

The NATIONAL
HORTICULTURAL
MAGAZINE



JOURNAL OF THE AMERICAN HORTICULTURAL SOCIETY, INC.

OCTOBER 1954

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The National Horticultural Magazine

VOL. 33

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No. 4

OCTOBER 1954

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The National Horticultural Magazine

The National Horticultural Magazine is a quarterly journal, being the official publication of The American Horticultural Society, Incorporated. It is devoted to the dissemination of knowledge in the science and art of growing ornamental plants, fruits, vegetables, and related subjects. The Journal is published by Monumental Printing Company at Thirty-second Street and Elm Avenue in Baltimore, Maryland, and is entered as second class matter in the post office of that city in accordance with the Act of August 24, 1912. Subscription to the Journal is included in membership, which is \$5.00 a calendar year.

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The Journal is issued for the months of January, April, July, and October. Manuscripts must reach the Editorial Office at the Society's Headquarters three months before publication is desired.

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John L. Creech

Franklinia alatamaha (See page 279)

Review Of Investigations On The Annona Species¹

JOHN C. NOONAN²

The edible annonas, indigenous to the Western Hemisphere, are probably as widely distributed in the tropical parts of the world as any other New World fruit. Frost and extended cool weather are recognized as the main climatic factors limiting the distribution of the annonas. In Florida, annonas have been grown on the coastal areas south of Stuart and Bradenton. The pond apple is a native in the swamps, both brackish and fresh water, of south Florida. A related plant, known as the papaw, has been reported to be growing as far north as New York (13).

Cultivated annonas in the United States are classed as novelty fruits, and some doubt that Americans in general will enjoy them. The odor of the fruit is rather pleasant in contrast to the odor of many other tropical fruits of minor importance. The fruit is made up of many carpels, joined together into one fleshy, roundish, edible fruit, with a muricate, scaled, or nearly smooth and netted skin. Each carpel normally contains a rather large, bean-shaped seed (23).

History

There is little doubt that annonas had an important role in the life of the peoples living in the sub-tropical regions of the Americas. Terra-cotta vases modeled after cherimoya fruits have been dug from prehistoric graves in Peru (18).

Annonas are reported in historical accounts of the discovery of the Americas; Popenoe writes: "The historian, Gonzolo Hernandez de Oviedo, in his 'Natural History of the Indies,' written in 1526, describes the soursop (*Annona muricata* L.) at some length, and he mentions having seen it growing abundantly in the West Indies as well as on the mainland of South America." It is thought the annonas were then introduced to Egypt, India, and other tropical countries by these early explorers (10). Wester (22) states that Annonas were first introduced into the United States in 1833 by Dr. H. Perrine. Reasoner (13), in his *Condition of Tropical and Subtropical Fruits in the U. S.*, written in 1887, described four of the Annona species which were then found in southern Florida. Since that time numerous introductions have been made from the Bahamas, Cuba, and other sources.

Description

Fortunately, there is very little confusion in botanical nomenclature, although the family ANNONACEAE and the genus *Annona* are sometimes spelled Anonaceae and Anona. The family contains more than forty genera, of which only two besides *annona* produce edible fruit. The biriba, *Rollinia deliciosa* Saff., is highly regarded in northern Brazil, and may be of value in sections of India which are free from frost. The papaw or pawpaw, *Asimina triloba* Dunn., is a wild fruit of temperate United States with some possibilities for improvement (7).

The genus *Annona* contains more than fifty species, of which five produce

¹Florida Agricultural Experiment Station Journal Series, No. 190.

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edible fruits of some importance. A number of others may have value in breeding or as root stocks. Most of the members of the genus, including all of the fruiting species, are indigenous to America (7). Those producing edible fruits in Florida are: *Annona cherimola* Mill., cherimoya; *A. diversifolia* Saff., ilama; *A. muricata* L., soursop; *A. reticulata* L., custard apple; *A. squamosa* L., sugar apple; and an annona hybrid, 'Atemoya' (8). The wild pond apple, *A. glabra* L., bears an inferior fruit with a resinous flavor.

Cherimoya trees have made poor growth in Florida and have borne few fruits, most of which are poorly shaped and of indifferent quality. The fruit is variable in size and appearance, irregularly heart-shaped, greenish or yellowish with areoles more or less distinct. The flesh is whitish, sweet, subacid, rich and melting. It is a tall shrub or small tree, with obovate-oblong leaves. The cherimoya is cultivated with limited success in California where a number of varieties have been propagated. Many of these are under trial in Florida, but thus far none has shown much promise of being adapted to Florida conditions (8, 22).

The ilama is now represented in southern Florida by a number of fruiting trees, and many young plants have been distributed in recent years (8). The tree resembles the cherimoya in size and habit; the fruit is also similar. The skin is whitish green often with a pinkish tinge; the flesh is white or pinkish (11). It is sometimes called "the cherimoya of the lowlands." Its hardiness is comparable to that of the sugar apple. The ilama has proved a shy bearer thus far under Florida conditions (8).

The soursop has succeeded fairly well as a dooryard tree on the Lower East Coast but most specimens are shy

though continuous bearers (8). It is a small handsome tree with dark green and shining, oblong-ovate or obovate leaves. The fruit is ovate-oblong or conical, greenish, with short, soft spines; the flesh is white, rather fibrous, juicy subacid, and well flavored (22). Cold winds, near-freezing temperatures or severe drought may cause defoliation, and light freezes kill twigs and smaller branches (8). It succeeds best in frost-free Key West where there is a small commercial use of the pulp in ice cream.

The custard apple succeeds only in the extreme southern portion of the state. The fruit matures during late winter and early spring. It is a small tree with lanceolate leaves. The fruit is cordiform, fairly smooth, tan or yellowish in color with reddish reticulations. The flesh is melting, slightly granular, creamy white, rich, sweet with a slight trace of acidity (22). Generally the quality is rather poor but chilling improves the sweet or rather insipid flavor. Some confusion has arisen because in Cuba and Australia and in some countries of Central America this fruit is known as "cherimoya" (8).

The sugar apple is grown to a limited extent in the southern counties and is the most successful of the annonas in Florida (8). It is a tall shrub or small tree with thin, oblong-ovate leaves which are sparsely hairy. The fruit is irregularly heart-shaped, tuberculate, greenish; the flesh is white, sweet and delicately flavored (22). The season begins in mid-summer and lasts for about three months, the fruits ripening irregularly. They are used almost wholly as a fresh fruit and are commonly chilled before eating. During the season the fruit may be found on local markets in southern Florida, but, on account of the characteristic splitting of its rind as it ripens or separation

of carpels, it seldom reaches its destination in good condition when shipped long distances (8).

The sugar apple and the custard apple have fruited fairly well in Florida, the sugar apple frequently coming into bearing the third year from seed (8).

A hybrid between the cherimoya and the sugar apple has been named 'Atemoya' and has proved quite satisfactory for southern Florida. The 'Atemoya' is eaten only as a fresh fruit, and the juicy, white pulp is of agreeable flavor and custardlike in consistency. The 'Page Atemoya' has proved to set more fruit and to have dependably better quality than the cherimoya under Florida conditions (8).

Pollination

Ahmed (2) reports that the yield of most annonas can be greatly increased by hand pollination. Flowers on the extremities of branches or weak flowers in clusters are unlikely to set fruit, so these are collected and used for pollen. Pollen is applied with a camel's hair brush before the stigmas have a chance to dry out. Only as many flowers are pollinated as the tree can carry to maturity. Hand pollination is very satisfactory in Egypt, but in India, at least under certain conditions, it is not entirely successful because the early flowers produce no pollen.

Construction of the flowers and their fragrance suggest that they are pollinated by insects, and in the course of Wester's observations, it was discovered that they are protogynous. As the flowers mature, a viscid fluid is secreted that covers the stigmas and which appears to be most abundant twenty-four hours before the pollen is shed. Until the shedding of the pollen, the petals assume an almost perpendicular position to the twig and leave a small opening facing downward, permitting

the entrance of pollen-bearing insects. As the time approaches for the discharge of the pollen, the petals spread out and upward so rapidly that movement is readily perceived; this phenomenon is accompanied by emanation from the flower of a fragrance similar to that of well-ripened bananas or pineapple. The fragrance is also noticeable in the flowers twenty-four hours previous to the shedding of the pollen. The stigma is now readily approached by large as well as small insects and if the stamens and stigmas were synchronous, self-pollination by insects or the wind might be effected (21).

It has been demonstrated that the sugar apple hybridizes readily with the cherimoya, custard apple and pond apple; the cherimoya has also been successfully crossed with the pond apple. So far, the attempts to cross the soursop with the cherimoya, sugar apple, and custard apple have failed (21).

Climatic And Soil Requirements

The soursop is the most tropical of all the annonas. It is very susceptible to cold and should be planted where it may be protected from the cold north and northwest wind (18).

The cherimoya is considered to be the hardiest of the annonas. A small tree thriving at higher altitudes, it is not successful near sea level. It has become well established in upland areas throughout the warmer regions of the world. The tree grows fairly well in southern Florida but fruits poorly (18).

Aside from the question of frost, or too much cool weather, the sugar apple and the custard apple are not particular as to climate. They are said to prefer a dry climate, at least during the flowering season, but in northern India they ordinarily set no fruits until the beginning of the rainy season, even

though flowers are produced during the hot, dry weather. Low humidity apparently interferes with pollination in Egypt. Although they are known to thrive under dry conditions, and withstand drought well, they should be irrigated during fruit development. While the trees will withstand drought, they do so to the detriment of developing fruit by going dormant and sometimes shedding their leaves (7, 18).

The annonas are tolerant of a wide range of soil conditions. The fact that they grow well on rocky soil has been commonly noted, both in India and in other countries. This does not mean, as some have thought, that the tree requires such stony ground for its best growth. The trees are rather shallow rooted so do not require a deep soil, but drainage must be good, as they suffer from water logging (7).

The soursop develops best in deep, rich, well-drained soil and is not as tolerant of lime soils as are some of the species of annonas. It has a shallow fibrous root system close to the surface so that a good mulching is necessary as well as frequent irrigation during dry spells (18).

Improvement By Selection

The quality and flavor of fruits from individual trees of the edible annonas are highly divergent, some being sweet and others acid, some distinguished by attractive coloring of their exterior and flesh, others possessing a hard shell-like rind that enhances the shipping qualities of the fruit, while in still others, aroma and flavor are highly developed. Certain species grow at high altitudes and are cold resistant—an invaluable characteristic in subtropics visited by frosts; some possess unusual vigor; and still others inhabit swampy and inundated regions incapable of growing other fruits, while

others succeed on high, well-drained ground (22). A program of selection and evaluation will be of major importance in obtaining annonas which have desirable features.

The fruits produced on inferior seedlings have given an adverse impression to those who have tried them without having had the opportunity to sample good specimens (14). As is often noted, the seedlings produced from seed of good fruit do not always produce fruit equal to the original; but fortunately the annonas are reasonably easy to root and graft so improvement could result from selection of wood from trees of known superiority.

No superior strains or horticultural varieties of the annonas have so far been propagated commercially in this state with the exception of 'Page Atemoya.' Some excellent seedlings are to be found among some of the earlier plantings which might deserve propagation. Observations suggest cultural practices affect not only the vigor and yield, but also fruit quality.

Propagation—Rooting And Grafting

Healthy branches of mature wood are used for rooting. The wood is taken during the period of dormancy and made into cuttings 5 to 6 inches in length and varying from $\frac{3}{8}$ to $\frac{1}{2}$ inch in diameter. These are set in sand to a depth of $\frac{4}{5}$ of their length, having at least one bud exposed above the surface. With bottom heat, a large percentage rooted in 28 days for transplanting into pots of soil (12).

At the Sub-Tropical Experiment Station, cherimoya, 'Atemoya,' ilama, soursop and sugar apple have been successfully veneer grafted on one-year-old stock of several species of Annonas including sugar apple and pond apple. The pond apple is used for a root stock because of tolerance to flooding.

Value And Uses

The food value is principally due to the richness in sugars, glucose and sucrose being found in almost equal proportions (18).

Most of the better seedlings can be eaten as fresh fruit which may be improved by chilling before eating. The strained pulp makes an excellent drink when mixed with milk. In employing the pulp for ice cream, it should be added to the cooled custard just before putting it into the freezer (16).

Annonas should be harvested while still firm and, with the exception of soursop, after the skin between the segments has turned a creamy yellow and may have begun to crack. This requires going over a tree every day or two. When ripe they are very delicate and must be handled with utmost care. This means that the fruit should reach the consumer within a few days of picking, and makes transport to distant markets difficult. If picked prematurely, the skin holds together better even after the pulp is soft, but the quality is damaged (7).

Among the native peoples of the tropics, the sugar apple is reputed to be of medicinal value. Tea made from the root is highly purgative, while that made from the leaves is mildly laxative and is also considered to have a general tonic effect on the digestive tract. (18). In some parts of its range, leaves of this species are rubbed over floors or placed in hens' nests to keep away vermin and the seeds are said to have insecticidal properties (15).

Insects And Diseases

The trees are commonly attacked in Florida by several species of scale

insects, by mealybugs and by a lacewing bug. The fruits are sometimes attacked and destroyed by larvae of a chalcid fly (8). In Trinidad, fruits are infested by several lepidopterous (the order of insects consisting of butterflies and moths) insects whose larvae tunnel into the fruit (5).

The incidence of anthracnose, caused by the fungus *Colletotrichum gloeosporioides* Penz., on the ANNONACEAE in Puerto Rico, seems to be correlated with high relative humidities. Experiments have shown that annonas are seriously attacked by the anthracnose fungus in the northeastern and wet inland region of Puerto Rico. The disease is responsible for a constant drop of flowers and fruits, a die-back of twigs and branches, and a damping-off of the seedlings (6).

The disease appears on young leaves, as small, light green spots, which, under high humidity, expand, until the whole leaves are scorched and may finally drop. From the leaves, the organism may grow into the young twigs which may be killed resulting in the condition known as die-back (6).

Young infected fruits drop and either rot or mummify. On mature fruits the characteristic lesions consist of small, inconspicuous spots on the skin of the fruits. When such fruits are cut open, a dry rot, without accompanying bad odor, is found in the pulp (6).

In Florida, the leaves are attacked by a rust fungus, *Phakopsora cherimoliae* (Lagh.) Cumm. This disease is often severe enough to cause premature defoliation. The cherimoya is probably more severely attacked than the other annonas (8).

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Annona hybrid 'Atemoya'

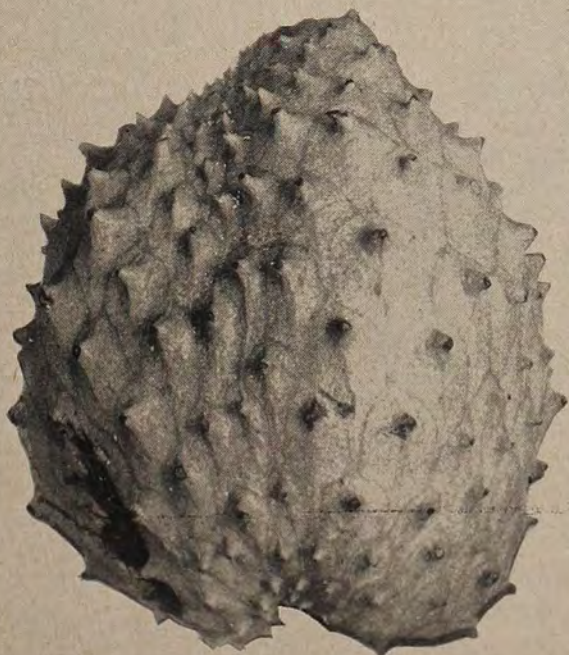
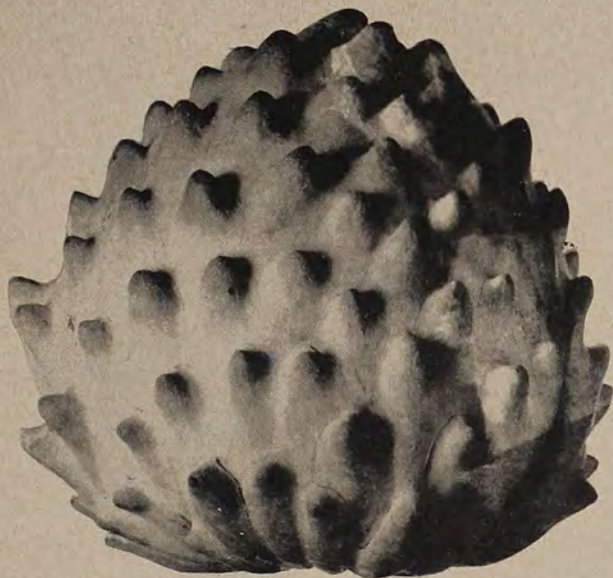
Annona diversifolia Saff., Ilama

Annona reticulara L., Custard Apple

Annona muricata L., Sour-sop

Annona squamosa L., Sugar Apple

—————→



A Deciduous Holly For Winter Color¹

O. M. NEAL AND ROGER W. PEASE²

For nine months of the year winter-berry remains unnoticed, a nonentity in its habitat along streams and swamps from Maine to Florida and westward to Missouri and Wisconsin. But with the coming of September, this plant begins to emerge from mediocrity. At first the scarlet fruits are complemented by the green foliage, which slowly turns a purplish bronze and falls to the ground. It is not until the last leaf falls, however, that the winterberry, or black alder, reveals its full beauty. From October to January few other plants can compete with its brilliance. The plant is a scarlet mass easily visible for half a mile. Like many other hollies, the fruits are long-lasting and rarely are eaten by birds. Gradually the berries succumb to winter freezes, and by January the plant fades into its environment and is lost among willows, viburnums, and other rank shrubs.

Branches of this plant are harvested and used for winter decorations and arrangements. Last year it was used in one of the girls' dormitories at West Virginia University during the Thanksgiving holiday. Less than half a pound was used. The potentialities of the winterberry for providing prunings can be brought out by the fact that twelve times this much was cut from another plant of the same clone. These plants under study were all of the same clone, propagated by division in April 1948. The size of the division varied at the

time, and the difference in harvest is an indication of this variation, which still persists. One female plant should provide ample decorating material for the home from the pruning necessary to keep it growing vigorously. In addition, such a plant would be very attractive as part of the home landscape, especially when used among low evergreens and backed by hemlocks.

