was recatalogued during the year, and the prices reconsidered in terms of filling and mailing orders. A booklet on the available publications

of the Arnold Arboretum was prepared and distributed to libraries and departments that might be interested.

### *Gifts and Grants*

The Arboretum and its staff have been fortunate in the support offered in the form of gifts, grants and materials from many individuals and sources. The Friends of the Arnold Arboretum respond regularly to requests that they renew their membership contributions, and the staff is grateful for this continuing support. Such funds are without restrictions, although most are used in the work associated with the living collections. A bequest was received from the Estate of Miss Harriet Rantoul, and memorial gifts were accepted in memory of Mrs. John E. Thayer and Ms. Virginia S. Coen.

As mentioned previously, a matching fund grant was obtained from the Massachusetts Society for Promoting Agriculture for the production of a film on plant propagation. The generosity of the Society was matched promptly by gifts from interested Friends. A similar grant from The Stanley Smith Horticultural Trust provided for the preparation of illustrations for a new manual of cultivated woody plants, and again matching funds were received from interested Friends. One gift was specified for support of work in plant propagation under the direction of Mr. Fordham, and two gifts were received to be applied to the care of the bonsai collection. A most welcome grant was received from The Charles E. Merrill Trust following our request for funds to support publication of three items of staff research nearing completion.

Gifts in kind included many books, some for review in *Arnoldia*, pots for the bonsai collection, and artifacts, including letters and photographs, relating to the history of the Arnold Arboretum. Many nurseries have donated the plants we ordered for our living collections, and these were accepted with gratitude.

The grant from the National Science Foundation, shared with other botanical collections at Harvard, is truly significant in the curatorial work in the herbarium and the retrospective work in the library. Support of field work for Dr. Stevens' trip to Malesia was obtained from the Atkins Fund. The Tozier Fund of Harvard granted a request by Drs. Miller and Wood for photographic equipment, and one by Dr. Howard for the development of visual material useful in teaching the families of flowering plants.

RICHARD A. HOWARD

Staff of the Arnold Arboretum 1975-1976

Richard Alden Howard, Ph.D., Arnold Professor of Botany, Professor of Dendrology and Director

Donald Wyman, Ph.D., Horticulturist, Emeritus

John Herbert Alexander III, A. of Sci., Plant Propagator (Appointed June 1, 1976)

Ida Hay Burch, B.A., Curatorial Assistant

James Alvah Burrows, B.S., Assistant Plant Propagator (Appointed August 11, 1975)

Michael Anthony Canoso, M.S., Manager of the Systematic Collections\*

Kathleen Ann Clagett, M.A., Technical Editor of the Journal of the Arnold Arboretum

Constance Tortorici Derderian, A.B., Honorary Curator of the Bonsai Collection

Gordon Parker DeWolf, Jr., Ph.D., Horticulturist (Resigned January 24, 1976)

Lenore Mikalauskas Dickinson, M.S., Librarian\*

Edward Herbert Flaherty III, Curatorial Assistant (Resigned March 5, 1976)

Alfred James Fordham, Propagator

Sheila Connor Geary, B.F.A., Assistant Librarian

Arturo Gomez-Pompa, Dr. Sc., Honorary Research Associate\*

Henry Stanton Goodell, Assistant Superintendent

Shiu-Ying Hu, Ph.D., Research Fellow in Temperate Asiatic Botany

Thomas Matthew Kinahan, Superintendent, Case Estates

Gary Lee Koller, M.S., Supervisor of the Living Collections (Appointed June 16, 1976)

Donna Anne Lynch, Curatorial Assistant (Appointed May 16, 1976)

Norton George Miller, Ph.D., Associate Curator and Associate Professor of Biology\*

George Howard Pride, M.A., Associate Horticulturist

Margo Wittland Reynolds, B.A., Staff Assistant (Appointed August 4, 1975)

Kenneth Ray Robertson, Ph.D., Assistant Curator

Bernice Giduz Schubert, Ph.D., Curator and Senior Lecturer on Biology

Jackie Marie Smith, M.A., Curatorial Assistant\* (Appointed July 16, 1975)