It may appear strange that a plant so striking in the winter and so useful in holiday decorations is not more commonly used until three characteristics of the species, in addition to its strictly seasonal interest, are recognized: 1) it is usually found on wet land; 2) there are occasional crop failures; and, 3) like most hollies, this species is functionally dioecious. This means that individual plants are either male or female and one of each is necessary for pollination and resultant berry formation.

If we examine these apparent weaknesses, we find that they are not as serious as one might think. In the first place, like many swamp plants, the winterberry tolerates a poorly-drained soil rather than actually requiring it. It is less injured by wet soil than it would be by competition with more vigorous species on well-drained soils. Occasionally it is found growing naturally (self-sown) on dry sites. It is doubtful if such bushes could survive, however, if other more vigorous shrubs were present.

The second factor which may be limiting the use of the winterberry is that the crop occasionally fails. Failure in other fruit crops is common. Alternate bearing is the rule in some varieties of apple—for instance, the 'York.' Another common reason for crop fail-

¹Published with the approval of the Director, West Virginia University Agricultural Experiment Station, as Scientific Paper No. 485.

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³The authors are indebted to the following members of the staff of the West Virginia University Agricultural Experiment Station: David R. Creel, Photographer, for the pictures used; E. S. Elliott, Assistant Plant Pathologist, for help in preparing the paper; W. H. Childs, Horticulturist, O. E. Schubert, Associate Horticulturist, and C. B. Lees, Assistant in Horticulture, for criticism of the manuscript.



Left: A branch from a female plant showing single or paired flowers. Enlargement shows prominent pistils and the absence of pollen. Right: A branch from a male plant showing flowers in clusters. Enlargement shows pollen-bearing male blossoms carried on a single stalk.

ure is weather too cold or too wet for pollinating insects to be active when the flowers are open. A third reason is damage to blossoms by late frosts. This seems a likely explanation in the case of winterberry because the plants grow on low frosty sites. Yet it appears unlikely because flowers are borne on shoots of the current season's growth and do not open until several weeks after frost danger is over. The buds are present, however, and susceptible to injury for a long period. During an observation period of seven years, the crop failed only once in the planting mentioned. That year there was a killing frost on the 29th of May and another on the 9th of June. The young buds turned black and dropped off; the foliage injury was evident until August. Plants several miles away, on high ground with good air drainage, escaped damage and bore heavily.

The third weakness—dioeciousness—is somewhat more serious, but not insurmountable. Although many nurserymen offer winterberry, few, if any,

specify the sex of the plants they sell. Thus a planting may be disappointing because a large percentage of non-berried male plants is present. Occasionally a planting will be all males or all females. In such a case the bushes rarely will set berries when they mature.

It is easy to determine the sex of a winterberry plant when in flower. A twig bearing typical female blossoms is illustrated first. The central pistil is prominent and well formed, but the surrounding stamens are non-functional. The male blossoms shown next are borne in clusters, and each cluster is attached to the twig by a common stalk. On the other hand, the female blossoms occur singly, not in clusters. Occasionally, however, female winterberry blossoms seem to be borne in clusters, but examination with a hand lens reveals no cluster-bearing stalks. Enlargement shows an apparent cluster of female blossoms on the right, but they lack the cluster-bearing stalk of the male blossoms pictured at the left.

The reason nurserymen do not offer winterberry plants of definite sex is not certain. Perhaps the demand for the species is so limited that they consider it impracticable to propagate it vegetatively in order to guarantee the sex of plants not old enough to blossom. An examination of possible methods of asexual propagation, however, indicates that it is feasible. Since the species is moderately stoloniferous, several young shoots may be dug each year from around the base of most bushes. These shoots will have the same sex and other hereditary characteristics as the parent plant. Also plants can be propagated from hardwood and softwood cuttings,



A softwood cutting showing root development after twenty days.

as shown by several experiments during the past twenty-five years. In 1929, Zimmerman and Hitchcock (1) reported that hardwood, leafless cuttings of winterberry rooted readily in the dark, provided the temperature was satisfactory. No rooting took place at fifty or ninety-five degrees and the rate of rooting varied between these extremes. Chadwick (2) worked with

softwood cuttings and obtained forty per cent rooting in sand, thirty-five in sand and peat, and sixty-five in peat. He also studied the effect of position of cut and found little difference, an average of eighty-four per cent of all cuttings rooting in this experiment.

In the spring of 1952, trials were initiated at the West Virginia University Agricultural Experiment Station to study the effect of several factors on the rooting and overwintering of cuttings from the selected clone. For preliminary observation, eighteen softwood cuttings were set on July 18, using materials and methods described for rooting American holly, *Ilex opaca*, (3). In brief, the essentials were a washed-sand rooting medium, the use of indolebutyric acid as a hormone, shading with lath, and watering with fog nozzles. Half instead of quarter light was admitted, however, and the method of applying indolebutyric acid to the winterberry differed from that employed for American holly. In the case of winterberry a one to two hundred and fifty stock solution was prepared by dissolving one gram of indolebutyric acid crystals (4) in 125 cc of ninety-five per cent ethyl alcohol and then adding 125 cc of distilled water. A concentration of seventy parts per million was prepared by adding 2 cc of stock solution to 115 cc of distilled water. The basal ends of the cuttings were soaked sixteen hours in the solution, washed, and then firmed into the rooting medium to a depth of about one and one quarter inches. The cuttings began to show root formation on August 2. A rooted cutting twenty days after setting is illustrated. On August 26, fourteen cuttings showed substantial root development. At this date, the rooted cuttings were transplanted to a section of the cold frame in which the soil medium was one-third sand and two-thirds light soil. Water was slow-



Lillian A. Guernsey

Ilex verticillata, in fruit

ly reduced by gradually decreasing the length of time the fog nozzles were operated. During the winter, temperatures within the frame were maintained

above freezing by bottom heat, thermostatically controlled, and by a straw mulch placed on top of the cold-frame sashes. In late March, 1953, the rooted

cuttings were transplanted to a lath house equipped with irrigation (5). All lived through the growing season, made satisfactory growth, and went into the winter in an apparently healthy condition.

These preliminary tests suggested that softwood cuttings of winterberry, given treatment similar to that described, will root readily, will survive the winter, and will continue growth thereafter.

In 1953, more extensive trials were made to elaborate on the data obtained from the trials started in 1952.

On June 27, twenty well-hardened softwood terminal cuttings from each of two bushes, one male and one female, were set—half under quarter light and the remainder under half light. Indolebutyric acid was applied as in 1952, but at a concentration of sixty instead of seventy parts per million. On July 20 none of the cuttings under quarter light had formed roots. All of the male and half of the female cuttings under half light had rooted. These results indicated the superiority of half light over quarter light, under the environmental conditions used, and showed that winterberry may be rooted when cuttings are taken as early as June 27. They also indicated a need for further observation of possible variation in rootability between male and female plants.

On July 18, eighty well-hardened cuttings were taken—ten each from four female plants on widely separated sites. These were given the same indolebutyric acid treatment used the previous year. On August 16, thirty-eight of forty male cuttings and thirty-two of forty female cuttings had rooted. The poorest rooting from any one bush was sixty per cent. The fact that half

of the cuttings taken from female plants on June 27 failed to root, while all the male cuttings rooted, indicated that the carbohydrate reserve of the female plants had been lowered by bearing a heavy crop of berries the previous fall. When the cuttings were taken four to six weeks later, rooting of the female cuttings was almost as good as the males, indicating that the carbohydrate reserve of the female plants had been replenished. Rooting of cuttings of both sexes was satisfactory at this season.

In concluding, then, three factors are evident: (1) despite the swampy natural habitat of winterberry, it thrives under cultivation on a rich well-drained soil; (2) the sex can be guaranteed by propagating known male and female plants either by division or by softwood or hardwood cuttings; and (3), if the site is free from damaging late frosts and if he includes at least one male plant to provide the necessary pollen, the homeowner can have a brilliant display of red fruits in the winter landscape.

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Some Interesting New Plants For Subtropical Areas

V. T. STOUTEMYER¹

There is considerable interest in new and improved plants for California at the present time. The rapid expansion of population, the growing awareness of the value of ornamental plants for use in the interiors of buildings, and the favorable climate for all year outdoor living and gardening have all tended to keep the nursery business prosperous and active.

Many new species of plants are being introduced, but, as can be expected, not all of these will succeed and become established on nursery lists. On the other hand, new variant forms of the old familiar plants, if they have genuine merit, frequently displace the more familiar types completely. The present discussion is confined to new varieties of plants which are already in cultivation or with newly introduced species of plants which appear to be superior to closely similar species already in cultivation. All of the plants to be discussed are currently available. Although they are naturally of greatest interest to those living in climates where they may be grown outdoors, many of them are commonly grown as florists' plants or as bedding plants in colder areas.

Variations may be found by good observers in almost any population of plants grown from seed, and sometimes mutations can be found in clonal vegetatively-propagated stock. In some cases this will involve problems of vegetative propagation, but, as we shall see later, the chances of using seed successfully are greater than are generally supposed.

The ordinary forms of *Solanum Rantonnettii* are said to be insignificant plants. The large-flowered form which is usual in nurseries is a type brought into cultivation by the late Kate Sessions of San Diego.

Formerly a small-flowered form of the Princess flower, *Tibouchina semidecandra*, was grown here. A visiting botanist from Australia told of a superior form grown in that country. After several unsuccessful attempts in which the plants were killed by fumigation, the plant was finally established successfully and is now the only form in our nurseries.

The bracts of shrimp plant, *Beloperone guttata*, have a color which renders it useful in some situations but undesirable in others. A new chartreuse form is very fine and will certainly extend the usefulness of this plant in outdoor landscape use. It should be outstanding also for floral arrangements.

One plant which is now available and which should be very useful is a clear yellow-flowered form of *Tecomania capensis*. This was discovered by a local physician on a recent trip to South Africa, who arranged for introduction. There is some variation in tones of yellow in the seedlings, and vegetative propagation should be used. This plant is somewhat tender and its use will necessarily be confined to the milder areas.

The frequent use of redwood exteriors in modern houses has undoubtedly increased the demand for red, bronze, or purple-leaved plants. An intensely red-leaved form of castor bean has been introduced in nurseries

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Yellow Tecomaria capensis

and is now common everywhere. The purple-leaved form of *Cotinus coggygria* grows well in southern California and is a striking ornamental. It is said to come reasonably true from seed.

Purple-leaved beeches, although not commonly seen, also thrive in the coastal areas.

Vegetative propagation, with its greater cost, is not always necessary



Dodonaea viscosa purpurea

to reproduce these variant strains of plants. Seeds may often be used with possibly a little roguing of undesired types. Seeds of the purple-leaved form of *Dodonaea viscosa*, a very fine new form now becoming available, come generally true to the type. This is a

good plant for hedges. It will stand considerable frost.

The bronze red-leaved form of *Cordyline australis* comes only partly true from seed. Unfortunately, some of the seedlings which show early promise of red foliage color tend to fade out to

a green as they grow older. This may be the result of natural crossing with the ordinary green type and might not be true for seed collected from well isolated plants.

Seedlings of jacarandas were grown from seeds taken from certain individual trees having superior foliage and flower characteristics, and were generally uniform in type, particularly in the matter of retention of foliage. Nurserymen should make an effort to stabilize superior types of this beautiful flowering tree.

A seedsman, who used to import seeds of the flame eucalyptus from its native habitat in West Australia, stated that these seeds produced trees having clear red flowers. However, seed produced in California often produces a wide range of flower colors probably because of extensive crossing with *Eucalyptus calophylla* and possibly others. They have had the same problem on the French and Italian Rivièras and have propagated desired types through inarch grafting. Recent experiments here point to the possibility of success with more rapid methods of grafting.

One beautiful flowering tree which needs selection for vegetative propagation or else some study of seed sources is the Cape Chestnut, *Calodendrum capensis*. Individual specimens vary greatly in time and amount of bloom, and the variation in vegetative types in any street planting is sufficiently great to raise a question concerning such use at the present time.

The bottle tree, *Brachychiton populneum*, is another tree which exhibits a variety of growth habits as we see it in southern California. Sometimes weeping forms may be found which are truly beautiful and have considerable ornamental value.

The bottlebrushes, when grown from seed, are often variable and many in-

ferior types appear. The variety of *Callistemon* offered as 'Red Chico' is an outstanding type, very floriferous, with large, deep red flowers.

Bougainvilleas are among the most spectacular vines for subtropical regions. The variety known usually as 'San Diego Red' has largely displaced the older 'Crimson Lake' and challenges the popular newer red variety 'Barbara Karst.' A new use for bougainvilleas is as a ground cover. However, only a few varieties have a habit of growth which makes them acceptable for this purpose. The relatively dwarf variety 'Temple Fire' is one of the very best. The variety 'Copper King,' a somewhat pinkish-orange color, is also good. 'Barbara Karst' has often been used since it is not a rampant grower.

The variety 'Sunset' was introduced as a long-desired yellow. It is actually a deep gold in color with somewhat bronzy tones. Unfortunately, it is practically impossible to grow the white varieties outdoors in California.

A great revival of interest in the camellias has been experienced in recent years on the Pacific Coast. The sasanqua group appear to be rapidly coming into favor because of their great usefulness for a variety of landscape purposes. Some of the flowers of the showier varieties are too short-lived. Others of the same type are much more durable. Some of the new varieties in this group are real improvements, but there is a need for more critical evaluation and serious attention to breeding. The different varieties show differences in vigor and in plant habit.

A few of the *Williamsii* hybrid camellias, produced in Cornwall, England, of which the unusually fine variety 'J. C. Williams' is typical, are being offered by California nurseries. These are crosses of *C. saluenensis*



Chartreuse Beloperone

with *C. japonica* and have unusual landscape value, since they are very floriferous and have an attractive habit of growth.

C. reticulata is only for the most favored areas climatically. With the recent introduction of many new forms from the Orient, many new forms should appear through hybridization. The disadvantage of the upright, leggy growth of this species can be overcome by planting a bushy camellia of either the japonica or sasanqua groups as a facer.

Lantana sellowiana is one of the most useful trailing ground-cover plants for the areas in southern California having a mild climate, but it has been available in only one color. It blooms practically all the year and will grow on steep slopes. The new lantana hybrid 'Gold Rush' is not as rampantly spreading, but can be used for the same purpose. It is also excellent for hanging baskets. The color is a very pure deep yellow.

Aucuba japonica is a useful shrub for shade and can also be used in some

situations for indoor plantings. An unusual new variegated type, in which the leaves have solid yellow centers with clear green marginal bands around the edges, has been introduced under the name of 'Goldiana' by a nurseryman in Los Angeles. As might be expected, growth is a little slower than with the types ordinarily available.

The loquat has long been a favorite for espaliers in California, in addition to being a useful small ornamental tree. The attractive foliage has also been a perennial favorite of the devotees of the art of flower arrangement. A new species, *Eriobotrya deflexa* Nakai, is now available. This has striking foliage

with a bronzy cast which is superior to the common loquat for ornamental use.

The development of air travel has doubtless stimulated interest in new introductions. Some unusual plants which would probably succeed in California have been observed and reported by plant-minded travelers. Probably the many difficulties incidental to successful plant introduction may eventually be overcome. Possibly a golden age of ornamental horticulture, such as Belgium, France, and Holland experienced around the end of the last century, may be just ahead for Californians.

Concerning Aeschynanthus

PEGGIE SCHULZ

There's little point to growing an ornamental plant unless it is beautiful, a collectors' item, or of botanical interest. *Aeschynanthus* is a delightful combination of all these and I think it high time more indoor gardeners became acquainted with this intriguing genus.

The name, pronounced ess-kin-ann'-thus, signifies "ashamed." For the life of me I can't see what these plants have to be ashamed of! Taken literally, I suppose it refers to the way the flower lips curve. Personally, I think them fine examples of dual-purpose plants. These plants, trailers in habit, have rich dark green, leathery leaves. During the spring and into early fall they bear most exotic, slightly fragrant, red or red and yellow tubular flowers.

Aeschynanthus, a genus of about seventy species, is endemic to the East Indies, Malaya, and Eastern Tropical Asia. It belongs to the GESNERIACEAE and is rather closely related to Columnea, a gesneriad which Dr. Steyermark

discussed in the last issue of this Magazine (33:212-215, July 1954).

For a number of years *Aeschynanthus* was known as *Trichosporum*. In fact, many gardening books and encyclopedias still list it as such. Too bad it couldn't have retained this rather descriptive name which referred to the unusual seeds with slender, dangling hairs. But *Aeschynanthus* is the conserved name and, is not only correct but also preferred.

There appears to be but four species in cultivation—at least in this country: *Aeschynanthus lobbianus*, *A. pulcher*, *A. marmoratus*, and *A. speciosus*. Many dealers list *A. pulcher* as a syn. of *A. lobbianus* but Doctor H. E. Moore, Jr., Bailey Hortorium, keeps them separate following C. B. Clarke in his monograph in *DeCandolle's Monographia Phanerogamarum*.

I have grown all of these species and found them excellent and showy additions to the greenhouse. At least two

of them, *A. lobbianus* and *A. pulcher*, make interesting and rather well-behaved additions to the window garden. *Aeschynanthus* surge into new growth about mid-February. At that time I have always given them feedings of fish emulsion or weak manure tea. I repeat this at monthly intervals and have enjoyed a good measure of bloom from my plants.

Gardeners, who derive a lot of satisfaction out of propagating, will find these plants very much to their liking. Take two-inch cuttings, remove all but two or four of the leaves, stick the cuttings into moistened sand, sphagnum moss, or partially sterilized leaf-mold. If you can supply them with bottom heat and room temperatures of about seventy to seventy-five degrees, they will root very rapidly. If not, the process is slower—but equally certain.

When the cuttings are well rooted, pot them in two-inch clay pots. Although they would flower the first year, it is a sound horticultural practice to pinch them back several times during that year to make them form more luxurious growth. Like the older plants, these youngsters, too, should be fertilized every six weeks.

Last spring I visited the Missouri Botanical Gardens, and the orchid house at Gray's Summit, Missouri. In

both places I saw splendid examples of *Aeschynanthus* covered with their strangely beautiful, brilliantly-colored flowers.

A. Lobbianus: The leaves are waxy green and the scarlet flowers grow from purple-brown vase-like receptacles (the calyx). This calyx is covered with a fine coat of hair and the hairy corolla is nearly twice as long as the calyx.

A. pulcher: The leaves are identical to those on the above species but the calyx differs. On this plant the red flowers emerge from a smooth green, or only slightly flushed calyx that is about one-third as long as the smooth (not haired) corolla.

A. marmoratus: This is the species for folks who appreciate variegated foliage. The waxy leaves are light green mottled on top with deeper green and underneath with reddish-brown. The curious flower is a mixture of green, chocolate- and reddish-brown.

A. speciosum: The waxy green leaves grow in whorls and the flowers of this species are bright orange.

The Dictionary of Gardening by the Royal Horticultural Society gives a rather thorough treatment of a number of the other members of the genus. Dr. Moore says that he has no record of many of the other species, except the four described here, as being cultivated in the home.

Correction

In Dr. Clement G. Bowers' article *Rhododendron Seed Germination in Agar Nutrient Solution*, which appeared in the July issue of this Magazine, an error was made in the formula for Knudson's Solution C, on page 207. The correct amount of Calcium nitrate $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ should have been 1.00 gram and not 0.25 gram as printed. We are grateful to Reader John H. Madison, Jr., Instructor and Horticulturist, University of California, Department of Landscape Management, Davis, California, for being the first to catch the proof readers' error. ED.

For Southern Gardens— *Hedychiums*

T. A. FENNELL

Those of us who are deeply interested in southern gardens and particularly those of the lower South quite often deplore the great proportion of northern plant material, especially herbaceous perennials, that it seems we must use. Unfortunately, very few of us do much about it. There are, however, numerous genera of little known but strikingly beautiful plants available to us that can be grown only in the South. A greater use of these plants will, I believe, add greatly to the charm of our gardens. Among these plants, near the head of the list, are the *Hedychiums*.

As a whole, this genus offers to southern gardeners one of the most charming of all groups of flowering plants. While many of the thirty-eight species and several hybrids are handsome, they vary considerably in their beauty, size, and form. Most of them are strong-growing plants with stems as much as five or six feet tall and broad dark green leaves sometimes eighteen or twenty inches long by two or three inches wide. They are essentially rich-soil, shade, and water lovers, though they will sometimes grow remarkably well in poor soil after becoming established if they are given plenty of shade and moisture.

They are generally considered to be fall-flowering but this is not true in the far South. In southern Florida, the tops of most species never completely die down and the plants may be seen in bloom at nearly any time from April or May until December or until later. I have found that at Coconut Grove, Florida, the plants can be kept growing from February to December and that,

by the liberal use of fertilizers and water, flowers can be produced over most of this period. The plants should be allowed to rest for a month or two during the winter of each year. This rest can be brought about, with us, by withholding water during December and January; farther north it is automatically produced by the colder weather; still farther north, where there is danger of the rhizomes being frozen, it is best to take them up, cut off the tops, and store the roots in a cool place. (In the way one stores the roots of either *Cannas* or *Dahlias*.) After storing them in this manner, they should be carefully examined for rotten spots, these places cut out, and the rhizomes cut in pieces of from one to five or six inches long and replanted. If you want numerous small plants but very few blooms the first year, cut the roots into two-inch pieces; but if you desire large plants and plenty of blooms, divide them into larger pieces, say five or six inches long.

Hedychiums seem to have a strange affinity for houses, and especially for the north side of the houses in this latitude. This is, no doubt, caused by the cool shade and copious water supply afforded by the eaves, but it is true, nevertheless, that the best *Hedychiums* are generally found in foundation plantings. They also do well along the courses of small streams and near lily pools where they can be watered by the overflow.

All of them are tender to frost, but, as they produce underground rootstocks or rhizomes, they may be left in the ground throughout the winter, provided they are protected from freez-

ing by a heavy mulch of leaves, straw, or peat moss.

All of the species are native to Asia, mostly from India and Cochin-China, except one which is found in Madagascar. They are especially numerous in the lower hills of the Himalayas, and it is in this region that most of the species known to cultivation are found. Some four or five hybrids have been raised in India and these, together with most of the best species, have recently been imported and are now established in this country.

Of these, the hybrid *H. pradhanii*, P.I. 80004,¹ is perhaps the finest. It is of a large robust habit with dark green leaves eighteen or twenty inches long and two to three inches wide, the stems reaching a height of five to six feet. The deliciously fragrant flowers are white, stained with pink when first opened, and changing to light yellow the second day, causing the inflorescence to seem to bear both white and yellow flowers. The individual flowers are about two and a half to three inches wide, and are borne on a long, well-arranged spike. The bud sheaths, which are tubular and borne at an angle of about sixty degrees from the spike, contain several buds which follow each other in blooming, so that for several weeks the spike seems full of fresh flowers, despite the fact that individually the flowers last only two days. The lip, the most showy segment of the flower, is about an inch and a quarter by an inch and a half in size, is deeply bilobate, with a light orange-pink stain near its base; the petals are about $\frac{5}{8}$ by $1\frac{1}{2}$ inches, flaring and white. The sepals are insignificant, yellow, narrow, and recurving. The long, projecting filament is deep pink and, with the yellow anther at its tip, adds materially to the flower's beauty.

¹Inventory number of the introduced plant, as maintained by the Plant Introduction Section of the U. S. Department of Agriculture.

Another hybrid, the very interesting *H. chandraberianum* P.I. 79995, offers a welcome addition to our southern gardens. Its large white and yellow flowers are borne from a compact, cone-like spike caused by the overlapping of the bud sheaths. The buds are borne two or more to the sheath, as are many of the genus, and follow each other in blooming sequence. The individual flowers last for two or three days and are white on first opening, turning to light yellow on the second day. The large bilobate lip is about 1 by $1\frac{1}{2}$ inches in size, white, with a yellow stain at its base. The sepals are yellow, curled longitudinally and recurving. The petals are white with a yellow stain near their bases and are spatulate in shape, about $1\frac{1}{2}$ inches long by $\frac{1}{2}$ inch wide. The light orange filament is about 2 inches long and is capped by a brilliant orange stamen. The plant is medium in habit, growing to a height of $3\frac{1}{2}$ to $4\frac{1}{2}$ feet, with acuminate dark green leaves approximately 8 inches long by $1\frac{1}{2}$ inches wide, with a red stain near their bases. While this hybrid is not as showy as *H. pradhanii*, it is altogether a very interesting and beautiful plant.

The several varieties of *H. coronarium* are all good and bear probably the largest flowers of the genus. The flowers are, however, badly crowded on the spike, and, though they are showy in the extreme, the spikes are never quite so large as those produced by some of the better hybrids, notably *H. pradhanii*. *Coronarium* is, however, probably the most fragrant of all the *Hedychium*s. I have seen and grown *H. coronarium* var. *flavescens*, P.I. 79998, which produced cream-colored flowers with a bright yellow stain near the center of the lip, extending to its base. The petals are also stained with deep yellow near their bases. The filament is yellow, capped by a bright yellow



Hedychium coronarium var. *maximum*. Three spikes of about average size.

low anther. The flowers are about four inches across, borne on a very compact spike as is typical of *H. coronarium*, each sheath containing two or more buds which follow each other in bloom.

The sepals are a lemon yellow, very narrow, curling about two inches long. The flaring petals are about 2 inches long by $\frac{3}{4}$ of an inch wide. The lip is about 2 by $1\frac{1}{2}$ inches, bilobate, the cut



The beautiful Hedychium pradhanii.

extending about $\frac{1}{5}$ th its length. Leaves from 12 to 15 inches long, about 2 to $3\frac{1}{2}$ inches wide, acuminate, with a tendency to yellow on the edges and tip when mature. An extremely hand-

some and very fragrant variety, *H. coronarium* var. *chrysoleucum*, P.I. 79997, is also a very charming plant. It produces large, very fragrant, and showy flowers about $3\frac{1}{2}$ inches in di-

anther, white with large spatulate area of orange on the lip. The bilobate lip is about $1\frac{3}{4}$ by 2 inches, petals each $1\frac{1}{2}$ by $\frac{3}{4}$ inches, white; sepals yellow in color, curling, insignificant; filament orange with orange stamen; spike compact, conelike, made up of the numerous overlapping bud sheaths which contain usually two or more buds that follow each other in bloom. Plant medium in habit, growing to a height of from 3 to 4 feet; foliage dark green with no red stain; leaves 11 to 12 inches long by $2\frac{1}{2}$ to $2\frac{3}{4}$ inches wide, acuminate. Then there is also *H. coronarium*, var. *maximum*, P.I. 79999, the best known of the species, which produces pure white flowers, about 4 inches wide; the petals are about $2\frac{1}{2}$ by $1\frac{1}{4}$ inches, and the deeply bilobate lip, about $2\frac{1}{4}$ by $2\frac{1}{4}$ inches, pure white with light green stain near the base. Sepals are white, about $2\frac{1}{2}$ inches long, narrow, and curled, rather insignificant. The spike is dense, conelike, each sheath overlapping the base of the one above and containing two or more buds which succeed each other in blooming. A handsome species, very fragrant, and with an exceptionally strong habit of growth.

The pretty *H. ghali*, P.I. 80002, is also a very interesting hybrid. The flowers are cream white with orange filaments and bright yellow buds. The spike is a bit too compact, though the sheaths hold 2 or 3 buds which succeed each other in bloom, thereby keeping a good head of flowers for several days. The sepals are narrow and, upon the opening of the flower, curl and become insignificant. The petals are fairly broad, about $\frac{7}{16}$ by $1\frac{1}{4}$ inches, and spatulate. The lip is bilobate and large, $1\frac{1}{4}$ by 1 inch in size. The leaves are approximately 12 inches long by $1\frac{1}{2}$ inches wide, and dark green. It is a fairly good variety.

A comparatively large group of the

genus produces highly-colored flowers. Of these *H. greenii*, P.I. 80003, produces well-shaped, deep-red flowers in spikes about 5 inches long. This species has not proved very satisfactory with us as yet. Should, however, this plant prove to bloom well, it will be a striking species as it produces easily the most brilliantly colored of any of the *Hedychium*s. *H. samsheri*, P.I. 80005, produces flowers medium in size, about 2 inches across, of a very good shape and very pleasant odor. The sepal, column, and base of the lip and the petals are all of a medium-orange color, while the other portions of the lip are light orange. The spike is well arranged and the flowers well held. Each sheath of the spike contains two and sometimes three buds which succeed each other in opening, thereby keeping a good head of blooms for several days. The foliage is a pleasing dark green, each leaf about 12 inches long by $1\frac{1}{2}$ inches wide, with a heavy midrib. The plant attains a height of 3 to 4 feet. *H. aurantiacum*, P.I. 79994, produces small flowers about $1\frac{1}{2}$ to 2 inches in diameter with narrow, spatulate, and light rosy pink petals becoming lighter near the outer end. The sepals are narrow, curled and light orange in color. Lip $1\frac{1}{8}$ inches long by $\frac{1}{2}$ inch wide, edges curled up at the base to form a narrow tube $\frac{1}{2}$ its length. It is deeply bi-lobed and its color is rose pink with a creamy pink area on outer edges. Filament light rose pink at base, becoming darker towards apex, about $2\frac{1}{2}$ inches long. Stamen and pistil light orange. The leaves are about 15 to 18 inches long by $2\frac{1}{2}$ to 3 inches wide, dark green with a dark red stain on the sheath. This is a very pretty species, the small graceful flowers of which combine to make a showy spike. Each bud sheath contains two or more buds that follow each other in bloom. The flowers last several days in

perfection and have a faint and pleasant odor; about 50 bud sheaths on a spike. It is an alpine species and does not grow as well as it probably would farther north. *H. spicatum*, var. *acuminatum*, P.I. 80006, produces fairly large light yellow, slightly fragrant flowers, which are well placed and held on an open spike. Petals are narrow, about $1\frac{7}{8}$ by $3\frac{1}{16}$ inches wide. Sepals narrow, and curled, rather insignificant. Lip large and showy, $\frac{7}{8}$ to 1 inch, by $1\frac{3}{8}$ to $2\frac{1}{2}$ inch long, bi-lobed, cut extending about $1\frac{1}{3}$ its length. Filament light orange in color, about 2 inches long. Stamen orange and $\frac{1}{2}$ inch long. Bud sheaths contain 2 or more buds, each opening on different days. Entire spike about 12 inches long, very graceful and airy in appearance. Leaves dark green in color, about $2\frac{3}{4}$ by 13 or 14 inches. Slight pink stain at the junction of the sheath and petiole. A vigorous grower and free bloomer.

Then there is *H. villosum*, P.I. 80008, an alpine species that does not like Florida summers, but that produces nice spikes of small, short-lived white and orange flowers, and *H. thrysoforme*, P.I. 80007, which is one of the poorer varieties that we have bloomed. Its flowers are small, white, fragrant, and individually insignificant. The segments are narrow and curled. The spike is compact, each bud sheath containing usually only one bud. Leaves are green, approximately 11 by $2\frac{1}{2}$ inches, inclined to die around the edges and tips about the time of the blooming of the

spike. We have in addition to the foregoing three species that have not as yet grown well or flowered. *H. coccineum* var. *angustifolium*, P.I. 79996, has grown fairly well but has not yet flowered. This may turn out to be an excellent species as it should not be judged by our plants which were nearly dead on arrival here and are still very weak. Its flowers are supposed to be brick red, shading to crimson, and to be carried on a fifteen-inch spike. *H. elatum*, P.I. 80000, is another species with which we have not yet succeeded. It is native to the sub-tropical Himalayas and therefore should grow fairly well with us, but it has been weak, a poor grower, and has not yet flowered. It is said to produce white flowers marked with pink on spikes a foot long. The last of the species that we have tried is *H. gardnerianum*, P.I. 80001, and is another which we have not yet succeeded in growing satisfactorily. It is reputed to produce yellow flowers that are followed by showy red fruits.

The above species and hybrids do not constitute all of the available *Hedychiums*, but only those that have been grown in our experiments. Each is valuable horticulturally and the group in the hands of a skilled hybridizer should produce some gorgeous varieties.

Lovers of flowering plants and especially the lovers of fragrant species will find the *Hedychiums* extremely interesting. I believe it a genus of unusual horticultural promise.

Begonia cucullata And Its Varieties

BERNICE G. SCHUBERT

The genus *Begonia*, which provides some of the most prized ornamentals, is a large genus with hundreds of species in both the Old and New Worlds. The variation in habit of the plants is very wide, ranging from delicate herbaceous types to vines (up to eleven meters long in *Begonia glabra* (*B. scandens*)), stout shrubs, and even trees. A new species soon to be described, from the mountains of Venezuela, comes into full flower and bears fruit at a height of three to four inches. Other species, such as *B. digitata* of Brazil, become trees. Many of the rare species are known to grow in only one or two spots in their native countries, but in these localities are found in profusion. This is the situation in some of the canyons of southern Michoacan in Mexico, where *Begonias* color the whole landscape. Other species are found in very small stands, and widely scattered, as *B. lutea* of Colombia.

Through the efforts of some of the California *Begonia* fanciers, several of the rarer Mexican species are now being cultivated as pure strains, a desirable accomplishment since many of these are attractive and interesting in nature, and hybridization would not necessarily increase their horticultural value.

Although Mexico is a splendid source for rare and interesting new species, an equally rewarding one is Colombia in South America. Here many strikingly curious species are found, one of them in the Section *Casparya*, a group in which the fruiting capsules are horned. This is *B. killipiana*, a species with large scarlet floral

bracts, and the stamens of the male flowers in two series of different lengths, a character which makes it a link between the genera *Begonia* and *Begoniella*. In the Section *Ruizopavonia* (named for the early Spanish explorers Ruiz and Pavon) is *B. cuatrecasana* with brightly colored flowers two to three centimeters long. *B. rossmanniae* is a close relative and notable for the extremely long wing of its fruiting capsule (up to four centimeters) and for its bracteoles which continue to grow with the fruit and become quite conspicuous.

It is rather remarkable that despite the great numbers of species to choose from in *Begonia* the bulk of the tremendous amount of horticultural work has been confined to relatively few. Considering the extraordinarily good results obtained, the possibilities inherent in working from a somewhat broader base seem limitless. The numerous new possibilities in *Begonia* could be discussed at some length, but the purpose of this paper is to treat briefly the botanical background of one of the commonest of the *Begonias* in cultivation, *B. cucullata*, known more widely as *B. semperflorens*, and its varieties.

The *sempreflorens* group of *Begonias* is probably the best known in the horticultural trade. The various forms are propagated without difficulty, cultivated without special problems, and brought to a state of abundant flowering rather rapidly. It would not be easy to give an accurate count of the number of hybrids produced in this group in the last fifty years, but the average, including the European

and American, would be at least two a year. The horticultural history of *Begonia semperflorens-cultorum* is well known and has been documented by the Belgian horticulturist, Charles Chevalier,¹ and in this country by Helen K. Krauss.² The plant known as *B. semperflorens* is important as one of the parents of the initial cross from which there have since been produced so many useful and attractive horticultural varieties, in which, it should be noted, its characters are always distinguishable. The characters which recommend it are the ones which have made it famous, so that through its various cultivated forms it has become perhaps the best known of the American begonias.

Botanically, the species, which should be treated as *B. cucullata*, is rather undistinguished. It is a fairly common plant in most of tropical and subtropical America, and the only species naturalized in the continental United States where it is found in the swamps and low grounds of peninsular Florida. It has the floral characters of the Section *Begoniastrum*, of which it is a member. These include for subsection *Eubegonia* Warb., to which it belongs, male flowers with four tepals, numerous essentially free stamens; female flowers with five tepals, three more or less persistent styles, and an unequally three-winged capsule. It is a somewhat variable species and the distinctions between the varieties are not always precise, but the species as such is always recognizable.