Stephen Alan Sponberg, Ph.D., Assistant Curator

Peter Francis Stevens, Ph.D., Assistant Curator

Karen Stoutsenberger Velmure, B.A., Botanical Illustrator

Jeanne Stockbarger Wadleigh, B.S., Editor of *Arnoldia*

Richard Edwin Weaver, Jr., Ph.D., Assistant Curator

Robert Gerow Williams, B.S., Superintendent

Carroll Emory Wood, Jr., Ph.D., Curator and Professor of Biology

\* Appointed jointly with the Gray Herbarium

*Bibliography of Published Writings of the Staff*  
 July 1, 1975–June 30, 1976

- Burch, I. H. News from the Arnold Arboretum. *Arnoldia* 36(1): 1976.
- Derderian, C. T. Subtropical bonsai for indoor gardening. *Arnoldia* 36(1): 1–21. 1976.
- DeWolf, G. P., Jr. Common pines of Massachusetts. *Arnoldia* 35(5): 197–229. 1975.
- . Plants in winter. *Horticulture* 53(12): 28. 1975.
- . Anatomy of spring. *Horticulture* 54(5): 18–20. 1976.
- Fordham, A. F. Notes from the Arnold Arboretum, Weather Station Data — 1974. *Arnoldia* 35(6): 263. 1975.
- . The Deodar Cedar — two new hardier forms. *Plants and Gardens* 5(2): 33. 1975.
- . *Cornus kousa* and its many variations. *Amer. Horticulturist* 55(2): 30, 31. 1976.
- . Propagation facilities at the Arnold Arboretum. *Amer. Nurseryman* 144(1): 13, 104, 106, 108, 110. 1976.
- (with S. A. Spongberg). *Stewartia* for ornamental planting. *Amer. Nurseryman* 162(10): 7, 57–61. 1975.
- (with S. A. Spongberg). *Stewartias* — small trees and shrubs for all seasons. *Arnoldia* 35(4): 165–180. 1975.
- Gillis, W. T., R. Byrne and W. Harrison. Bibliography of the natural history of the Bahama Islands. *Atoll Res. Bull.* 191: 1–123. 1975.
- Grimé, W. E. *Botany of the black Americans*. Scholarly Press, St. Clair Shores, Mich., 230 pp. 1976.
- Howard, R. A. Modern problems of the years 1492–1800 in the Lesser Antilles. *Ann. Mo. Bot. Gard.* 62: 368–379. 1975.
- . The genus *Anethanthus* (Gesneriaceae). *Jour. Arnold Arb.* 56(3): 364–368. 1975.
- . *Lindernia brucei*, a new West Indian species of the Asian section *Tittmannia*. *Jour. Arnold Arb.* 56(4): 449–455. 1975.
- . The director's report, The Arnold Arboretum during the fiscal year ended June 30, 1975. *Arnoldia* 35(6): 241–261. 1975.
- . Cumulative index, National Horticultural Magazine and American Horticultural Magazine 1922–1971. *Amer. Hort. Soc.* iii–v: 1–109. 1976.
- . The university botanical garden. *Newsletter, Univ. Ga. Bot. Gard.* Spring: 7–16. 1976.
- . The Arnold Arboretum. *Amer. Nurseryman* 144(1): 8, 9, 90, 92, 94. 1976.
- . The Case Estates of the Arnold Arboretum. *Amer. Nurseryman* 114(1): 17, 119, 120, 123. 1976.
- . In defense of the Rev. Dr. Reuben D. Nevius and the plant called *Neviusia*. *Arnoldia* 36(2): 57–65. 1976.
- . The Nikita Botanic Garden, Yalta, USSR. *Arnoldia* 36(3): 110–118. 1976.
- (with N. H. Giles, R. H. Wetmore and R. C. Rollins). *Karl Sax. Harv. Univ. Gaz.* 71: No. 21. 1976.
- Hu, Y. S. The Orchidaceae of China, VIII. *Quart. Jour. Taiwan Mus.* 27(3, 4): 419–467. 1974 (1975). IX. *Quart. Jour. Taiwan Mus.* 28(1, 2): 125–182. 1975.

- . The tour of a botanist in China. *Arnoldia* 35(6): 265–295. 1975.
- Koller, G. L. Gardening on rescued soils. *The Green Scene* 3(6): 19–21. 1975.
- (with Blum, S.). Plant treasures of Fairmount Park. *Morris Arb. Bull.* 26(3): 40–46. 1975.
- . Yellow or red for autumn: *Enkianthus*. *The Green Scene* 4(1): 24–25. 1975.
- . Shrub profiles — sparkling Winterberry. *Morris Arb. Bull.* 26(4). 1975.
- Lee, Y. T. (with J. H. Langenheim). Chromosome numbers of *Hymenaea* L. *Taxon* 23: 619–624. 1974.
- (with J. H. Langenheim). Systematics of the genus *Hymenaea* L. (Leguminosae, Caesalpinioideae, Detariceae). *Univ. Calif. Pub. Bot.* 69(v): 109 pp. 1975.
- . The genus *Gymnocladus* and its tropical affinity. *Jour. Arnold Arb.* 57(1): 91–112. 1976.
- (with K. R. Robertson). The genera of Caesalpinioideae (Leguminosae) in the southeastern United States. *Jour. Arnold Arb.* 57(1): 1–53. 1976.
- Miller, N. C. (with K. R. Markham and L. J. Porter). The taxonomic position of *Sphaerocarpos* and *Riella* as indicated by their flavonoid chemistry. *Phytochemistry* 15: 151, 152. 1976.
- (with L. J. Howe Ambrose). Growth in culture of wind-blown bryophyte gametophyte fragments from Arctic Canada. *The Bryologist* 79: 55–63. Spring 1976.
- Reynolds, M. W. Dwarf fruiting shrubs. *Arnoldia* 35(5): 230–237. 1975.
- . Small shrubs with noteworthy winter bark. *Arnoldia* 36(1): 28–32. 1976.
- . *Liriodendron tulipifera* — its early uses. *Arnoldia* 36(3): 119–124. 1976.
- Robertson, K. R. The genera of Haemodoraceae in the southeastern United States. *Jour. Arnold Arb.* 57(2): 205–216. 1976.
- . *Cercis*: the redbuds. *Arnoldia* 36(2): 37–49. 1976.
- (with Y. T. Lee). The genera of Caesalpinioideae (Leguminosae) in the southeastern United States. *Jour. Arnold Arb.* 57(1): 1–53. 1976.
- Schubert, B. G. (with E. A. Shaw). A reinterpretation of *Leucaena* and *Lysiloma*. *Jour. Arnold Arb.* 57(1): 113–118. 1976.
- Spongberg, S. A. (with E. A. Shaw). In reply to Mr. Welch. *Taxon* 24(5/6): 629–632. 1975.
- (with A. J. Fordham). *Stewartia* for ornamental planting. *Amer. Nurseryman* 162(10): 7, 57–61. 1975.
- (with A. J. Fordham). *Stewartias* — small trees and shrubs for all seasons. *Arnoldia* 35(4): 165–180. 1975.
- . *Styracaceae* hardy in temperate North America. *Jour. Arnold Arb.* 57(1): 54–73. 1976.
- Stevens, P. F. The old world species of *Calophyllum* (Guttiferae). I. The Mascarene species. *Jour. Arnold Arb.* 57(1): 167–184. 1976.
- . The altitudinal and geographical distributions of flower types in *Rhododendron* section *Vireya*, especially in the Papuasian species, and their significance. *Bot. Jour. Linn. Soc.* 72: 1–33. 1976.
- Wadleigh, J. S. (pseud. J. Kilborn). Mushrooms at home. *Horticulture* 53(8): 30. 1975.
- . Planting the minor bulbs. *Horticulture* 53(10): 53, 54. 1975.
- . What to give the gardener. *Horticulture* 53(11): 50–55. 1975.
- . The overlooked leek. *Horticulture* 54(4): 22–24. 1976.