Begonia semperflorens was described as new and illustrated in 1828 by Link and Otto, from Brazilian material; and again illustrated by Hooker in 1829. Previously, however, in 1805, Willdenow had described *B. cucullata*, also

from Brazil. The two species are not identical, but very closely related and we have, in recent botanical studies, treated *B. semperflorens* (the later described species) as a variety of *B. cucullata*, under the name *B. cucullata* var. *hookeri*, because this varietal name is the first one so used to represent the plant commonly known as *B. semperflorens*.

In order to make clear our botanical conclusions, a taxonomic treatment of the varieties of *Begonia cucullata*, with a key to their identification, and some illustrations, is presented here.

BEGONIA CUCULLATA Willd. Sp. Pl. 4: 414. 1805; Klotzsch, *Begoniaceen-Gattungen und Arten*, in *Abhandl. der Königl. Akad. der Wissenschaft*. Berlin, 1854, 27, Pl. 1. 1855; A. De Candolle in *Mart. Fl. Bras.* 4¹:341. 1861, in *DC. Prod.* 15¹:292. 1864; Smith & Schubert in *Darwiniana* 5:101, Fig. 11. 1941, in *Caldasia* 4:99, Pl. 12. 1946, in *Field Mus. Nat. Hist.*, Bot. Ser. 13,⁴ No. 1:187. 1941.

B. spatulata Lodd. *Bot. Cab.* 2:Pl. 107. 1817.

B. paludicola C. DC. in *Bull. Soc. Gèneve, Sér.* 2, 6:125, Fig. 7. 1914.

?*B. agrifolia* Rojas in *Bull. Géographie Botanique* 24:215. 1914.

Plant perennial, but flowering the first year, caulescent, stoloniferous, glabrous, 1-10 decimeters high, never tuberous at the base. Stems erect or ascending, more or less branched, somewhat succulent, reddish. Leaves petiolate with asymmetrical, narrowly ovate blades, somewhat inrolled at the base, narrowly obtuse at the apex, palmately nerved, 7-8 cm. long, 6-7 cm. wide, crenate-serrate and ciliate; petioles to 2.5 cm. long; stipules oblong, obtuse, strongly ciliate-serrulate, 2-3 cm. long, 6-11 cm. wide, usually fused to the petioles. Cymes axillary, few-flowered; peduncles 3-5 mm. long,

¹Chevalier, Charles, *Les Begonias*, pp. 276-278. Liege, 1938.

²Kraus, Helen K., *Begonias for American Homes and Gardens*, pp. 74-88. New York, Macmillan Company, 1947.

bracts persistent, ovate, ciliate-serrulate, 5 mm. long; pedicels slender. Staminate flowers with 4 tepals, the outer two suborbicular or reniform, 8 mm. long or rarely longer, pink, the inner two narrowly obovate, shorter, white, anthers linear, longer than the free filaments. Pistillate flowers with 4 or 5 subequal, obovate tepals, 6-9 mm. long. Fruit a trilocular capsule, 24-30 mm. long by 12 mm. wide; wings 3, unequal, the largest triangular, subacute; placentae bilamellate, ovulate throughout; styles bifurcate with spiralling stigmatic tissue.



Plate 1. *Begonia cucullata* Willd. var. *cucullata*, as illustrated by Smith and Schubert in *Darwiniana* 5:101, Fig. 11. 1941. 1. Upper portion of plant, adapted from illustration of *B. spatulata* Lodd., in *Bot. Cab.* 2: Pl. 107, 1817. 2. Seed, $\times 50$, from collection of *Cabreta*, No. 856.

It seems best to interpret this species, for the present at least, not from the original description of Willdenow which was based on inadequate material, but by the more critical one of Alphonse DeCandolle. In this description the character of the seed is introduced for the first time. The only illustration cited by DeCandolle under *B. cucullata* is of the species which he places in its synonymy, *B. spatulata* Lodd. This plate is reproduced here to illustrate his concept.

Key to the Varieties of *Begonia cucullata*

1. Seeds acute. Leaves narrowly ovate, subtruncate and slightly revolute at the base. Stipules ciliate-serrulate, obtuse. Staminate tepals not usually more than 8 mm. long. ----- *B. cucullata* var. *cucullata*
1. Seeds narrowly obtuse.
 2. Leaves narrowly ovate, subtruncate at the base. Stipules ciliate-serrulate, acutish. Staminate tepals up to 18 mm. long. ----- var. *hookeri*
 2. Leaves narrowly elliptic, narrow and unequally cuneate at the base. Stipules almost entire, large ----- var. *arenosicola*

B. CUCULLATA Willd. var. *HOOKERI* (A. DC.) Smith and Schubert in *Darwiniana* 5:104. 1941.

B. semperflorens Link & Otto, *Ic. Pl. Rar.* 9, Pl. 5. 1828; Hook. in *Bot. Mag.* 56: Pl. 2920. 1829.

B. hookeri Sweet, *Hort. Brit.* Ed. 2, 437. 1830, in *Steud. Nom.* Ed. 2, 1840.

B. sellowii Klotzsch, *Begoniaceen-Gattungen und Arten in Abhandl. der Königl. Akad. der Wissenschaft.* Berlin, 1854, 28. 1855.

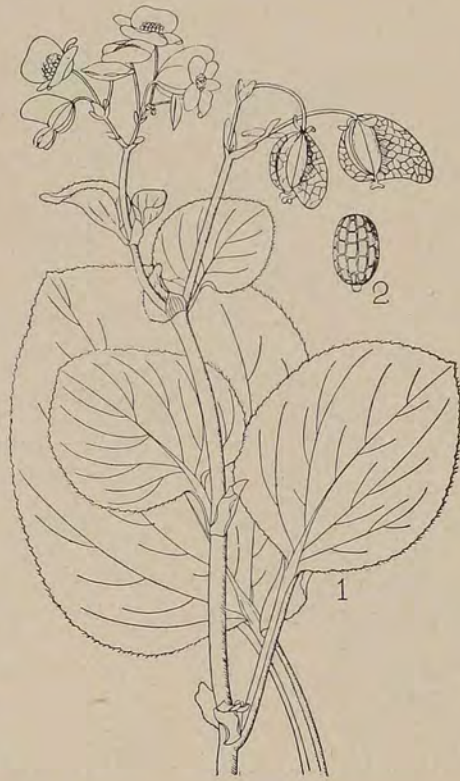
B. semperflorens β *hookeri* A. DC. in *Mart. Fl. Bras.* 4¹:342. 1861; *Prod.* 15¹:293. 1864.

B. semperflorens γ *sellowii* (Klotzsch)
A. DC. in *Mart. Fl. Bras.* 4¹:342.
1861; *Prod.* 15¹:293. 1864.

Plants with narrowly ovate leaves,
truncate at base; stipules ciliate-ser-
rulate, acutish, staminate tepals 12-18
mm. long (rarely only 8 mm. long).
Seeds obtuse. Plate No. 2.

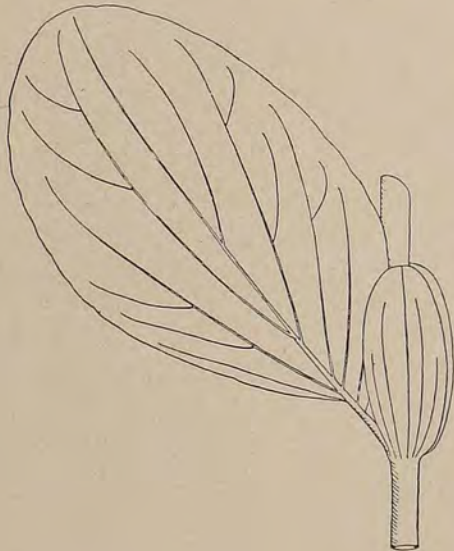
Geographical distribution: south-
eastern Brazil and northeastern Argenti-
na.

The first name for this plant in the
varietal category is *B. semperflorens*
 β *hookeri* A. DC. The dimensions of
the flowers vary greatly and the shape
of the seed is often not absolutely regu-
lar. It is from this form, however, that
most of the parent stock of the horti-
cultural variations was undoubtedly de-
rived.



→
Plate 2. *Begonia cucullata* var. *hookeri*
(A. DC.) Smith & Schubert, in
Darwiniana 5:104, Fig. 12. 1941. 1
Upper portion of plant, adapted from
illustration of *B. semperflorens* by
Hooker f. in *Curtis Bot. Mag.* Pl. 2920.
1829. 2. Seed, $\times 40$, from collection of
A. Burkart, No. 7865.

←
Plate 3. *Begonia cucullata* var. *arenosi-
cola* (C. DC.) Smith & Schubert, in
Darwiniana 5:106, Fig. 13. 1941. Leaf
and stipules, $\times 1$, from collection of
Venturi, No. 766.



B. CUCULLATA Willd. var. *ARENOSICOLA*
(C. DC.) Smith & Schubert in *Dar-
winiana* 5:106, Fig. 13. 1941.

B. subcucullata β *arenosicola* C. DC.
in *Bull. Herb. Boiss.*, Ser. 2, 3:404.
1903.

B. subcucullata C. DC. *loc. cit.*

Robust plants to 1 m. high, with
narrowly elliptic leaves unequally
cuneate at the base; stipules larger and
frequently exceeding the internodes,
oblong, obtuse, subentire. Seeds ob-
tuse. Plate No. 3.

Geographical distribution: Paraguay and northern Argentina.

The first name for this plant in the varietal category is variety β *arenosicola* under *B. subcucullata*. *B. subcucullata* is a synonym of *B. cucullata* as here defined. This variety may be distinguished by its elliptical leaves which are unequally cuneate at the base, by its larger subtire stipules and its obtuse seeds.

Of some of the other species which enter into the *B. semperflorens-cultorum* complex as defined by Mrs. Krauss, a few words must be said. *B. schmidtiana* Regel, a Brazilian species, was used in perhaps the earliest crosses in 1878. The species is well illustrated, and there seems to be no doubt concerning its botanical identity.

The next species noted by Mrs. Krauss, used in crosses with hybrids of *B. semperflorens* and *B. schmidtiana*, was *B. roezli* Regel (Plate No. 4). This species, according to her, is

"sometimes erroneously named *B. bracteosa*." *B. roezli* as known from Regel's illustration (in *Gartenflora* 1876, p. 194) is very closely related, if not actually a form of *B. bracteosa*, and if one of the species is to be placed in synonymy of the other, or reduced in rank to a subspecific category under the other, it must be *B. roezli*, the later described species. The *B. roezli* of Lynch which Hooker renamed *B. lyncheana* is something quite unrelated, and there is no reason to suppose that its origin was not Mexico as Hooker stated. While between *B. bracteosa* and *B. roezli* Regel there is a difference only in the density of the inflorescence, between these two and *B. lyncheana* as illustrated by Hooker f. (*Bot. Mag.* 6758) (Plate No. 5) are fundamental differences in the pistillate flowers. *B. lyncheana* has 2-4 tepals and many-branched styles, whereas the other species have only 2 pistillate tepals and bifid styles.

Top, left: *Begonia roezli* Regel, reproduction of illustration accompanying original description of species in *Gartenflora*, Pl. 871. 1876.

Top, right: *Begonia semperflorens atropurpurea*, a commonly cultivated form, also known as *Begonia 'Vernon.'* Illustration reproduced from *Revue Horticole*, Vol. 63:84. 1891.

Bottom, left: *Begonia semperflorens rosea*, a commonly cultivated form. Illustration reproduced from *Revue Horticole*, Vol. 83: Fig. 168. 1911.

Bottom, right: *Begonia lyncheana* Hook. f., reproduction of illustration accompanying original description of species in *Curtis Bot. Mag.* Pl. 6758. 1884.



Recent Advances In Horticulture

FREEMAN A. WEISS

Chelates and Chlorosis

In the chemical jargon with which the modern horticulturist is expected to be familiar there is a series of terms of relatively recent origin, featuring words and expressions such as chelate (pronounced key-late), non-ionic metal complexes, polyamino carboxylic acids, EDTA, Versenes, and Sequestrenes. These terms are encountered so often, both in scientific and popular horticultural writings and even in advertisements in garden magazines, that it is impossible to ignore them even if one is averse to mixing chemistry with plant culture. In relation to horticulture, all these materials have to do with the cure or prevention of one of the most familiar yet obscure of all plant maladies—chlorosis.

In its commonest form chlorosis is due to a deficiency of nutritional iron, the characteristic manifestation of which is a pale yellowish-green color in the interveinal areas of the leaves, while the veins remain a nearly normal green. The leaves are undersized in severe cases and assume an ivory tint; marginal burning and premature defoliation may ensue. Iron deficiency in the plant does not necessarily mean that the soil is deficient in iron content; in fact, average soils usually contain, on a quantitative basis, all the iron that plants require, which is percentage-wise miniscule. Nor does iron deficiency occur only when the soil's iron is locked up in calcareous compounds, causing the so-called lime-induced chlorosis. Contrary to widespread belief, nutritional iron deficiency is often associated with acid soils, especially extremely acid ones, having a pH below 5.5.

Iron chlorosis is a prevalent and de-

bilitating affliction not only of ornamental plants such as azaleas and roses, but also of important fruit crops, as citrus and pineapple, and even of shade trees. It is also a matter of common experience that the often prescribed remedy for iron chlorosis—applying iron (ferrous) sulfate with or without sulfur to the soil, or in dilute solution to the foliage—fails to effect a lasting cure. Plant physiologists have therefore been much concerned with the question of how iron is absorbed and assimilated by plants, and practical horticulturists with finding a reliable remedy for chlorosis.

Iron is an essential constituent of the chlorophyll of plants, as it also is of hemoglobin, the red coloring matter of animal blood. It is indispensable in the plant's food manufacturing and food assimilating processes. Its absorption from the soil is, however, subject to definite limiting factors, one of which is the pH or acid-alkaline balance. Its availability is also influenced by the presence of other elements, both those essential such as calcium, phosphorus, and potassium, and nonessential or sometimes even toxic elements such as aluminum, copper, and zinc. The form in which iron is present also affects its usefulness to plants, the trivalent or ferric form (as in the hydrated oxide of iron which we call rust) being generally unavailable, and in excess may be toxic.

A chelate is defined chemically as a compound that will inactivate or "complex" a metallic ion, with the formation of a carbon-nitrogen ring in which the metallic ion is held. An iron chelate is first of all an iron-containing organic compound; next, it may be a source of iron for plants, so good a source, in

fact, that it may be used to cure chlorosis. Chelates are remarkably stable under a wide variety of conditions. As the iron portion of the molecule is unionized, it is not subject to exchange with other metallic ions and is not influenced by the acid or alkaline reaction of the soil. Chelates may indeed be the form in which nature provides plants with iron, and scientists are only learning how to duplicate another of her vital processes.

The value of iron chelates as a source of iron in plant nutrition and as a remedy for chlorosis was first shown by Ivan Stewart and C. D. Leonard of the University of Florida. They used a compound of iron chelated with ethylene diamine tetraacetic acid (whence the symbol EDTA) to cure chlorosis in citrus trees. Subsequently other investigators employed various other iron chelates, all possessing such long chemical names that the practice of designating them by symbols, such as FE-EDTA-OH, EEDTA, etc., has grown up. They are, in general, an iron compound chelated with a polyamino polycarboxylic acid. Some are effective only in acid soils, others in calcareous soils (where iron sulfate is quite ineffective) and thus have opened

the way for curing or preventing iron chlorosis under practically all growing conditions.

Next, chemical firms that had long specialized in the use of chelates for controlling metallic ions in various industrial applications, such as water-softening and the maintenance of stable emulsions, turned their attention to the value of chelates in agriculture. The result is a series of manufactured products sold under trade names such as Versene Iron Chelate, Ferro-grene, and Versen-ol (formulations of the Bersworth Chemical Company, of Framingham, Massachusetts); and the Sequestrenes (products of the Geigy Chemical Corporation, New York City). As with other specialty compounds in agriculture, the cost of these materials seems high relative to iron sulfate, for instance, but they have the merit of being effective in very small doses and of producing lasting results.

Surely, any grower who has had trouble with chlorosis, and who has found the simpler remedies inadequate, should satisfy both his scientific curiosity and his practical needs by experimenting with these newest of chemical aids to healthy plant production.

Words Of Regret

Mrs. Gladys C. Nolan and Mr. Elmer J. Lorenz wish to record the following corrections to their article *The Begonias Collected by Thomas MacDougall* which appeared in the last issue of this Magazine:

On Page 178: Photographic credit for the illustration should be given to Mr. Ladislaus Cutak and the subject of the illustration should be Mr. Thomas MacDougall (seated).

On Page 180: The illustration of *Begonia cavum* is improperly displayed—the right hand side of the illustration should actually be the top. Perhaps many technically interested persons gathered this obvious error from the positions of the leaves and the flowers.

Ed.

First Record Of *Lilium Canadense* L.

MARJORIE F. WARNER

There is a figure of "Martagoun sive Lilium de Canada auri colorem referens, inteis vero nigris maculis sparso flore," in the *Augmentatio*, 1614, of the *Florilegium novum* of Johann Theodor de Bry. The original *Florilegium* was published in 1612, and it has been stated in some work that I cannot rediscover that the figure of *Lilium canadense* was published in 1612. This may have been because it was found in a copy of the *Florilegium* with the title-date 1612, by someone who did not realize that it contained supplements. The first of these, entitled *Amplificatio*, 1613, is present in most copies of the *Florilegium*, with continuously numbered plates; but the second supplement or *Augmentatio* is often lacking or imperfect, or has its plates arranged irregularly, so that its half-title, with date 1614, is readily overlooked.

The figure of *Lilium canadense* in the *Augmentatio*, 1614, is essentially the same as the "Martagum Americanum flore luteo pointato," in Pierre Vallet's *Le jardin du roy Louis XIII*, undated, but with a dedication signed January 10, 1624. These duplicating pictures were reproduced a few years ago in this journal, in *Additional Notes on the History of the Persian Cyclamen*, by Walter C. Blasdale (*Natl. Hort. Mag.* 30:192-197, Oct. 1951). While the drawing is poor, they are seen to be practically identical but neither one copied from the other. As it is always assumed that all the flowers of his *Jardin du roy* were drawn by Vallet himself in the garden of Jean Robin, the Royal Botanist, it may be inferred that de Bry had a drawing of *Lilium canadense* by Vallet, although it antedates the latter's book by a number of years.