- Weaver, R. E., Jr. Sassafras: a neglected native ornamental. *Arnoldia* 36(1): 22-27. 1976.
- . The Cornelian Cherries. *Arnoldia* 36(2): 50-56. 1976.
- . The Witch Hazel family (Hamamelidaceae). *Arnoldia* 36(3): 69-109. 1976.
- Wood, C. E., Jr. The Balsaminaceae in the southeastern United States. *Jour. Arnold Arb.* 56(4): 413-426. 1975.
- (with S. A. Graham). The Podostemaceae in the southeastern United States. *Jour. Arnold Arb.* 56(4): 456-465. 1975.
- (with L. B. Smith). The genera of Bromeliaceae in the southeastern United States. *Jour. Arnold Arb.* 56(4): 375-397. 1975.
- (with Preston Adams). The genera of Guttiferae (Clusiaceae) in the southeastern United States. *Jour. Arnold Arb.* 57(1): 74-90. 1976.



*The Arboretum provides a pleasant outdoor studio for young art students.*

# Notes from the Arnold Arboretum

## WEATHER STATION DATA — 1975

Average temperature for 1975: 62.0°

Precipitation for 1975: 55.35"

Snowfall during winter of 1974-75: 39.3"

Warmest temperature: 100° F on August 3

Coldest temperature: -1° F on February 10

Date of last frost in spring: April 30, 1975

Date of first frost in autumn: October 30, 1975

\* Growing season for 1975 was 184 days

	Avg. Max. Temp.	Avg. Min. Temp.	Avg. Temp.	Extreme Max.	Extreme Min.	Precipi- tation	Snow- fall
Jan.	40.0	22.9	33.4	60	8	6.31	5.1
Feb.	38.9	19.8	29.3	57	-1	3.69	20.1
Mar.	44.4	26.1	35	60	11	3.06	2.5
Apr.	53.3	33.1	43.2	70	24	3.04	3.8
May	74.1	50.0	62	95	38	2.79	0
June	78.4	58.0	68.2	96	43	2.68	0
July	86	64	75	94	48	3.98	0
Aug.	82	62	72	100	48	6.81	0
Sept.	77.9	53	65.4	82	35	5.88	0
Oct.	65.7	44.1	54.9	84	30	5.31	0
Nov.	57.9	37.0	47.4	77	24	5.32	2.0
Dec.	41	21	31	65	0	6.28	15.7

\* Growing season — The growing season is defined as the number of days between the last day with killing frost in spring and the first day with killing frost in autumn. This time is determined by the last spring and the first fall temperature of 32 degrees F. or lower.

Spring 1976 began precariously. It was one of the earliest in many years; the result of an unusually warm ten days in April. Temperatures began rising on the 15th, and reached a record high of 95° F on the 19th. Five days of warm weather followed until the 24th of April when a sudden drop of 30° F resulted in damage to many flowers and developing buds. The floral displays of *Magnolia* and *Forsythia* were prematurely ended by the sudden change of temperature, and on top of Bussey Hill the flower buds of *Davidia involucrata* and *Chionanthus retusus* never developed.

The remaining days of April and early May were seasonably cool with day temperatures in the 50's and 60's and night temperatures in the 30's and 40's. In spite of these cooler days, the spring season progressed two weeks ahead of time so that visitors to the Arnold Arboretum on Lilac Sunday found the early *Syringa vulgaris* varieties past their peak and the later lilacs just coming into bloom.

JAMES A. BURROWS



# Botanical Embedding

by SHEILA MAGULLION

This article is not intended as a detailed guide to embedding, but discusses only the basics of botanical embedding and some of the procedures that have been moderately successful for me. As with all practical matters, experience is the only real teacher, and the hope here is to provide a starting point for readers interested in pursuing the subject.