It was certainly not published in 1612, nor yet in 1614, because of an interruption in publication of the *Florilegium* early in the progress of the *Augmentatio*, 1614, that delayed the plate of *Lilium canadense* for a year or two. In 1641, when Matthäus Merian published the *Florilegium renovatum et auctum*, a reissue of de Bry's plates with many additions, he stated in his preface that the work had been published 25 years before, that is, in 1616. However, there was some doubt whether this date covered all the plates of the *Augmentatio*, or whether some of them were never issued till they came out in the *Anthologia magna*, which was published by the heirs of de Bry in 1626.

There were various complications, but eventually sets of plates of the *Augmentatio* were found, unnumbered but apparently complete, one of which seems to have been precisely planned to fill out both *Amplificatio* and *Augmentatio*, thus completing the *Florilegium* as a whole. *Lilium canadense* is among these final plates, and is therefore covered by the date 1616. In the later numbered editions of the *Florilegium*, it is Plate 90.

This does not explain the discrepancy in dates of the de Bry and Vallet plates; and I submit the theory that not only *L. canadense* but other flowers in the *Augmentatio* were from a collection of preliminary drawings by Vallet or another artist. I think we must assume that although the plates were not published till 1616, the year 1614 was the time of blooming or particular record of the plants represented; and these include North American species which at that time could hardly have

been found in Europe except in Robin's garden. There is a figure of a Cypripedium, probably *C. reginae*, an "everlasting" labelled "Gnaphalium Americanum" (*Anaphalis margaritacea*), and others that seem familiar, though often too crudely drawn for exact identification. We know that Robin had some of these plants in 1623, and there is good reason to believe he had received some of them many years before. As to the drawings: I have sometimes wondered whether a mysterious artist who was called "the Englishman" could have done some of them. The half-title of the *Augmentatio*, 1614, has the figure of the "Flos passionalis, sive Granadille" (*Passiflora incarnata*) which bloomed in the garden of Jean Robin in August, 1612, and is said to be "depictum à quodam, qui vocatur Anglus." There were other Frenchmen who used this pseudonym during that half-century, but there is no clew to this one save that he may have been a protégé of the Queen Mother, Marie dei Medici, whose "herborista" or botanist, N. Descamps, wrote the inscription on this plate.

So 1616 is the earliest positive date I have found for *Lilium canadense*. Other illustrations soon followed. There was a wretched little cut of a single flower and bud that might have belonged to any lily of the type, in an appendix dated 1619, to the *Histoire des plantes* (Paris, 1620), of Geoffroy Linocier. Vallet's folio plate was duly published in his *Le jardin du roy Louis XIII* in 1624, but is hardly better or worse than the de Bry plate of 1616. Meanwhile a beautiful plate had

been drawn by Daniel Rabel and published in his anonymous *Theatrum Florae* (1622, Plate 33). This was undoubtedly drawn in Robin's garden, where Rabel got some of his handsomest subjects, and it is thought that some plates of his *Theatrum Florae* may have been drawn as early as 1615.

Although the very first record of the Canada lily was an illustration, it was noted about the same time in botanical texts. Bauhin, in his *Pinax theatri botanici* (1623, p. 79), cited de Bry's name, "Martagon sive Lilium de Canada" &c, as synonym under his "Lilium flavum angustifolium;" and in the same year the "Martagon, seu Lilium Sylvestre Americanum flore luteo punctato" was listed in the *Enchiridion isagogicum* (1623), the catalog of the royal garden in Paris by Jean and Vespasien Robin. But the earliest account, though rather inadequate as botanical description, was contributed by Petrus Hondius, the pastor of Ter Neuzen in Holland, to the Dodoens *Cruydt-boeck* (Leyden, 1618, p. 310), edited by Joost van Ravelingen. Hondius seemed rather indifferent to the beauties of the "Martagon van Canada," which he thought much "like the other yellow lilies." But he must have grown it in his garden, or observed it closely in that of someone else, as he describes its manner of bulb formation; and his observations must have been made during the years 1613-1617; so we may guess that *Lilium canadense* had already entered into European cultivation before the delayed plate of de Bry's *Augmentatio*, 1614, was finally issued in 1616.

August 23, 1954

Growing Coniferous Ornamentals From Seed

E. H. TRYON

Many conifers, such as the pines, firs, spruces, and hemlocks, which grow naturally in our forests make fine ornamental trees for use around the home. The home owner, who is interested and in a position to take care of the young plants, may raise coniferous ornamentals from seed himself.

A conifer grown from seed will, of course, be similar to the species in characteristics, such as color and form, but will not have the uniformity of an individual tree propagated asexually by grafting, budding, or rooting.

These trees can be raised from seed by methods quite like those used in gardening. In fact, many gardens are suitable for such use. Whether or not the garden is chosen for the site to raise these evergreens, certain conditions are needed: 1). The soil should be light in texture with a sandy loam preferred. Never choose a heavy clay soil as the roots of the seedlings when lifted are more subject to injury than are those in a light soil. 2). The soil should be reasonably fertile but should not be high in lime. A pH of 5.0 to 6.0 is preferred for most conifers, although the cedars will stand a somewhat higher pH. 3). The ground should be nearly level or have a slight slope, but both water and air drainage should be satisfactory. 4). A water supply should be nearby as the seedlings require watering during the summer.

Seed Source And Storage

Coniferous seed may be obtained by collecting the mature cones or fruits in the fall. The cones of the pines, firs, spruces, and hemlocks should be allowed to dry slowly in a well ventilated place, and the seed shaken out when the cones open.

Often it is inconvenient or impossible to collect the seed of desired species. Then small amounts of seed can be obtained from reliable commercial seed dealers, such as F. W. Schumacher of Jamaica Plain, Massachusetts, and Herbst Brothers of New York City, New York. Their seed is usually of good quality, with known germination capacity. Often as little as one ounce of seed may be purchased when only a few trees are to be raised. The seed which is collected or purchased in the fall must be stored, and the seed of some species should be treated to aid germination when sown in the spring. The seed of most pines, spruces, and hemlocks can be stored under dry, cool conditions. For small lots, the seed may be placed in an airtight jar, such as a Mason jar, and left in the refrigerator until spring. Seed of species of firs have embryo dormancy and require stratification under moist, cool conditions in order to enable the seed to germinate the following spring. Stratification can be accomplished by placing the seed in moist sand kept at a temperature close to forty degrees Fahrenheit for three months prior to sowing. The sand should remain moist but never allowed to become saturated. Often stratification also will increase the germination percentage of the other three groups of conifers.

Preparing The Seedbed

Seed may be sown either in the spring or fall, but spring sowing is more common and may be done at the same time that the garden seed is sown. The firs, when fall sown, do not need special stratification treatment as overwintering in the seedbed results in a similar condition. Sowing may be done

Species	Recommended number of seedlings to raise per square foot	Average germination percentage for the species	Recommended number of seed to sow per square foot	Average number of seed per ounce	Number of square feet one ounce of seed will sow
Eastern white pine (<i>Pinus strobus</i>)	40	60	140	1,560	10
Red pine (<i>Pinus resinosa</i>)	40	70	150	3,120	20
Austrian pine (<i>Pinus nigra</i>)	40	60	140	1,560	10
Norway spruce (<i>Picea abies</i>)	50	50	200	3,750	19
Blue spruce (<i>Picea pungens</i>)	60	70	200	6,250	30
Red spruce (<i>Picea rubens</i>)	60	50	240	8,750	35
Balsam fir (<i>Abies balsamea</i>)	60	20	600	3,750	6
Fraser fir (<i>Abies fraseri</i>)	50	40	700	3,120	5
White fir (<i>Abies concolor</i>)	50	30	500	940	2
Eastern hemlock (<i>Tsuga canadensis</i>)	50	30	500	12,500	25

in the spring as soon as the soil has dried out enough to be worked. The soil should be plowed and disked prior to sowing the seedbed. Next the bed is prepared. The size of the seedbed may conveniently be one foot wide, with a length sufficient to raise the desired number of seedlings. The surface should be raised two or three inches to allow for drainage. The bed should be raked, removing all stone and other coarse material, then leveled and firmed.

Seeding

The seedbed is now ready to be sown. The following table shows the number of seedlings of each species that can be raised in a square foot. The number of seed to sow are listed also, based on average seed characteristics of the species. When the actual germination percentage of the seedlot being sown is known, adjustments in number of seed sown should be made.

The seed is scattered by hand as evenly as possible over the surface and pressed into the soil. Next cover up the seed with sand or a sandy soil to a depth of one-fourth an inch or a little less. Then mulch with straw or brush or cover the bed with burlap in order to keep the surface moist until the seed germinates.

When more convenient, the seed may be sown in drills or garden rows which are about six inches apart. These drills are treated in a similar manner to the described bed, except that only one-half or two-thirds as much seed is sown for the same area of seedbed.

Care Of The Seedbed

As soon as the bed is mulched or covered after sowing, it should be watered and kept moist but not wet. A hose with sprinkler attached is quite satisfactory. As soon as germination begins, the mulch is removed and the beds shaded. A light shade, from above

only, is ordinarily used the first year. However, the pines often may be successfully grown without any shade. A light-weight cloth, such as cheesecloth, or laths alternately spaced similar to snow-fence construction will provide suitable shade.

Watering will generally be required during the summer. Shade should be removed during damp weather and after heavy rains in order to allow a quicker drying of the soil.

Weeds should be kept out of the seedbed. During the weeding, the tree seedlings in the bed should be thinned to the desired number per square foot in spots where they are too dense.

The seedlings should be hardened by fall to prevent killing by low temperatures. This is done by gradually reducing both the amount of shade and water during the latter part of the summer. As soon as winter sets in, the seedbed should be mulched with straw or other plant materials. The mulch, which should be thick enough to cover the seedlings, will protect them from freezing temperatures and also will protect the soil and reduce frost heaving of the small trees. This mulch is removed the following spring after freezing weather has passed but before growth starts.

The length of time that seedlings remain in the seedbed depends upon such factors as growth rate of the species and soil fertility. Generally, the pines listed should remain in the seedbed two years, and the other species three or even four years.

The seedlings are next transplanted to another part of the garden or prepared area to allow room for further development before being set out as ornamentals. The space between the transplants must be large enough to allow full crown development until the

time the small trees are balled and burlaped and moved to their final setting.

Other trees than those mentioned may be raised for ornamentals in a similar manner. These others include the junipers and arbovitae. Seed treatment to hasten germination is somewhat different for them than that described, and much helpful information on this and other matters relating to raising a tree species may be found in *Woody Plant Seed Manual*, Miscellaneous Publication No. 654, the U. S. Department of Agriculture.¹

A fungus disease called "damping-off" is sometimes serious in coniferous seedbeds the first few weeks after the seeds germinate. Many different chemicals have been used to treat this disease. Tersan, a product of E. I. DuPont Company, has given good control. One ounce of Tersan should be spread on fifteen square feet of prepared soil and then spaded to a six-inch depth. The seed should be sown three days following the application.

The selection of a species to raise deserves some consideration. The appearance of the tree probably is given first consideration by most persons. Also, climatic factors, particularly the air temperature where the tree is to be located, should be somewhat like those where the tree occurs naturally. Actually, for ornamental use, a species often can be grown a good bit beyond its natural range because competition from neighboring trees is eliminated and special care can be given the tree when needed.

One thing is of considerable importance in raising tree seedlings. That is care. If you are not in a position to look after the seedlings, especially during the first year, don't try to raise them, purchase them from a nursery.

¹Available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. \$2.00.

X *Mahoberberis Miethkeana* A New Hybrid

LEONARD W. MELANDER and GEORGE W. EADE¹

In February 1948, the Federal barberry-eradication office in Minneapolis received an unusual *Mahoberberis* specimen for identification. This specimen was taken from a plant found in the Miethke Nursery near Tacoma, Washington, by George W. Eade, in the course of making a survey of the *Berberis* and *Mahonia* species and varieties being grown in the nurseries in western Washington. The specimen was obviously some type of *Mahoberberis* but did not conform to the description of *Mahoberberis neuberti* (Baumann) Schneid. Henry O. Miethke, the proprietor of the nursery, stated that he had found this plant in 1940 growing in a group of seedlings of *Mahonia aquifolium*. Since it was so attractive, he had been propagating it and had used it in landscaping work in that vicinity.

A study of the specimen proved that it was a new form of *Mahoberberis*. A check of the literature in 1948 showed that this was the first additional *Mahoberberis* that had been reported since 1850, when G. N. Baumann of Bolwiler, France, discovered the plant which is now called *Mahoberberis neuberti* (Baumann) Schneid. This latter plant was called *Berberis neuberti* Hort. by Le Maire in 1854. Later, the nursery trade called it *B. ilicifolia* Hort. In 1906, Dr. C. K. Schneider² created a new genus for this species and called it *Mahoberberis neuberti* (Baumann) Schneid. The new form was called *Mb. miethkeana* in honor of

Henry O. Miethke, who discovered it. Since this new hybrid was discovered, two other hybrids, *Mb. aquicandidula* and *Mb. aquisargenti*, have been described.³ The foliage of these two forms appears very similar to that of *Mb. miethkeana*. However, since only the two small plants in the Arnold Arboretum were available for observation, no further comparison has been possible.

Since the latter form now has been tested for susceptibility to stem rust, found resistant, and placed on the list of approved species of barberry, mahoberberis, and mahonia by the Plant Pest Control Branch of the Agricultural Research Service, U. S. Department of Agriculture,⁴ a formal description is included, as follows:

Mahoberberis miethkeana Melander & Eade, hybr. nov.
(*Mahonia aquifolium* × *Berberis 'Renton'* Hort.?)

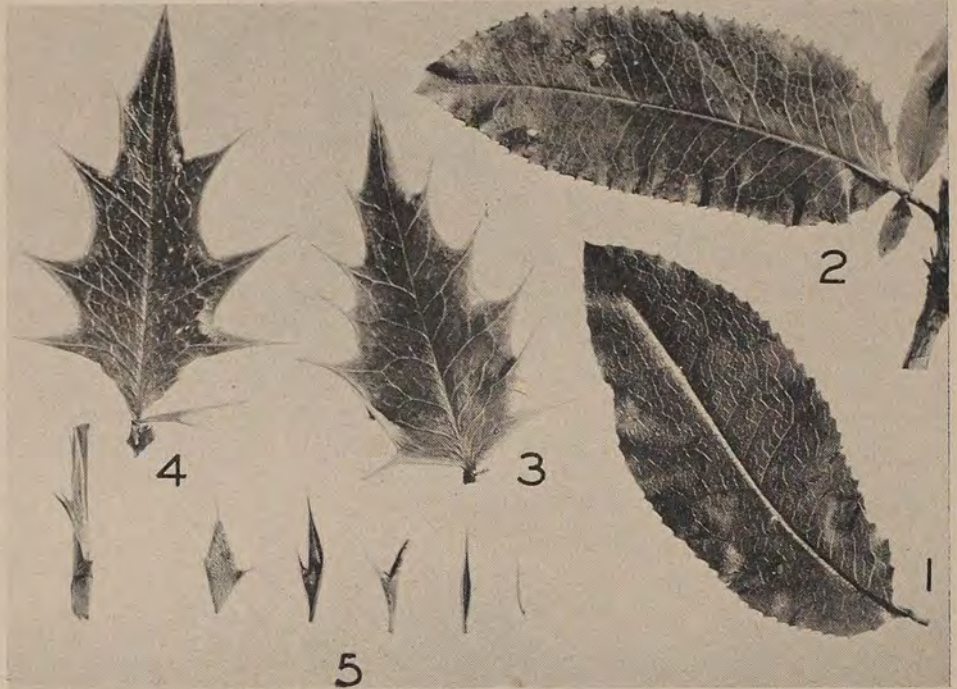
Frutex sempervirens; rami erecti subgraciles paullum sulcati hornotini viridi-brunnei annotini grisei spinis parvis debilibus donati; folia lucida dimorpha, alia grosse sinuato-spinosa alia spinuloso-serrata, utraque simplicia vel interdum pinnata foliolis lateralibus 1-2 parvis vel minimis; flores flavidi alii apice pedunculi pedicellis duplo longioris umbellati, alii infra medium pedunculi fasciculati; fructus niger 2-ovulatus, stigmatate sessili.

³Jensen, H.: Zwei Neue Mahoberberis Hybriden. *Deut. Baumsch.* 2: 300-301, Dec. 1, 1950.

⁴U. S. Department of Agriculture: Administrative instruction designating rust-resistant species and varieties of barberry, mahoberberis, and mahonia plants. *Bur. of Ent. & P. Q.*, Domestic Quar., B. E. P. Q., 577, Rev. Apr. 25, 1953.

¹Formerly Pathologist, Plant Pest Control Branch, Agricultural Research Service, U. S. Department of Agriculture, and Nursery Inspection Supervisor, Department of Agriculture, State of Washington, respectively.

²Schneider, C. K.: *Ill. Handb. Laubholz.* 1: 806. 1906. Hybr.



Types of leaves born on Mahoberberis miethkeana Melander & Eade:
 1. Simple leaf, serrated edges, thinly coriaceous. 2. Compound leaf, serrated edges, thinly coriaceous. 3. Simple leaf, sinuately serrated edges, coriaceous. 4. Compound leaf, sinuately serrated edges, coriaceous. 5. Types of modified leaves and leaflets. All types are found on older branches. Type 3 predominates on young shoots.

Type specimen in the Arnold Arboretum herbarium collected in the Miethke Nursery, Tacoma, Washington, May 1949, by Melander, Busdicker, and Eade (No. 702 B).

This new form of mahoberberis is a tall, erect shrub, growing at least six feet in height, and is very conspicuous by its bright green, glossy, evergreen leaves. According to Mr. Miethke, this plant also can withstand freezing temperatures, and the older foliage develops considerable color in the fall and does not drop until spring.

Mahoberberis miethkeana has two distinct types of leaves, which may be simple or compound. One type has

sinuately spiny leaves, and the other has serrate-edged leaves, simple as well as compound. The sinuately spiny-edged, leathery leaves are the only type of leaf formed on new branches. However, they also may be produced on the older branches. The compound leaves of this type have a main leaflet with one or two small side leaflets resembling wide spines. All leaves of this type are reddish when first developed and then turn to a bright, shiny green color. The serrately-edged leaves develop on older wood and have a reddish cast at first and develop into a dark, shiny green. They also may be compound, with one large main leaflet and

two side leaflets. The different types of leaves make this shrub very conspicuous.