To embed is "to lay in surrounding matter — as to embed in clay or sand," according to Webster. A simplified outline of the process of surrounding dried horticultural material with plastic is to lay the specimen on a supporting layer of plastic in a suitable container, cover it with another layer, and when the resulting block has hardened, remove it from the mold to be sanded and polished.

The plastic used is a polyester resin that comes from the manufacturer as a light blue, syrupy liquid with a strong gaseous odor. On the addition of a catalyst (usually M.E.K. peroxide), it turns green, then clear, and eventually cures hard and odorless with some shrinkage. Technical books on plastics in general include information on the make-up of embedding plastic (or casting resin, as it also may be called), and the exact manner in which it reacts to the catalyst. Knowledge of this process is a prerequisite to understanding and solving some of the problems that may arise in embedding.

It should be mentioned that both the plastic and catalyst are inflammable — the catalyst highly so — and although the makers usually state that the plastic is no more toxic than ordinary house paint, I find that it is, especially when large quantities are curing. As a safety precaution, an exhaust fan should be operating while the odor is noticeable.

It is advisable to have the work area located away from food and food preparation because of the insidious odor that is readily transferred. A place where the materials may be left undisturbed for several days at a time, and where the inevitable spill will not be a tragedy is necessary; the plastic has great adhesive qualities and once hardened is almost impossible to remove. In the liquid or tacky stages it can be taken off one's person with an abrasive cleaner, and off clothing, if tackled immediately, with a strong detergent. Most other surfaces, including measuring and mixing containers, can be cleaned with a solvent, or detergent and hot water. Heatproof glassware can be boiled in a strong detergent solution. Cleaning of equip-

ment is not easy, so whenever possible disposable items should be used. Clean-up material and the plastic itself should not be disposed of by way of household plumbing.

### *Flower Drying*

Drying the botanical material is a very important part of the embedding process. Since there is so much excellent literature available on the subject, only a few points in relation to the preparation of the items for embedding will be mentioned here. It is essential that the material be quite dry and as perfect as possible before it goes into the plastic. Any flaws will worsen and appear magnified in the finished cast, and improperly dried items will discolor.

Select perfect flowers just opened or opening. Mature blooms often develop brown edges in the drying medium and are much more likely to become transparent in the plastic.

Flowers with woody stems attached should be removed from the desiccant when the petals are crisp; then the stem portion is given extra time to dry either in or on top of the drying medium. Flowers such as roses with heavy calyces require similar treatment.

Large leaves can trap air bubbles when positioned in the plastic, so care must be taken to preserve their natural contour and to avoid flattening them in the drying process.

Leathery evergreen leaves turn brown unless given time to dry thoroughly. They also are prone to "silver" when embedded, as are nuts, pine cones, and certain woody materials.



Silvering occurs when the plastic fails to adhere to the embedded specimen, creating a void that gives the illusion of a silver coating. The exact cause of the trouble is uncertain; the shrinkage of the plastic or specimen, or the presence of a barrier substance are two theories. Some authorities advise preparing difficult materials by soaking them in various solvents. Unfortunately, this has not yet worked for me and silvering remains a problem. In any case, I think it is very important that material prone to this difficulty receive long and careful drying to insure that all shrinkage has taken place before the embedding process.

Dried pine cones, nuts and seeds can be stored indefinitely under ordinary room conditions without deterioration. Autumn leaves when dried also will keep their color and form for months with a minimum of fussing. Other material must be kept closely covered at all times and is best embedded as soon as possible after it is thoroughly dry. If storage is necessary, light and humidity should be excluded to preserve flower color, and to keep fragile items crisp.

### *Molds*

Almost any leakproof container other than those made of copper, rubber, and certain plastics can be used as a mold for the plastic while it is setting. However, in order to produce the most satisfactory results, the following points might be considered before making a selection.

Square and rectangular casts with straight sides are easier to sand and polish than are those of other shapes, and in general are more satisfactory to display.

It is much easier to remove the hardened cast from a flexible mold than from a rigid one; however, as the inevitable shrinking takes place during the gelling process, the sides of a flexible mold will draw in. All rigid molds should be treated with mold release before the plastic is poured.

When hardened, the plastic will mirror exactly the container in which it was set; a glass surface will produce a cast with a glasslike finish that requires no sanding or polishing. Most miscellaneous objects such as tin cans have bumps and seams that are transferred to the cast and will have to be sanded out later. Materials that scratch easily and are difficult to clean should be avoided if the molds are to be reused.

When only a few small specimens are to be embedded, suitable molds can be found among the commercially available ceramic or plastic types; or there are specially designed metal molds that can be taken apart to facilitate removal of the cured cast. The sizes available limit their usefulness for most botanical embedding.

Satisfactory containers, mostly round, can be found among laboratory glassware; however these are expensive and have a limited life



*Euonymus leaves and fruits that have silvered badly.*

expectancy. Items with beading around the rim make removal of the cast difficult without breakage. Tupperware and freezer containers in heavy polyethylene plastic come in acceptable shapes and sizes and some bakeware may be useful. Kitchenware should not be used for food after being used as a mold for the plastic.