Sinuately serrate leaves measure (average twenty-five leaves) 5 centimeters wide and 7.8 centimeters long and are elliptic-lanceolate in outline. Serrate leaves on older shoots measure about 4 centimeters wide and 9 centimeters long and are oblong-lanceolate in shape. The length of the spiny edges accounts for the width of the sinuately serrate leaves, which appear narrower than the serrate-edged leaves. The side leaflets on the sinuately serrate leaves measure about .5 centimeters wide and 1.5 centimeters long, while the side leaflets on the serrately-edged leaves measure about 1.4 centimeters wide and 2.9 centimeters long.

Mahoberberis miethkeana has short, weak, inconspicuous spines (*Mb. neuberti* branches are unarmed). The branches of *Mb. miethkeana* are erect and slightly grooved. They are rather slender, erect, and graceful. The new branches are greenish brown and become gray the second year. The internodes are short and slightly angled.

In contrast with *Mb. neuberti*, which has no inflorescence whatsoever, *Mb. miethkeana* has an erect inflorescence consisting of two groups of fascicled pedicels—one at the tip and one part way down on the peduncle. The flowers are yellowish to cream color and the berries are black with a sessile stigma. The berries appear to have two (perhaps rudimentary) ovules. No seeds have been found. *Mahoberberis miethkeana* is distinctly different in appearance from *Mb. neuberti*. Its bright, shiny leaves are in sharp contrast to the dull green leaf of *Mb. neuberti*. Its branches also are erect, slender, and graceful compared to the heavy, burly-type canes of *Mb. neuberti*. The outstanding difference, however, is that *Mb. miethkeana* pro-

duces flowers and possibly fruit, while *Mb. neuberti* is devoid of any type of inflorescence.

Since *Mb. miethkeana* was first observed in a seedling population of *Mahonia aquifolium*, it is obvious that this mahonia is one of the parents. Since there are several species of evergreen barberry being grown in the nursery, *M. aquifolium* could have been



Inflorescence of *Mahoberberis miethkeana* Melander and Eade: A. Inflorescence showing erect peduncles with fascicled pedicels attached near base and at end. B. Immature fruits.

crossed with any of these evergreen barberries; but from the characteristics of *Mb. miethkeana* it would appear to us that it had crossed with *B. Renton Hort.*, a form of barberry sometimes



Probable parents of *Mahoberberis miethkeana* Melander and Eade: A. Female parent, *Mahonia aquifolium*. B. Probable male parent, *Berberis Renton*, Seedling origin.

labeled *B. knighti* Hort. If, at some time in the future, this new hybrid produces viable seed, it may furnish further evidence that, when there is an intergeneric cross between mahonia and berberis, evergreen barberries appear more compatible with mahonia than deciduous barberries, such as *B. vulgaris*. This may be borne out by the fact that the latter species is one of the parents of the *Mb. neuberti*, which is

entirely sterile.

Mahoberberis miethkeana should be a welcome addition to the list of broad-leaved evergreens for landscaping purposes.

The authors wish to express their thanks to Dr. S. F. Blake, Agricultural Research Service, U. S. Department of Agriculture, for his assistance and suggestions in the preparation of this manuscript.

The American Horticultural Society, Inc.

— Desires to Express to —

The Royal Horticultural Society

its sincere congratulations and good wishes
on the occasion of the Sesquicentennial Celebration.

For 150 years, the Royal Horticultural Society has taken a distinguished part in the development of the horticultural arts and sciences, many of which have brought lasting benefits to mankind.

The American Horticultural Society therefore commends the Royal Horticultural Society's past efforts and hopes that it will enter upon a new and equally fruitful period of progress to the end that all peoples will come to enjoy the benefits reaped from the pursuit of horticultural knowledge.

Done at the City of Washington,
District of Columbia, this first
day of June, in the year of our Lord,
One thousand nine hundred and
fifty-four.



John L. Beech
President

Francis A. Was
Secretary

The American Horticultural Society was represented at the Sesquicentennial Celebration of The Royal Horticultural Society July 26 to July 28, 1954 by Mr. William L. Hunt of Chapel Hill, North Carolina, and by Dr. Donovan S. Correll, Silver Spring, Maryland. The multi-colored congratulatory address, poorly represented by the black and white illustration above, was read at the ceremony and presented to The Royal Horticultural Society. This document will become a part of the archives of that Society.

Native Woody Plants Of The North Central States Useful In Landscape Work

G. WM. LONGENECKER¹

People who live in the cooler parts of the United States are often envious of the seeming wealth of plants which can be grown by their southern neighbors. If one looks at the situation critically, he will find that there are any number of beautiful trees and shrubs that do well in the North that cannot be grown to perfection in the South. It seems to be part of human nature to want things "from the other side of the fence."

In Europe this past summer, I saw a large variety of American plants being grown in gardens and used as cut flowers which we usually pass by as common and ordinary and not worth growing. Such things as hardy aster, goldenrod, brown-eyed susan, helenium, fleabane and liatris received a prominent place in their gardens and in flower arrangements. But these beautiful flowers, which come from our native prairies and should be a part of our garden heritage, are scorned by the majority of our gardeners who instead attempt to grow plants much less suited to our gardens.

The same can be said for woody plant materials. There is a place for exotic shrubs and trees and horticultural varieties in our landscape developments, but there is also a place for natural landscapes and native plants. Many of these native plants are as beautiful as anything one might import, and they are adapted to the soils and vigorous conditions of the particular area in which they are found.

In the cool parts of the North Central States, the flowering dogwood will not grow, but there is a very excellent small tree native to this area which belongs to the same family and merits attention and can be successfully grown. This is the pagoda or alternate-leaved dogwood (*Cornus alternifolia*). It has attractive, flat clusters of white flowers which are followed by an abundance of blue fruits which are born on contrasting red stems. The character of the tree is interesting with its successive whorls or tiers of horizontal branches. Because of this horizontal branch habit, it can be useful when used in connection with the horizontal lines of the low, sprawly contemporary house. The foliage is a good lustrous green during the growing season and it turns a beautiful reddish bronze-purple in the fall. In winter the bark on the trunk is a reddish brown in contrast to the greenish bark on the branches and twigs.

The prairie crabapple with its fragrant pink flowers and its smooth gray branches, and the native hawthorns with their clusters of white flowers and showy red fruits and interesting branch patterns should not be forgotten in our modern landscapes.

A less known but excellent small tree or large shrub for northern gardens and lawns is the shadblow serviceberry (*Amelanchier canadensis*). It has loose clusters of white flowers in early spring which are soon followed by attractive and edible bluish-black fruits. Its clean, smooth, gray bark in contrast to other plantings stands out as an attractive feature during the winter months.

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The Alleghany serviceberry (*Amelanchier laevis*) is another very excellent small tree. It differs from the shadblow serviceberry by having pinkish flower buds in early spring and reddish-bronze fall color in place of the clear yellow fall color of the former.

There are a number of native shrubs which are particularly good for home landscapes because they change with and are attractive at the various seasons of the year. This is particularly important in small areas and small yards where, because of lack of space, plants should be limited in variety and number in order to have good composition.

The native viburnums as a group are particularly good in this respect because they give a sequence of interest throughout the year.

The mapleleaf viburnum (*Viburnum acerifolium*) is a fine small shrub for a shady location. In this type of a situation it will flower, fruit and give a gorgeous display of fall color.

The Rafinesque viburnum (*Viburnum rafinesquianum*) is closely related to the downy viburnum and is an excellent medium-sized shrub for the cooler parts of this northern area, but, like the downy viburnum, it does not like the hot summers of the South.

One of the showiest of the tall-growing viburnums is the American cranberry-bush viburnum (*Viburnum trilobum*) with its edible translucent red fruits which follow the attractive flat, showy clusters of white flowers.

Two other important viburnums are the blackhaw viburnum (*Viburnum prunifolium*) and nannyberry viburnum (*Viburnum lentago*). They are often confused because they are quite similar in flower and fruit but can be easily distinguished if one observes their habit of growth. The blackhaw viburnum has a stratified or horizontal branch habit like a small horizontally

branched hawthorn, while the nannyberry viburnum is more narrow and upright in form.

The blackhaw viburnum is especially useful in plantings near the "ranch type" house where a repetition of the horizontal line of the house is desired.

In a list of the particularly good native shrubs of this northern area, one should not forget the gray dogwood (*Cornus racemosa*) with its abundance of white flowers in June, its waxy, white fruit on rosy-red stems in early autumn and its rosy fruit stems which hang onto the plant after the fruit and leaves have dropped. The gray dogwood is a good plant to use where plantings are wanted which will attract birds as a large number of kinds feed on its fruit.

The American filbert (*Corylus americana*), another worthwhile shrub for northern yards, has long, swaying, yellow catkins in spring before the leaves appear, has interesting bur-covered nuts in late summer and autumn; its sunset autumn colors and its "zigzag" winter branch pattern are other high spots of interest in its seasonal cycle.

Near a pond or pool or in good moist soil such shrubs as the red-Osier dogwood (*Cornus stolonifera*) with its smooth red stems, common winterberry (*Ilex verticillata*) with its profusion of holly-red fruits, and the common buttonbush (*Cephalanthus occidentalis*) with its flowers gathered into round ball-like clusters, are at home. The common buttonbush is not used as often as it should be considering its year-round interest. It has beautiful glossy foliage, its round flower clusters are out of the ordinary and the ball-like fruit clusters turn a pleasing brown and persist throughout the winter months, furnishing unusual pictures when covered with snow or observed against a winter sky.

Low-growing shrubs are in great demand at the present time because of the popularity of the low one-story house. There are a number of good native shrubs that could well be used to meet this demand. Such shrubs as the Jerseytea ceanothus (*Ceanothus americanus*) and its smaller, wider-leaved cousin (*Ceanothus ovatus*) might well be used. Both types have beautiful clusters of white flowers in late June and July and both of them will thrive in light, dry soil in a sunny situation after they have once become established. The dwarf bushhoneysuckle (*Dierrevilla lonicera*), another fine small shrub, seldom gets to be over three feet tall. It has good foliage and long, light yellow, funnel-shaped flowers in June. It will withstand considerable shade and will grow in fairly dry situations.

There are a number of other fine native shrubs which should be recommended for planting in the North Central States. The plants which have been mentioned are hardy in the cooler parts of this area, but in any discussion of native shrubs for landscape plantings

one should not forget the common ninebark, particularly the one with rosy, bladderlike seed pods which hang onto the plant for most of the summer, or the scarlet elder (*Sambucus pubens*) with its showy bright scarlet fruit and interesting winter character.

A discussion of this kind should also include the common witchhazel (*Hammamelis virginiana*), the latest of the shrubs to bloom, and others which the limited space will not even permit mentioning.

Professor Longenecker has prepared two lists of woody plants for the Wisconsin area that contain a record of the cultivated species of that locality. The first, "Woody Plant List For Wisconsin," is an alphabetical tabulation of almost five hundred species, with emphasis on their hardiness. The second, "Plant Lists According to Size, Use and Soil," treats of their hardiness (it has a zone map for the State of Wisconsin), size, habits, and other desirable data. Both papers are prepared in mimeographed form and are available from the University upon request. Ed.

A Book Or Two

[See explanation of the "(Library)" note on Page ii]

Beautiful Gardens of the World. Edited by Robert Jackson. Evans Brothers, Limited, London, England. 1953. 88 pages, illustrated. 42 Shillings. (Library).

"It would be idle to pretend that a deep and abiding love of flowers is as common everywhere in the world as in Britain. *** To go round the world's gardens, even if only in pictures, is a fascinating experience for any garden lover." Thus commenced and ended Editor Jackson in his very informative work.

He does explain by reasons of climatic, economic, and other conditions, why it is not possible for all the world to cherish or rather enjoy gardening as it was once known in the British Empire.

The more outstanding gardens in some thirty-odd sections of the globe are herein described and pictured (six in colors) including some in England, Scotland, Ireland, Bermuda, South America, Australia, China, South Africa, Egypt, Switzerland, to mention only a few. The United States is represented by some of its gardens in New York (Thorndall), Seattle, Virginia, Tennessee, and one on the Isle of Hope. There are over a hundred illustrations in black-and-white which are engraved from the best of photographs.

For those of us who shall possibly never get around the world and see these gardens portrayed, this volume will prove more than just a fascinating experience. To see the wealth of plant materials, as used under various circumstances, and to view the classical designs in landscape and architecture, is a very liberal education of such for yesterday, today, and forever.

Gardening In The Lower South. H. Harold Hume. The Macmillan Company, Inc., New York, New York. Revised Edition, 1954. 377 pages, illustrated. \$7.50. (Library).

The revised edition is a much better looking book than the first—in type, paper, illustrations (as presented, for they are the old cuts) and general format. The one conspicuous addition is the chapter on *Hemerocallis*, of all things, a most useful and charming perennial for the Deep South as elsewhere, but scarcely deserving a chapter when other much more permanent plants have the familiar brief treatment.

The reader should be reminded that the author still considers his area, "the eastern part of South Carolina, Georgia, all of Florida, the southern regions of Alabama, Mississippi, and Louisiana, and eastern Texas." The reviewer does not agree with the writer in his belief in "uniformity of horticultural practice throughout" which is very brash on so short a residence in southern Mississippi. It is probably true that there are spots throughout this area that are like those familiar to this writer in Mississippi, but the differences between the necessary practices in New Orleans, and in Mobile, as contrasted with what must be done here, are too striking to be brushed off.

Aside from this difference, which is possibly only a matter of opinion, the book remains like its predecessor, a valuable handbook for the beginner, not so much for the old-timer, who probably would not change any way. All the basic things are here, simply, succinctly stated, possibly too briefly on account of size of the manuscript as related to costs of book production.

But the reader must be reminded also that this is a book on gardening, not a book on plant materials, so that no matter how regretful he may be that very little shows of the work of the Plant Introduction Garden, or the hosts of plants that must have come from Edwin A. Menninger in Stuart, Florida, or the amazing Bromeliads of Mulford Foster, the book is about gardening and the practices involved in its pursuit. If one will focus his attention, therefore, on the discussion of the practices, he will not be disappointed. Plants are mentioned in connection with the different types of gardening, from all the most familiar to the purely exotic, from flowers to fruits to vegetables. Not too much is said about garden styles, which is regrettable though understandable. Not too much space is given to the usual gloomy discussion of insects and diseases. No mention of the Azalea petal blight, no sorrowing over the several ailments of the Camellia, no mention of the appalling grasshopper with its passion for Amaryllids, and so on. This makes for a happier book.

There are various bits of sage advice for the northerner who is now trying to garden in the south. These could be much extended, and to the great advantage of the new comer, who only too frequently finds no one in his neighborhood who can tell him what he desperately needs to know.

Any book attempting to cover a large geographic area in our United States must be a difficult project, for no matter what the statisticians may say about general uniformities of areas, there are areas within all of them, that do not agree with the generalizations. This is what must have worried many a writer including Dr. Hume, who, by and large, has come off rather better than most.

B. Y. M.

Planning The Garden. Robert B. Deering. University of California, College of Agriculture, Davis, California. 1953. 70 pages, generously illustrated. \$1.00.

Dr. Deering is the Chairman of the Department of Landscape Management at Davis. In this booklet, the California Agricultural Experiment Station's Extension Service Manual 10, he has brought together various papers and ideas that he has written and conceived during past experiences.

For the people concerned with the best selections for the new house and the new garden, this will be an enlightening paper, regardless of the section of the country. It is very interesting and educational for those of us less fortunate, just to learn why the previous denizens did not (or did) make us as comfortable as they could have, and it will provide solutions of correction in order that we may utilize the air, sun, wind, et al, for our whims.

After taking care of the basic land acquisition, Dr. Deering explains how to plan (and consequently finance) long range developments to suit one's needs—basically living with the garden, the little plants, the little offspring, and then how to remodel after the once little things are grown.

Labour-Saving Planning and Planting. Gardens and Gardening, Volume 5. Edited by F. A. Mercer and Roy Hay. The Studio Publications, London, England. (Studio Crowell, New York, New York). 1954. 144 pages, 126 gravure illustrations. \$4.50. (Library).

I have oftimes modestly admitted to being a gardener. I like to putter around with garden tools instead of a true putter, and the next day I can show my golfing friends vegetables or

flowers when they have nothing but sore muscles to show for their efforts. But there are times when gardening can be done best—or more pleasantly, at least—from some other point than the garden. Perhaps the best season for gardening inactivity — physically speaking — is the month of January when the seed and nursery catalogues begin to arrive in the mail box. It is possible then to do a whole season's gardening right before the fireplace. One can lay out a garden, plant it and almost taste the vegetables and smell the flowers—with no more effort than poking the logs in the fireplace. The heat of midday in summer is another time to take it easy, and either of those times would be ideal for reading this book on labor-saving and planting.

Now, this book won't tell you how to save work this season. It's too late for that. But it will give you suggestions that will allow you to cut down on next year's maintenance. Of course, it must be understood that even a low-maintenance garden will require considerable work in the beginning. It must be planned and looked at as a long-range economy.

Various experts discuss different features of a low-maintenance garden in this volume. First is the matter of paving or surfacing some of the areas to cut down on future work. Definite instructions are given for the construction of walkways and pavings by the owner himself, and this section should be welcome to anybody who has surveyed a patch of dried and brown lawn grass from his hammock. Another section is on labor saving flowering trees and shrubs—those to be used as permanent features instead of annuals and perennials. Another good section is on ground covers, which includes the use of low-growing shrubs as cover plants. The building of screens, arbors, and

garden houses, is also taken up, as well as the planting of hedges for protection and privacy. A final section on roses as low-maintenance plantings may be discounted in the Washington area, and this is a reminder again that this is a British publication.

But we all know that the British have long been known for their fine gardens, and this volume is ample proof. The photographs are beautiful, and so graphic as to give many ideas even without the text. Once again, it's a fine book for those on whom years and lassitude are catching up.

Claude A. Mahoney, *CBS Radio*

Physiology of Seeds. Wm. Crocker and Lela V. Barton. Chronica Botanica Company, Waltham, Massachusetts and Stechert-Hafner, Inc., New York, New York. 1953. 267 pages. \$6.50. (Library).

There exist several classics in this field, written many years ago, before recent important developments. They often deal only with certain phases of seed problems. This new work is an attempt to give a broad coverage of our knowledge of seeds and germination, mainly from the viewpoint of the investigator. Miss Barton points out that since many of the unsolved problems are discussed as well as recent progress, the book will interest all workers in the fundamentals of seed technology.

For the amateur, the chapters on seed anatomy, factors affecting germination, and dormancy are perhaps most applicable. The authors are peers in seed technology and their work has been continued over a period of many years. Thus the text has been prepared with a fund of personal knowledge behind it.

It is Volume 29 of "A New Series

of Plant Science Books" under the editorship of Dr. Frans Verdoorn, Chronica Botanica Company.

J.L.C.

Rinehart's Garden Library: *Evergreens*. L. L. Kumlien; *Roses*. Roy E. Shepherd; *Small Fruits*. Ralph E. Barker; *Vegetables*. Jack M. Swartout; *Lawns*. John D. Bernard; and *Annuals*. Ann Roe Robbins. Edited by W. W. Goodpasture. Rinehart & Company, Inc., New York, New York. 1954. Each title contains under a hundred pages, all are well illustrated. Each title is \$1.50. (Library).

This interesting set of six books, soon to be followed by seven or eight more, will comprise "Rinehart's Garden Library" under the general editorship of W. W. Goodpasture, and could more aptly be called a "Garden Library for the Beginner." For the beginning amateur, these books can serve as an introduction to the wonderful field of horticulture.

The approach used in each book is very similar—first, the reader finds out why he should be growing roses, vegetables, small fruits, etc., then, he finds a discussion of soil preparation for the particular crop, and the various kinds to plant. The discussions on growing specific crops are usually very brief but in general cover adequately what should be known on routine culture and how to control the common insects and diseases.

As with most books of this sort, the text suffers from the compression of such a vast quantity of literature. The reader will not find all the answers here but very sensibly each author refers the reader to his county agent or agricultural experiment station for specific information for his area.

The attractive color covers on each book will undoubtedly do much towards selling each book. The line illustrations, although not numerous, are clear and should aid materially in helping the beginner to grasp the subject matter.

Francis de Vos

Basic Botany. (An Introduction to the Science of Botany). Fred W. Emerson. The Blakiston Company, Inc., New York, New York. 1954. 425 pages, illustrated. \$5.00. (Library).

The plan and content of this revised, second edition, have been determined by the experience of the author, who has taught and carried on research in a rather wide range of educational institutions and climatic conditions. Physiology, anatomy, morphology, taxonomy, genetics, and ecology, are all treated in this edition, but not in an altogether traditional order. Leaves, stems, and roots are discussed in rather full detail, but as integral parts of the plant, which is a functional as well as a morphologic unit.

Use of the first edition by many students and teachers has made obvious a great number of needed changes of expression and lack of contents. Insofar as possible, the revised edition takes care of this. The changing times have also demanded changes in equipment, such as the use of the electron microscope and the development of the phase microscope, as well as changes in other phases of information. Much progress in gathering of facts is being made constantly at the research level and much newly acquired information is slowly influencing interpretations. Biochemistry with its offspring, enzymology, has thrown much light upon almost every phase of life activity. While perhaps less spectacular, genetics,

cytology, and paleontology, are all affecting and being affected by all the other disciplines. Published reports by numerous individual investigators and research teams, and those of symposia, together with reviews and compilations by specialists have assembled great masses of growing information. The revised work brings all accounts up to the present time.

Daylilies for Every Garden. G. M. Fosler and J. R. Kamp. University of Illinois, Urbana, Illinois. 1954. 64 pages, illustrated. 35c. (Library).

This paper, Circular 716 of the College of Agriculture, is very nicely printed and contains much useful data on *Hemerocallis*. It covers culture, uses, the industry, and even breeding. There is a section on buying, the top-notch varieties, and a listing of the 100 "best" based on a recent poll. One fine illustration gives a comparison of flower color patterns which is worth a hundred times the price of the circular. Orders should be sent to the University at 110 Mumford Hall.

A Selected List of Cacti and Other Succulent Literature. Botanical Books, Oakland, California. 1954. 25 pages.

This bibliographical-mimeographed catalogue, available free as *List No. 5* from the publishers at 3066 Georgia Street, is given space here simply because it is believed to be the most complete list of succulent literature ever published, and many of our readers are interested in cacti and succulent plants.

It contains a listing of over three hundred titles as well as all current succulent journals of the world, and

therefore, will well serve the botanical and horticultural librarians.

Principles of General Ecology. Angus M. Woodbury. The Blakiston Company, Inc., New York, New York. 1954. 504 pages, illustrated. \$6.00. (Library).

This book is designed as a college text of general ecology at upper-division level. It may be of interest to other workers in the field and also to the layman. It assumes a foundation knowledge of general biology, general botany, and general zoology or their equivalents. It may be of special interest to research workers in many fields and to workers in applied fields such as forestry, agriculture, wildlife, limnology, oceanography, and others because it outlines a large field into which such activities fall.

The essence of ecology lies in its point of view. It approaches the study of the living organism from the standpoint of its relations to its environment, and especially the way in which the inherent automechanism within the organism are supplied with the necessities of life. The environmental complex is so intricate and there are so many possibilities of adjustment and maladjustment, that it is important for man to develop a clear understanding of these relationships.

Plant Breeding For Everyone. John Y. Beaty. Charles T. Branford Company, Boston, Massachusetts. 1954. 102 pages, illustrated. \$2.75. (Library).

If this handy little book receives wide distribution, plant breeding should receive quite an impetus—in some direction. One particular chapter indicates

the quality of the work—we find that one can “grow thousands of new varieties,” merely by growing one thousand seeds, each of eleven named plants, and then selecting for new varieties from the eleven thousand seedlings.

Perhaps the most valid parts of the book are those quoted from correspondence with various breeders. Other than this, the best suggestion offered is to start with the three basic text books on plant breeding listed at the end of the last chapter before one plans an enthusiastic plunge into the field of plant breeding.

J. L. C.

An Introduction To Trees. John Kieran. Hanover House, Garden City, New York. 1954. 77 pages, illustrated. \$2.95. (Library).

This work has been prepared for the beginner as a help in learning to recognize and name our most common trees. An elementary descriptive text gives the essential data for identifying these trees along with other related items. Colored illustrations (of a hundred and one trees) will aid considerably. The book will be welcomed by the inquisitive mind.

Much of the wit and knowledge of John Kieran (displayed in his “Information Please” radio program) will not be found wanting in this book, the third of his popular nature introductions.

Modern Gardens. (Masterworks of International Garden Architecture.) Peter Shephard. Frederick A. Praeger, Inc., New York, New York. 1954. 144 pages, illustrated. \$9.50. (Library).

Whether the unassociated and un-

amalgamated modern landscape designers and the architects of the world have been working hand-in-hand on house and garden designs, the main emphasis illustrated allows the reviewer to believe today's gardens are laid out with the house plans, and in many instances, vice versa. This excellent volume clearly shows the organic relation of modern gardens to contemporary architecture.

Almost three hundred photographs of gardens and structures were finally selected to tell the story of a diversified love for the beautiful. Gardens ranging from twenty square feet to many square miles (Holger Blom's Park Department, Stockholm) are illustrated as well as the roof gardens, indoor gardens, long narrow town gardens, seaside, and desert gardens. The gardens depicted are not, of course, confined to any one country, any more than is modern architecture: both are manifestations of an aesthetic language without frontiers in the Western world.

To complete the photographic proof of today's taste, Author Shephard also furnishes descriptions of materials used for paving, terracing, and walls, as well as providing the details of design and planting. Many ideas should be copied in the desperately needed “modernization” of what we now have to make the better best for today.

Popular Gardening Ideas. Edited by T. H. Everett. Arco Publishing Company, Inc., New York, New York. (Fawcett Publications, Inc., Greenwich, Connecticut, Fawcett Book Number 218). 1954. 144 pages, illustrated. \$2.00. (Library).

You will recognize such authors as Paul Work, W. E. Whitehouse, Fred Grau, George L. Slate, E. A. Piester, Ben Blackburn, H. H. Hume, Jan de

Graaff, P. P. Pirone, John L. Creech, and a host of other well known horticulturists, as contributing to this book. (The members of this Society will also recognize some of the plant propagation illustrations from their own January 1954 issue of this Journal!) The book is well illustrated.

The editor has selected some fifty-two first-rate articles that originally appeared in *Popular Gardening* during the past four years, and has arranged these articles under eleven topics.

Listing these topics is about all the reviewer need do in the way of describing this very helpful reference of Editor Everett's wise selections: Soils and Lawn, The Fruit Garden, Vegetables, Roses, Trees and Shrubs, Flowers, House Plants, Green Thumb Tips, Plant Propagation, Gardening Tools, and Special Situations.

Flower Arranging Book. Loret Swift. Arco Publishing Company, Inc., New York, New York. (Fawcett Publications, Inc., Greenwich, Connecticut, Fawcett Book Number 229). 1954. 144 pages, illustrated. \$2.00. (Library).

Profusely illustrated with over two hundred "Do" and "Don't" photographs, this small book should interest and help a student of flower arranging, who needs concise step-by-step instructions for using properly conditioned materials in the right container, to achieve a satisfying design by the necessary combination of distinction, proportion, balance, and color. Short chapters follow on arrangements for home dining tables, for church, school, and office use, for holidays, the making of corsages, and the techniques of drying materials for arrangements. And, since the window box is an outdoor arrangement, the author tells how to make

them and how to arrange the plants in keeping with the size and style of the window.

Mrs. Swift is an accredited flower show judge of the National Council of State Garden Clubs, a flower exhibitor, arranger, lecturer, and interior decorator.

M. C. L.

Pioneer Plant Geography. W. B. Turrill. Martinus Nijhoff, The Hague, Netherlands. 1953. 266 pages, illustrated. 19 Guilders. (Library).

This is an account of Joseph Dalton Hooker's investigations as a phytogeographer, covering the period 1844-1904, and is published as Volume 4 of "Lotsya — A Biological Miscellany," under Editor Frans Verdoorn. In the years covered by this work, Hooker analysed the flora of several important areas—the Arctic, Syria, and Palestine, India, Africa, North America, Galapagos Islands, and Antarctica.

Turrill has extracted from Hooker's writings, his floristic interpretations.

Many of these conclusions are stated by the author to have formed the basis for later studies on the constitution and origin of flora. Then, Turrill compares Hooker's conclusions with those of later researchers who have studied the same flora.

It must be expected that this is mainly a text book. The descriptive style of Hooker, however, permits one the opportunity to explore foreign lands mentally and observe the tremendous range of plants inhabiting the earth.

J.L.C.

(The three previous volumes are: *Vernalization and Photoperiodism*; *Dictionary of Genetics*; and *Trace Elements in Plant Physiology. Recent Advances In American Ethnobotany*, the fifth volume in this series, is being released. Ed.)

The Gardener's ABC of Pest and Disease. A. W. Dimock. M. Barrows and Company, Inc., New York, New York. 1953. 191 pages, illustrated. \$2.95. (Library).

Dr. Dimock, backed by his long experience as an authority on diseases of ornamentals, has done a splendid job of recording the latest information in this little book in terms that can clearly be understood by everyone. He gives only information that is vital to the problem in hand, omitting the technical that the average gardener need never know in his successful fight.

Part I includes a ten-point program for insuring plant health with a minimum of work. The most popular plants are then alphabetically listed with their ailments, symptoms and what to do in each case. There is a section treating the minimum of equipment needed, the various sprays (and by trade names). Others giving an alphabetical arrangement of various pests, foliage diseases, seed treatment, root and crown trouble, complete the second part.

For those of us in the state of not willing to put up the good fight, there is an amusing section listing some trouble-free plants (or almost so!).

1954 American Tomato Yearbook. John W. Carncross. Rutgers University, College of Agriculture, New Brunswick, New Jersey. 1954. 36 pages, illustrated. \$2.00. (Library).

Dr. Carncross again edits the yearbook that is of great value to tomato growers, the tomato dealer and shipper, the tomato canner, the tomato research specialist and all others interested in the industry.

This edition brings an up-to-date listing of the workers in research—some two hundred strong, in various phases, the statistical end of the indus-

try, with the current diseases, pests and their controls. There is a listing of recent literature, quite helpful, and a buyer's guide. Copies of this paper can be obtained from 8 Elm Street, Westfield, New Jersey.

Woodland Portraits. Jeannette Klute. Little, Brown and Company, Boston, Massachusetts. 1954. 50 major plates in full color, the same in miniature black-and-white, and three minor color plates. \$20.00.

As I now sit to write you of these woodland portraits, I find eyes blurred with tears as they recall the enjoyment of my childhood days, when, for the first time, I discovered the Showy Lady's-slipper in flower, the painted turtle emerging from its home, the joy of gathering Ground-Pine for Christmas decorations, and the thrill of finding eggs in the Robin's nest. Photographer Klute has recorded fifty striking examples of Nature's garden that many of us shall never be able to see again.

Firstly, credit and the highest tribute available must be paid to Miss Klute as one of the ablest photographers of today. Secondly, and equally as great, tribute must be paid to her and the members of her laboratory for the splendid reproduction of the plates from Eastman Dye Transfer Prints. *They are the most naturalistic portrait reproductions of any color work to date.*

The volume is made up of fifty colored plates, most of which measure about ten by twelve inches, of animals, and plants one can find in the woodland, if he has the curiosity and patience. The overall size of the volume is about thirteen by seventeen inches. Dr. Ralph M. Evans, (Miss Klute's associate), as Director of the Color Technology Division of Eastman Ko-

dak Company, explains in the preface, how the work came about and gives an exciting biography of the author. Miss Klute likewise tells much about her aims in the work. At the end of the volume, a black-and-white miniature of each of the color plates is reproduced and accompanied by the technical details of how each portrait was made.

H. M. E.

Gardening For Color. William H. Clark. Little, Brown and Company, Boston, Massachusetts. 1954. 212 pages. \$2.95. (Library).

This is a stimulating, nontechnical book for the gardener who wishes to plan to plant for a year-round succession of harmonious and attractive colors in his garden. "The use of color," writes Mr. Clark, "is the climatic accomplishment of all superior gardeners; a field much neglected and capable of immense improvement." The author here examines the field and gives valuable, practical suggestions for improvement in it.

Animal Control in Field, Farm, and Forest. W. Robert Eadie. The Macmillan Company, New York, New York. 1954. 257 pages. \$3.75. (Library).

Dr. Eadie, international authority on injurious mammals, brings together in one volume, the scattered, little-known information on the control of mammals which cause damage. While he explains the use of poisons, old and new, as well as traps, his emphasis is on natural means of control by which populations in the wild are kept in proper balance. Dr. Eadie gives a brief life history and description of each animal, explaining the animal's relationship to man, especially from the economic standpoint, noting the problems it pre-

sents and the types of damage it may do. Control procedures are then given in detail for the varied situations.

Bromeliads, A Cultural Handbook.

Mulford B. Foster. The Bromeliad Society, (Secretary Victoria Padella, 647 South Saltair Avenue), Los Angeles, California. 1953. 64 pages, illustrated. \$1.50, paper bound; \$3.00 cloth bound. (Library).

Mr. Foster, and other members of The Bromeliad Society, have prepared a very interesting handbook on the Bromeliads, treating the culture, propagation, uses, insects, as well as providing much technical data on the botany, characteristics, and distribution.

Garden Lighting. Edythe Polster. Home Lighting Department, Westinghouse Lamp Division, Bloomfield, New Jersey. 1954. \$1.00.

For the first time, Editor Polster has published a complete reference on the various lamps available for the gardener today. Flower show exhibitors will find many examples of garden-lighting fixtures to harmonize with their plantings, which will afford the proper illumination without giving their flowers a washed-out look usually conspicuous with floodlights.

A Century of Georgia Agriculture, 1850-1950. Willard Range. University of Georgia Press, Athens, Georgia. 1954. 333 pages, illustrated. \$5.00. (Library).

This book represents the first attempt to give Georgia agriculture a comprehensive historical account of the major developments over a period as long as a century. The material is divided into three parts, covering the ante-bellum agriculture at its peak as well as the process and extent of its

destruction by the Civil War; 1865-1900, a period characterized by a search for ways to restore prosperity; and 1900-1950, in which Georgia agriculture underwent rapid development in mechanization, diversification, and application of scientific methods.

The Lives Of Wild Birds. Aretas A. Saunders. Doubleday and Company, Inc., New York, New York. 1954. 256 pages, illustrated. \$3.50. (Library).

Mr. Saunders gives explicit information on identification by color, markings, size, shape, habits, posture, habitats, songs, and calls. He describes the nesting cycle, courtship, egg laying, incubation, and care of the young for different types of birds.

Wild Flowers And How To Grow Them. Edwin F. Steffek. Crown Publishers, Inc., New York, New York. 1954. 192 pages, illustrated. \$3.95. (Library).

Author Steffek, associate editor of *Popular Gardening*, has written with great understanding and has given very careful attention to accuracy. The book is a clear, systematic study of the conditions under which wild flowers flourish. He tells about soil, seasons,

water, light, drainage, climate, plant enemies, etc., and tells exactly how to care for and increase some 350 species of wild plants.

The Web Of Life. John H. Storer. The Devin-Adair Company, New York, New York. 1954. 192 pages, illustrated. \$3.00. (Library).

A simple, elementary book on the fundamentals of ecology, opening the curtain on the balance of Nature, revealing dramatically how all living things — mammals, bacteria, insects, grass, birds, etc., sustain and control one another in an intricate pattern of interrelationships.

Handbook Of Plants Of The Colorado Front Range. William A. Weber. University of Colorado Press, Boulder, Colorado. 1953. 232 pages, illustrated. \$5.00. (Library).

Professor Weber presents in his handbook, a complete and easy to understand key to the local flora of the Central Rocky Mountains, a region which is the meeting place for Arctic, Rocky Mountain, Midwestern, and desert flora because of geological and glacial events of an earlier period. Some 1400 kinds of plants are keyed and classified.