If a number of larger casts are contemplated, it usually will be more satisfactory to make molds to the required specifications. Aluminum or other light gauge metal makes up into quick easy molds, inexpensive enough to be considered disposable. Aluminum sheets can be measured and ruled with a pencil and a long straight ruler, and cut into strips with kitchen scissors. Right angle corners are made by bending the strip against the ruler, or any straight sided object, and joining the ends with Scotch or masking tape to make a frame; this is sealed to the base with caulking cord, or similar material, to form a leakproof container. Four pieces of wood strip or plate glass can be made up in the same way. Wood must be covered with Mylar or cellophane to make it waterproof.

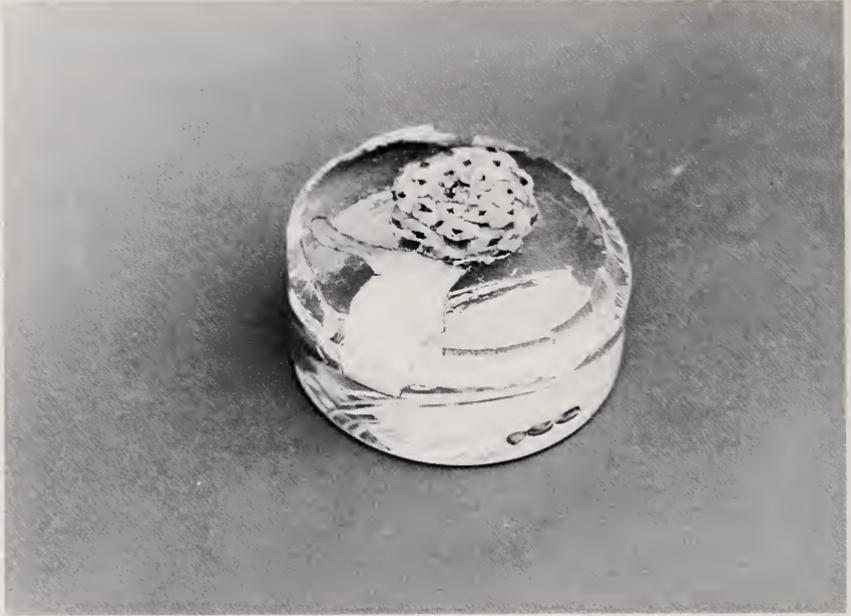
The base need not be of the same material as the sides. An aluminum base sometimes permits a large thin cast to warp, but on the other hand presents no removal problems as it needs no mold release and can be peeled off easily as soon as the plastic has hardened. If the cast is to be displayed bottom side up, a glass base will allow the work to be checked at all stages for bubbles and general effect. Plate glass should be used to minimize the possibility of cracking from stress as the plastic sets.

### *Calculating the Catalyst*

This is a very critical phase of the embedding procedure. If too much catalyst is added, the plastic will set too quickly and in the process generate internal heat; the degree of heat reached being in direct proportion to the amount of catalyst used. This internal heat produces adverse results such as bleaching and silvering of the embedded specimen and fracture and splitting of the cast. Shrinkage also seems to increase. Conversely, too little catalyst will keep the plastic under control but it will not cure to the desired crystal clarity.

When determining the percentage of catalyst to plastic, the two most important factors to consider are the quantity of plastic needed to cover the specimen, and the temperature at which the work is to be done.

Most instructions advise working at a temperature between 70 and 75 degrees. I have found temperatures as low as the upper 50s to be quite satisfactory, especially when embedding large and difficult items, and would postpone beginning any major project if the temperature of the work area were above 70 degrees. The plastic takes longer to set in this lower range, but there will be much less danger of internal heating.



*A major fracture.*

A fast setting formula is used for all base layers, which are usually less than 1/4 inch deep, and for very small casts. However, as the size of the block increases, decreasing amounts of catalyst are needed for the covering layer. Material requiring a mold 5 inches square and larger can be covered more safely by two or more layers. The drawback here is the noticeable dividing line between layers, especially when slow setting mixtures are used. Flowers with large fragile petals should be covered completely with one pouring or layer, otherwise the portion of petal left exposed will probably become limp and collapse into the plastic.

Be sure to select a resin specifically designed for botanical embedding, and use the manufacturer's instructions as a general guide. Some experiments with small expendable material will develop experience and confidence.

#### *Embedding Procedure*

The specimen probably will need to be cleaned with an artist's brush to remove dust and any remaining traces of desiccant. Trim it to fit comfortably into the selected mold, establish a plan for the exact position of the arrangement, and determine the quantity of plastic that will be needed to cover it.

This can be calculated mathematically. In metric measurements,  $L \times W$  divided by 30 will give the number of ounces necessary to

make a layer 1 cm. deep, or the quantity can be measured by filling the mold with water to the required depth and transferring it to a measuring container.

Make sure the mold is clean and dry and apply mold release if necessary. Measure into a small mixing container enough resin for the base layer, and with an eye dropper add the catalyst to make a fast setting mixture. Stir thoroughly for at least a minute or until all traces of the catalyst have disappeared. The catalyst will spread outwards to the circumference of the container and must be stirred back into the center to insure thorough blending. Pour the mixture into the mold, cover it with a tent of paper to keep out dust and foreign objects, and leave it to gel for approximately an hour or until it is firm but still very tacky.