The Gardeners' Pocketbook

A Climbing Fern

One should be inclined to doubt any suggestion that ferns might become weeds, but that has been the experience of a writer in his work in raising azaleas from seed under the usual routines. Windborne spores of Maidenhair, Holly, and Climbing ferns have found their way to the transplant flats that are usually kept in a pleasantly uniform state of moisture, and have come up in sufficient numbers to be a nuisance. Since the supply of Holly fern in the garden is limited, one looks with pleasure on these; since the young of the Maidenhair are repeating, in some cases, the crested form of one of the parents, again, tolerance; but the Climbing ferns grow too quickly and soon smother the small azaleas if not removed.

Hume, in *Gardening in the Lower South*, recommends the Climbing fern, which in this case is *Lygodium japonicum*, "for moist shady positions in woods," but here, that does not seem essential. The oldest plant on the place clambers some twelve feet to the eaves of the back porch in a situation that is dry enough, since it must compete with roots of *Pittosporum* and *Photinia*, and its young, planted in a fence row development, made of azalea, camellia, magnolia, with various native things as temporary nurse plants, have already clambered on the top of all the plants and are expanding, as clematis does, over the bush tops.

It is really a charming fern, with thin, wiry stems, and leaves that are "pinnate into pinnatifid or lobed," with the margins toothed, and, in the case of the fronds that are spore bearing, appear as if ruffled as well.

If this species, credited (*Hortus*) to the East Indies, East Asia, and Aus-

tralia, is hardy here, one can only wonder if the other Asian species might not survive as well; and even the brief description of *L. volubile*, with its foot-long segments, from "Tropical America" makes one wonder if it too might not survive.

L. japonicum is usually herbaceous but sometimes the fronds survive into the second season. And borrowing again from *Hortus* (p. 450), it should be pointed out that the "twining stem is really petiole and rachis."

B. Y. Morrison, Pass Christian, Mississippi.

The Australian Gold Blossom Tree

Both Florida and California have drawn heavily on the flora of Australia for the ornamental trees that have been introduced to brighten residential plantings of the warmer areas of both states. Yet one of the loveliest of them all is still conspicuously absent. This is the Lilac Barklya, *Barklya syringifolia*, which C. T. White of the Brisbane Botanical Garden enthusiastically termed "one of the handsomest and showiest of our native trees."

This tree was named for Sir Henry Barkly (1815-1898) at one time governor of Victoria, though it is scarcely hardy enough to thrive that far south in Australia, but is found growing naturally only in the coastal districts of Queensland to Rockingham and as far south as the Richmond River in New South Wales.

In its native land *Barklya* is commonly called the "goldblossom tree" in recognition of the large dense trusses of small, bright yellow-orange flowers. These contrast magnificently with the rich dark evergreen foliage. Audas in *Native Trees of Australia* calls "very beautiful" the six- to seven-inch sprays



Barklya syringifolia

of small, golden, pea-shaped blossoms that come in clusters at the ends of the branches and above the foliage. Herbert in *Gardening in Warm Climates* writes the "brilliant display of small crowded orange flowers" comes in summer (January) and if it follows the same habit in the northern hemisphere, it would provide a much-needed winter-blooming tree on the Florida landscape.

Barklya botanically is a monotypic genus—there is only one species and it is allied to our so-called Orchid tree *Bauhinia*. It makes a tall tree, sometimes to sixty feet, but at first is apparently reluctant to grow. It requires shelter and a moist, rich loamy or leaf-soil. "Our most ornamental tree and though a bit slow, worth waiting for," writes Dr. George H. Hewitt of Bell-

ingen, New South Wales. "Most ornamental and well worth cultivating," says Anderson in his *Trees of New South Wales*.

The specific name *syringifolia* was given to this plant because the alternate two- to four-inch, heart-shaped leaves much resemble those of our northern garden lilacs, the generic name of *Syringa*.

Fortunately there is no commercial use for the timber of the *Barklya* tree and its ornamental beauty never needs to be sacrificed to the sawmill. It is strictly an outstanding ornamental that deserves to be widely planted in suitable areas in the United States. It is propagated by seeds and by cuttings from stems or roots.

Edwin A. Menninger, The Flowering Tree Man, Stuart, Florida.

Parkinsonia aculeata

For a small tree that stands drought and heat, there is none better in these parts than this tree, sometimes known as the Jerusalem Thorn. It is true that it yields relatively little shade, for the crown is not wide nor are there many branches. The finely pinnate leaves are as graceful as those of a good fern and the green-barked trunk and branches make picturesque rather than graceful patterns in winter when the leaves have fallen. By mid-May, however, the flowering begins with the leaves and keeps on in full display for over a month, with intermittent flowering thereafter. As the whole structure of the tree seems pliant, it moves freely with every breeze.

The flowers are borne in pendulous racemes, are bright yellow in color, and catch the sunlight as finely as do the blooms of forsythia in earlier spring. According to "the books", they are fragrant, but, if so, the scent does not add much in this garden to the mingled scents of many other plants blooming at the same time. The individual flower is as large as a small sweetpea, and the floral parts spread apart widely as in all the members of this section of the Pea Family.

If there are faults to be remembered, they are few. The plant produces seed abundantly and the self-sown seedlings appear after the soil is really warm, here, in June and July. They transplant poorly as they have the typical tap root of many legumes. If one wants to grow more plants, it is wiser to gather seed and sow several where the plants are wanted later, thinning as needed. Growth from seed is rapid so that not many years must pass before flowering begins.

The location of the plant should never be where it is close to a path as the trunk and branches are armed with

small but very stiff spines, small enough so that one forgets them until stuck.

This species is related to the "*Palo Verde*" of New Mexico, which is *Parkinsonia Torreyana*. So far as is known, this latter species has not been tried here on the Coast, but, as it is reported to grow as tall as twenty-five feet, it might be worth the effort to introduce it, even if it comes from a land where summer rains cannot be counted upon regularly.

B. Y. Morrison, Pass Christian, Mississippi.

The Starfish Flowers

The Stapelias are among the most interesting plants that Africa has sent us. They were among the first brought to Europe by the Dutch, who established a garrison and fresh vegetable gardens at which is now Capetown to supply sailing vessels in their long journey around Africa to the Spice Islands. Their novel forms and coloring and their startling beauty have intrigued collectors ever since.

An infinite variety may be had now and new ones are still being found in their native velds. At least a hundred species are known, varying from tiny inch-wide flowers to those with great five-rayed stars fifteen inches in diameter! Though they vary along several evolutionary lines, they all have a strong family resemblance so that one is never in doubt as to what the plant is.

For the window garden, they make most attractive specimens as they flower when small and do so on the young growth, so there is no problem, as with many plants, of properly maturing the growth. Even young plants, if robust, will flower the first season and bear a surprising number of blossoms over a period of several months. Late summer and fall are their natural flowering periods, when some of the choicest ones

come into bloom. Many, however, flower almost all the year. Stapelias are so widespread in South Africa, and climatic and edaphic conditions vary so much that, in cultivation, some species find congenial flowering conditions the year around.

They belong to the Milkweed family though you would never guess it unless you saw the characteristic two-fingered pods filled with silky parachutes which burst open when ripe and are wafted away on the first stray breeze. There is a whole group of closely related genera, some seventeen in number, belonging to the subtribe Stapelieae most of which are also in cultivation in fanciers' collections. These range from India, where the most primitive types are found, across Asia and the near East to the tip of Spain, and in grand array and abundance down Africa through veld and desert to Table Mountain on the Cape of Good Hope.

The plants are moderately small, generally from two to eight inches tall and from the thickness of one's finger to an inch through, a number of stems closely packed forming a plant. Generally, the stems are single and not branched, arising from the base and creeping forward, rooting as they go. The stems are generally four-angled, the flowers being borne at the base in clusters opening one at a time and resting on the ground.

Their culture is simple, thriving in a sunny south, west or east window and liking, as do most plants, plenty of fresh air. They should be potted in three- to six-inch pots or pans with an inch or so of coarse sand or gravel in the bottom for good drainage. For soil, use equal portions of friable sandy loam, sharp sand and coarse leafmold. A little bone meal or well rotted manure may be added as they are gross feeders when in full growth. They are best potted in late spring although they

may be moved at any time, disturbing the roots as little as possible. Pot in barely damp soil and do not water for a week or so to allow any broken roots to heal. Then water lightly only when dry until fully rooted. Give plenty of fresh air. Never overwater, water only when dry, remembering that these are desert plants and resent wet feet. They are easy to care for during the summer growing period. When fall comes and the blossoming period is slackening, gradually withhold water so they may rest through the sunless winter months in a semi-dormant condition to be ready for the lengthening days of spring. Below is a list of desirable species for those who would enjoy growing these beautiful and novel desert stars.

Stapelia variegata. The commonest and best known species, with leathery maroon and yellow stars three inches in diameter.

S. gigantea, Giant Star Flower. Huge eight to fifteen inch stars, yellow with thin reddish lines and covered with long reddish hair and fringed with darker hairs.

S. nobilis, Royal Starfish Flower. Very large stars with purple hair.

S. grandiflora, Snowflakes. A lovely little species with inch-wide stars covered with silky white hairs. Charming.

S. semota. A dwarf species with pretty maroon-spotted stems and bright yellow-barred, red-brown flowers.

S. Dummeri. The stems spotted three to five inches tall bearing upright yellow blossoms covered with clavate hairs.

S. pulvinata. Lovely stars densely covered with handsome soft pink hairs, the petals barred with purple and heavily fringed with purple and white hairs.

S. Gettlefi. A large-flowered species

beautifully striped yellow and tan and heavily fringed with white hair.

Harry Johnson, Johnson Cactus Gardens, Paramount, California.

Mahonia Fortunei

Although this evergreen mahonia lived unhappily for several years in the north, and finally died, I am not sure whether it could have been saved or not. Here, no one plants it commonly although it is one more broad-leaved evergreen that deserves attention for that fact alone.

Unlike the winter-blooming and more commonly met *Mahonia Bealei*, this species is summer blooming, mid- to late June; unlike it also, its inflorescences are short, with small bright yellow flowers, not noticeably scented, and are followed by equally small blue-black berries.

Its real distinctions, however, have to do with its manner of growth and habit, and the type of leaves.

The books describe it as a South Chinese plant that may grow up to six feet. Here it is rarely over four. The shoots make a broad-based clump, spreading gradually but not suckering as in the barberries. This makes for a mass of canes, unequal in height and furnished with the tufted leaves, that have an ascending curve that is very charming. Like those of all mahonias, these are pinnately compound, but the leaflets are narrow, with not too spiny teeth along or toward the apex of each leaflet, giving the whole an almost fern-frondlike aspect. The fact that the shoots are not clothed from bottom to top with foliage and that the individual shoots have the leaves at differing levels, makes it possible to see the stems rising through the foliage.

It is perfectly true that, if one were to have to choose ten broad-leaved evergreens for this climate, this species

might not be in that ten, but in any climate where there is an admixture of deciduous and evergreen growths, it is charming in winter to have as wide a variety of evergreens as possible to diversify the textures and colors. There is little color before the leaves fall, just a little yellowing, so that it is greenness that counts here. Leaf drop comes in spring, after the new growth.

B. Y. Morrison, Pass Christian, Mississippi.

*Franklinia alatomaha*¹

The frontispiece in this issue is the flower of *Franklinia alatomaha*, the tree discovered in 1770 by John Bartram and since 1790 has never again been reported as having been found in the wild. As a consequence, all cultivated trees are presumed to have been propagated from the specimen that Bartram brought to his Philadelphia garden.

The flowers, three to four inches across, are white with a large cluster of orange stamens at the center and may easily be recognized by the one distorted petal that destroys the symmetry of the flower. Several buds are borne in axillary clusters and the flowers open at intervals from mid-July to frost time (around October 15 in the District of Columbia area). Foliage color is also conspicuous, with occasional red flags during the summer followed by an overall red autumn foliation. Aside from these features, one should also take note of the unique woody capsules which, after the dispersal of the seeds, resemble rings of W's joined at the ends of the arms.

Propagation is easy from both softwood and hardwood cuttings but the young trees are slow to develop. The gardener anticipating a display of the handsome flowers should, therefore,

¹See *Franklin's Tree* by Charles F. Jenkins in *The National Horticultural Magazine*, October, 1943, and *Low Growing Native American Flowering Trees*, by Helen M. Fox, April, 1944.

obtain a good tree from a nursery. The *Franklinia* will be found in gardens along most of the Atlantic coast. Small specimens were noted in a garden at Amherst, Massachusetts, but these have never flowered and probably will not attain the full height of twenty to twenty-five feet, due to the severe winters. Trees are available from nurseries, but members having difficulty in locating a source may request this information from the Society.

J. L. C.

Inarching Camellia reticulata

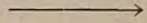
The technique of inarching is a decidedly useful tool in the propagation of a difficult plant. Few textbooks on plant propagation stress the value of this method and regard it mostly of academic interest.

Having dispelled such a notion myself by experimental proof, a pictorial sequence of inarching of *Camellia reticulata* is presented herewith to reveal its merits.

This species is often difficult to propagate by grafting or budding since there is a lack of callusing of the tissue of the scion. When a bud or sprig is inserted onto stock of *C. japonica*, a normal callusing of the stock may occur, almost covering the scion which will be found to have died and can be worked loose from the stock. Failure of a callus union will be noted upon close examination. Although this may

be similarly true in inarching, some callusing does occur and the stock and varietal branch unite.

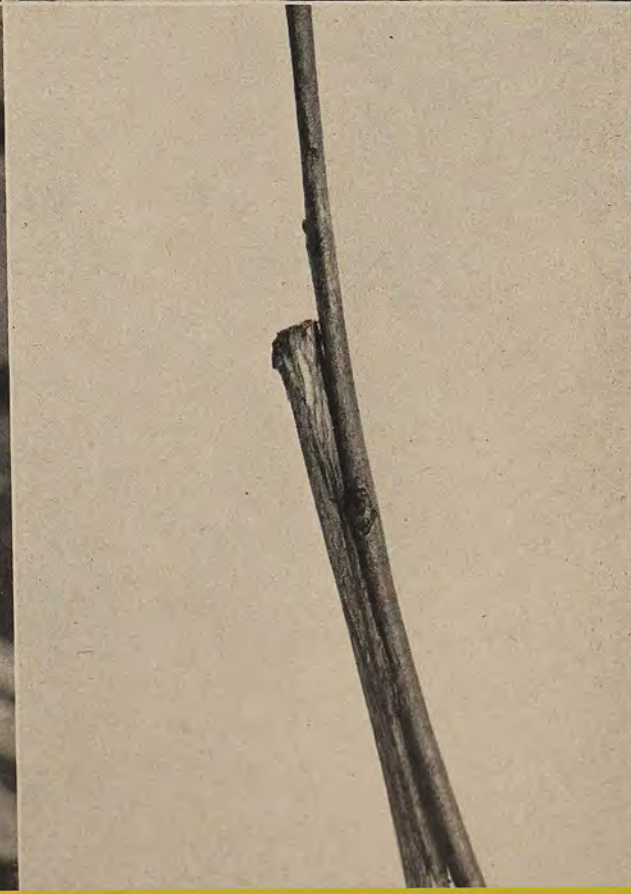
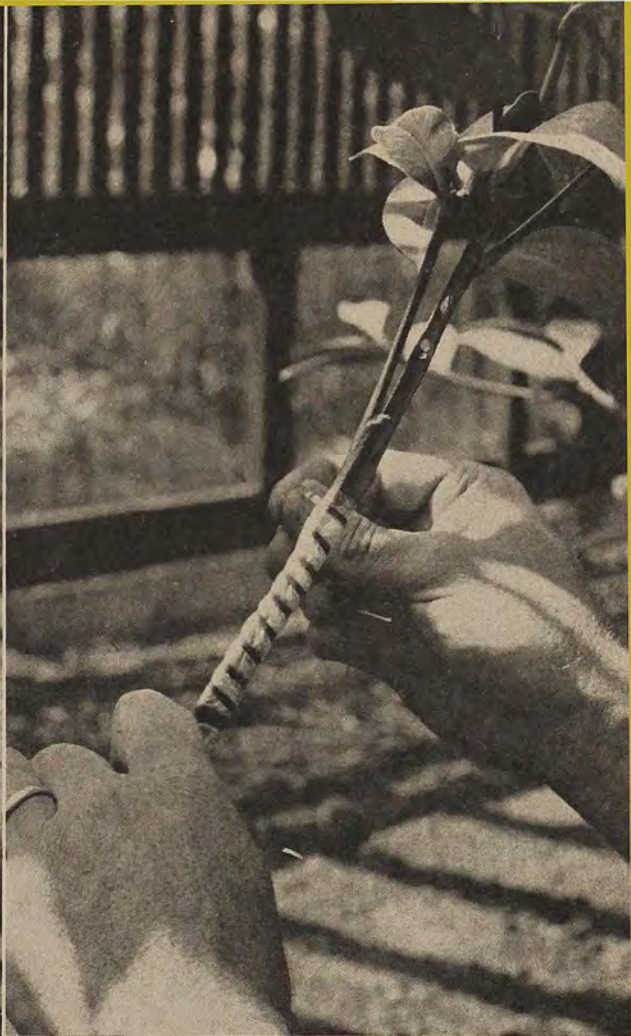
Illustrated in the top left photograph, the varietal branch and the stock are veneered at points opposite each other. The slicing wounds may be about three inches long, and, if possible, the branches should be of a similar size. The top right illustration shows the



wounded surfaces are brought together so that the cambiums are approximated. A piece of polythene film is placed over the wounded stem and held in place with ties, such as budding strips.

The bottom left illustration pictures a completed inarch, the varietal branch and the stock joined together at the wound, but each still attached to its respective top and root. After the callus becomes visible, it may be desirable to gradually prepare the varietal branch for removal by notching just below the union. The same is true of the stock, with the notch above the point of union. The last illustration presents the completely united inarch, the notches are extended through the stems and the varietal branch is parted from its parent. Now it is an integral part of the stock and the top portion of the stock is completely removed, being replaced by the varietal scion.

J. L. C.



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