Using tweezers or forceps, position the specimen so that it makes contact with the plastic in at least two or three places, particularly if it is a spray or consists of several small pieces. If possible, arrange leaves and campanulate flowers so that air can escape. Minor adjustments can be made for a few minutes; fragile items should be moved as little as possible after being positioned on the base layer of plastic.



*Positioning a specimen on base layer of plastic.*

Cover the mold until the specimen has adhered firmly to the supporting layer. This probably will take less than an hour, but the project can be left for longer periods or even overnight. Any part of the specimen that has not adhered will float to the surface when the covering layer is poured; if allowed to remain there, the fragment will be moved by the setting action of the plastic to the side of the mold, ruining a cast that might otherwise have been usable.

If this mishap befalls a valuable or irreplaceable item, the situation sometimes can be saved by waiting until the covering layer has begun to set. The wayward object then may be pressed back into its position on the base layer very gently with the stirring rod, and held in place until it has been caught by the setting plastic. This is time consuming and irritating and it is much better to avoid the problem when the item is positioned by trickling a few drops of catalyzed plastic over any part that may fail to adhere.

Measure resin and catalyst to make the covering layer. Mix thoroughly as before and pour it into the mold, taking care not to direct the stream onto any fragile areas. Let the resin run down the stirring rod to break the force and also to help eliminate air bubbles. Again cover the mold with the paper tent and leave it to set overnight. If another layer is needed to cover the specimen, repeat the procedure the next day using the same formula as for the first layer.

An identifying label written or printed on plastic film can be placed on the layer preferred. If it is to be set on the supporting or base layer, place it in position after the covering layer has been poured so no air will be trapped under it. Unlike plant material, it will not rise to the surface.

Some thin textured and light colored flowers become transparent while the plastic is setting. If this tendency is aesthetically displeasing, it can be prevented to a great extent by waiting until the catalyzed plastic begins to turn clear before covering the specimen. The timing has to be very exact in order to permit the air bubbles trapped in the specimen to be released and rise to the surface before the plastic sets.

### *Sanding and Polishing*

The surface exposed to the air does not cure completely for some days and will remain slightly tacky to the touch. If sanding is attempted at this stage the paper will gum up and become useless immediately. To overcome this some instructions advise curing the cast by applying gentle heat, but as this can very easily result in damage to a flower of unstable color, I prefer to finish the cast with a very thin layer of plastic of the same fast setting formula used for the base. When it has set, the mold and contents can be moved to a warmer situation where it may be left for a few days to cure to workable hardness.



*A cast prior to sanding.*

If a flexible mold was used there will be no problem in removing the cast at this point, but with rigid molds more curing time may be needed for the cast to come free. If the embedded item is sturdy enough, gentle top heat may be applied using a 40-watt light bulb inside a cardboard carton; or the mold can be given alternate hot and cold water treatment. Placing the mold in the refrigerator for a few hours may be enough to release the cast. Glass molds sometimes shatter under this cold treatment, so they should be securely enclosed in a heavy paper bag as a precaution.

The sanding and polishing operation is easier if done by machine; however, if none is available satisfactory results can be accomplished by hand rubbing. Sanding is done wet with four grades of water-proof silicon carbide paper.

A small cast that can be grasped comfortably in the hand may be sanded by laying a sheet of 120 grit paper on a flat bench and rubbing the cast across it until the surface is completely smooth. A large cast of 4 inches or more is easier for a small hand to manage if it is placed on a wet towel or thin piece of wettex laid on the work area, then rubbed with the sanding paper which has been wrapped around a piece of wood or a sanding block. At intervals the cast and the paper should be washed to remove accumulated sludge and to check progress.

When there are no traces left of the original top surface the same procedure is repeated with the 220, 400, and 600 grits. Before moving on from the 220 paper make sure there are no deep scratches left from the 120 grade. Depending on the type and texture of the mold that was used, the bottom and sides may only need to be sanded with the 600 grit. Rottenstone can be used for the final sanding operation.

Hand buffing does not produce the same finish as a buffing wheel, but brisk rubbing with a soft cloth and either silver polish, auto polish, or one of the polishes sold specifically for plastic will produce a very satisfactory lustre. A final gloss can be added with a coat of spray-type furniture polish.

*Sheila Magullion is a Friend of the Arnold Arboretum and an active volunteer who has been working on an experimental embedding project for several years. Many of her beautiful casts of Arboretum plants are on display in the entrance hall of the Administration Building in Jamaica Plain.*



*A group of finished casts.*

*Materials***For Flower Drying**

Desiccant	Sand
	Silica Gel (hobby shops, garden supply stores, etc.)
	Boraxo
	Cornmeal

Rigid, leakproof containers that can be covered easily.

Camel's hair brush for cleaning flowers.

**For Embedding**Level work bench

Newspapers to protect work surface, floor and surroundings.

Plastic (hobby shops are possible sources of suitable types)

Catalyst — comes with plastic.

Eye Droppers — usually come with catalyst.

Measuring and Mixing Containers — glass or disposable laboratory containers. Pyrex glassware (½-pint to 1-quart pitchers), paper cups (unwaxed), coffee cans.

Stirring Rods — laboratory glassware, wire made from coat hangers or such.

Molds

Mold Release — (hobby shops or same source as plastic).

Brush — for release.

Solvent

Detergent — Tide, Boraxo.

An old saucepan for cleaning up.

**For Polishing**

Sanding paper — 120, 220, 400, 600 wet strength.

Any silver polish, auto polish, polishing cloth (or any old soft rags).

Furniture polish — Pledge.

*Suggested Reading*

Carico, N. C. and Guynn, J. C. 1962. *The Dried Flower Book*. Doubleday and Co., New York.

Cherry, R. 1967. *General Plastics*. McKnight Publishing Co., New York.

Condon, G. 1970. *The Complete Book of Flower Preservation*. Prentice-Hall, Inc., New Jersey.

Cook, J. G. 1975. *The Miracle of Plastics*. Dial Press, New York.

Foster, M. 1974. *Preserved Flowers*. Transatlantic Arts, Inc., New York.

Karel, L. 1973. *Dried Flowers*. Scarecrow Press, New York.

Newman, J. H. and Newman, S. 1972. *Plastics for the Craftsman*. Crown Publishers, New York. (Some sources.)

Newman, T. 1969. *Plastics as An Art Form*. Chilton Book Co., Pa. (Some sources and notes on procedures.)

Simonds, H. R. and Church, J. M. 1963. *Concise Guide to Plastics*. Van Nostrand Reinhold Publishing, New York.

Vance, G. S. 1972. *The Decorative Art of Dried Flower Arrangement*. Doubleday and Co., New York.

## Arnoldia Reviews

**Trees of Pennsylvania, the Atlantic States and the Lake States.** Hui-lin Li. Philadelphia: University of Pennsylvania Press. 276 pp., illustrated. \$17.50.

This extraordinary volume is primarily a reference book but of a special kind — it has both winter and summer keys. The usual leaves, flowers and fruits of trees are described and depicted, but in addition spring and fall leaf color are noted as well as winter bark and bud. There are discussions of habitat, hardiness, cultural needs, and ecological companions for all the trees cited. The geographical distribution of the various species is mentioned.

Everything is in this volume to aid the serious student in finding answers to his questions (by student is meant the amateur tree-lover rather than the academician). Basic botany and taxonomy are included; there is also a very high component of aesthetic pleasure in the trees depicted and the physical make-up of the book itself. The craftsmanship in the drawings by the author's wife is of the highest order, and the artist is obviously a knowledgeable observer. The author's descriptions seem to be accurate and the choice of accompanying photographs is superb. The work itself is on the finest quality paper, exquisitely printed, and no typographical errors were observed! The reviewer has seldom met a volume as admirable.

ELINORE B. TROWBRIDGE

**The Enchanted World of Alpine Flowers.** Dr. Elfrune Wendelberger, translation by Oscar Konstandt and Gisela Farnworth. Innsbruck, Austria: Pinguin Verlag. 88 pp., illustrated. Austrian S 27.80.

In this small volume the interested reader will find no construction details for rock gardens, no discussion of ventilation systems for the alpine house, and no suggestions for the domestication of even the most docile of the alpine flora. No, this is not a rock gardening book at all, but a song in celebration of the natural beauty of the Alps.

The book is divided into sections that consider the flora of the Alps on the basis of altitude, local habitat and season of bloom. Additional sections briefly deal with the glacial period and local common names and traditions surrounding the plants. Dr. Wendelberger's concern for the delicate balance of life in the mountains is evident throughout the book, periodically surfacing in a description of once-rich meadows spoiled by man's careless use, or in a comment about the tourist's role in the gradual decline of native plant populations.

Although Dr. Wendelberger credits the book's success to its lavish adornment with full-page color illustrations, the real charm of the volume lies in her own love of the mountains and her ability to convey this love to the reader. Her prose is lyrical despite occasional lapses which may be due to difficulties in translation, each phrase as delicately balanced as the mountain flora itself.

This is not a book to which the collector of alpines will turn again and again for information. There is nothing here for which a more com-

prehensive reference does not already exist. Rather, this is a book for the lover of flowers, offered as a cordial invitation to spend a rainy afternoon visiting, or revisiting, the enchanted world of alpine flowers.

JENNIFER HICKS

**The Laurel Book.** Richard A. Jaynes. New York: Hafner Press. 180 pp., illustrated. \$10.95.

Subtitled "Rediscovery of the North American Laurels," Jaynes' book on laurels (*Kalmia*) fills a gap in the horticultural literature by bringing together much of the available knowledge on these beautiful plants. His book will doubtless please the growing band of laurel enthusiasts, as well as all horticulturalists interested in shrubs, particularly those who grow rhododendrons.

All aspects of growing laurels are considered, much attention being paid to their genetics, breeding and hybridisation, subjects on which Jaynes himself has carried out much original work. Propagation of laurels, both from seed and vegetatively, is dealt with in detail, as are all aspects of growing the adult plant and of protecting it against pests. J. E. Ebinger contributes two chapters, one on laurels in the wild and the other on their toxicity.

It should perhaps be mentioned that the classification of *Kalmia* proposed by Southall and Hardin (referred to briefly by Ebinger), differs considerably in detail from that adopted by Ebinger himself. Southall and Hardin recognize more species of *Kalmia*, but fewer varieties and forms. Regarding the latter, the wisdom of recognizing forms based on polypetalous and apetalous variants may perhaps be questioned; the "apetala form" mentioned on pp. 26 and 27 is not recognized by Ebinger in his formal revision. It is not clear just what the 25 distinct traits of mountain laurels referred to on pp. 35 and 157 are, the table 13-1 listing many more than 25 variations. A number of illustrations, unfortunately including some of the colored ones, lack clarity; printing errors are pleasantly few.

All in all, this is a useful book which should stimulate more interest in one of the finer groups of shrubs native to North America.

PETER F. STEVENS

**One Hundred Great Garden Plants.** William H. Frederick, Jr. New York: Alfred A. Knopf. vi + 207 pp., illustrated. \$15.00.

With few exceptions, this book admirably fulfills its self-avowed purpose — to introduce the author's personal choices of the 100 best trees, shrubs and groundcovers for use in the home landscape. One might, of course, take issue with his selection, for everyone has favorites; but one can hardly find fault with his presentation. There is an unmistakable impression that the author is on intimate terms with each and every one of the 100 plants mentioned; this is borne out when one learns that each specimen included is cultivated by Mr. Frederick on his own 25-acre property. It is, no doubt, from daily contact such as this that the author is able to write with such feeling about his choices.

Each specimen is presented in a one- or two-page essay and is accompanied by a color photograph that very effectively captures the nature of the individual plant. In addition to plant descriptions, the essays include observations on care and intriguing historical vignettes. The author is not content to merely offer descriptive paragraphs on the plant material; there is a multitude of good advice on how best to fit the specific plant into the home landscape. He discusses color, texture and structural form, and freely dispenses advice on companion plantings to further enhance the appeal of the various plants he has chosen.

The essays alone are sufficient reason to purchase this volume, but there are other reasons as well. The print is easily readable, and a very pleasant balance, both visually and content-wise, exists between the written words and the photographs, which are exceedingly lovely and capture subtle nuances of most of the plants mentioned. Indeed, it is hard to find much fault at all with this very pleasing little book. It would make a lovely housewarming gift for the new homeowner.

MARGO W. REYNOLDS

**How to Grow Wildflowers and Wild Shrubs and Trees in Your Own Garden.** Hal Bruce. New York: Alfred A. Knopf. 294 pp. + v., illustrated. \$12.95.

Harold Bruce is one of that small but very fortunate band of people who are born with eyes that see and with hearts made to sing by the beauty of the world about us. He lives in Delaware which he has explored quite thoroughly, but he also has made many excursions to the north, south and west. He writes with much charm and with a great deal of knowledge. Nearly every page contains useful advice and bits of information new even to the fairly knowledgeable reader. The book makes no pretense of being a botanical textbook, but Bruce discusses some subjects in considerable detail: the trilliums, the hardy hollies, the pine tree tribe and others.

He describes many trips to the seashore, the barrens and the piedmont, and the reader feels himself included in these explorations and is delighted with the companionship offered and the very interesting information given. I was very pleased to find properly extolled the many virtues of the hobblebush (*Viburnum alnifolium*),—perhaps the most beautiful of our deciduous, flowering shrubs— which grows well in quite deep shade. In describing trees that contribute to autumn color, the author, however, makes only passing reference to the sugar maple (*Acer saccharum*) as one that turns a good yellow. (Perhaps sugar maples do not thrive in the latitude of Delaware.)

The book contains some 28 beautiful colored plates and the rather wide margins are adorned with very good line drawings and also with short synoptic sentences such as students often scribble on the margins of their textbooks. This book is warmly recommended both for the pleasure of its reading and for the information contained.

ALLEN BRAILEY

**Ornamental Conifers.** Charles R. Harrison. New York: Hafner Press. 1975. 224 pp., illustrated. \$17.95.

“This book was designed to fill the long felt need for a popular all-colour guide to garden conifers, written and compiled in such a way as to be easily used and understood by the average home gardener.” This introductory statement is well executed by the author in the production of a handsome volume featuring 516 superb illustrations of garden conifers, mostly cultivars, ranging from *Abies* to *Widdringtonia*; another 38 colored illustrations of conifers in garden use follow. No other volume approaches the excellent color reproduction so essential in distinguishing horticultural varieties in conifers. The vast majority of the photos were from New Zealand locations, the author’s home country, and are of young plants. The author knows his plants and the descriptions often indicate this familiarity, as “an irregular, dumpy little heap of cheerful, dark-green foliage bearing little resemblance to its towering forest parent.”

The general descriptions and suggestions on cultural methods are good, and a helpful glossary is supplied. Only the few paragraphs on diseases seem inadequate for United States readers.

RICHARD A. HOWARD



\* AN AFTERNOON WITH NURSERY CATALOGS

This session will be devoted to studying various catalogs offering seeds and plants for both indoors and outdoors. Common and unusual material will be reviewed. A remarkable opportunity to share your experiences with others and get an early start on your spring gardening.

Tuesday, March 8

1:00 p.m. — 3:00 p.m.

Fee: \$3.00; Friends \$2.00

Instructors: George Pride, Assoc. Horticulturist, and Richard Weaver, Taxonomist

\* AN EVENING WITH NURSERY CATALOGS

The content of this course is identical to the one above. Fees and instructors are also the same.

Tuesday, March 15

7:00 p.m. — 9:00 p.m.

Meet at the Red Schoolhouse, Case Estates, 133 Wellesley St., Weston

*\* (These events are not offered in conjunction with the Massachusetts Horticultural Society.)*



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