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W. H. HODGE

Tibouchina sellowiana
A handsome specimen flowering at the Botanical Institute
São Paulo, Brazil

[See page 59]

The Lilyturfs in Gardens

H. Harold Hume[1] and B. Y. Morrison[2]

Common names or garden names of plants usually have been given by those who lived with them as native plants or have grown them in their gardens. Some names have been in use for many years but Lilyturf is an exception. There was no name commonly used for these plants in the United States, so in 1929 L. H. Bailey proposed that they be called Lilyturfs. This is a very appropriate name, since they belong to the Lily Family and they form a turf of sorts or cover the ground with their grass-like leaves.

The Lilyturfs as wild plants are native of China and Japan, mostly in the latter country and have been known in western botanical and garden literature at least since 1712. In that year, Engelbert Kaempfer, a German doctor with the Dutch East India Company in his book *Amoenitatum Exoticarum,* illustrated and described one of them, now known to botanists as *Ophiopogon japonicus.* He cited the Japanese names *mondo* and *riuno fige* for it, which he translated into Latin as *Barba serpentina* (Snake's Beard). This species has come to be widely known through much propaganda as Mondo Grass, a not too inept name as the plant in great masses does suggest a grassy surface or lawn.

In spite of the fact that they have long been known in the literature, both technical and popular, the individual plant longest known and grown is probably the species now known as *Ophiopogon jaburan.* Many readers will doubtless recall this name in old lists, such as Dreer's, where the plant was offered for use in pots forty years or more ago.

The greater number of plants included under the common name of Lilyturf belong to the related genus *Liriope* (pronounced Lir-ì-o-pe), and it is probable that only within the last decade or so, they have come into general use in parts of this country and their possibilities exploited to any extent. Much remains to be done to prove the ultimate limits of their cold hardiness and still more for their uses in garden designing, since they need not always be written off merely as ground covers.

In the genus *Ophiopogon,* there are only two *bona fide* species now generally cultivated in the United States, (*O. jaburan* and *O. japonicus*) with an additional plant masquerading under the invalid name of *O. arabicus.* This last is a distinct plant, with more or less the stature of *O. japonicus,* but differs markedly in that the new leaves, though green on appearing soon turn black, and that unlike its presumptive kin, it is slower than slow to increase.

In the genus *Liriope,* there are several species and many cultivars that have originated mostly from seed of one species, *L. muscari.* These have been propagated to some extent, particularly for use in the South (south of Washington, D. C.), though it appears that this area is not necessarily their proper climatic limit. These species include: *L. exiliflora, L. spicata, L. muscari, L. graminifolia,* and *L. gigantea,* the last mentioned is a new species described in *Baileya* Vol. 9, No. 4 (1961). The gardener who is curious about the technical distinctions between the genera and the species is referred to the above-mentioned work.

In brief, it may be said that the Lilyturfs (*Liriope* and *Ophiopogon*) are much alike in general appearances, with the best distinctions to be found in the growth habit, in the structure of the flowers, and in the kinds of inflorescence.

Although any generalization is dangerous, it may be said that all species in the two genera are evergreen-herbaceous plants, either forming caespitose clumps or spreading by underground stolons or rhizomes, some at alarming rates. The leaves though evergreen are at their best

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for a little more than one year, save in *O. japonicus* which seems to be a little more resistant to cold and sun. The leaves vary in length and width. Among the cultivars of *O. jaburan* and *L. muscari,* garden cultivars exist that show various types of leaf variegation, some of which are of great value in bringing a new color range into any mass planting. In the South where gray is rare and gaudy colored leaves are common. These plants make a welcome addition for even the variegated forms carry through as green from a distance.

Garden Values and Uses

Ophiopogon and *Liriope,* strange as it may seem, have been neglected plants. They are now gaining favor as their values are recognized and the uses to which they may be put in garden making have become better known. They may be used as ground covers particularly for places where grass is difficult to establish and maintain. They are also useful for the edging of walks and the facings of shrubs and flower plantings. They make attractive pot plants both as green foliage masses and when in bloom. In the olden days it was the cultivar 'Vittata' of *O. jaburan* that was mostly used in this manner. In *Baileya* (*l.c.*), E. H. Wilson is quoted, who wrote in *A Naturalist in Western China* 2:44 (1913) and *China the Mother of Gardens,* p. 324 (1929): "Table grass (*Liriope spicata*) is admired for its graceful habit and is placed on a desk or table to afford rest to the eyes when reading or studying."

In the lower South, particularly in gardens of the coastal towns of the Atlantic and Gulf, these plants have been used more extensively than elsewhere. It is not unlikely that some of them were introduced long ago by sailors who touched at different ports. What could be more highly regarded as a gift for a friend, than plants from a foreign land? Lilyturfs could easily be transported either as plants or as seeds.

Ground Covers

Since these plants are grass-like in their growth habit, they are particularly suitable as ground covers in shade, and in or alongside lawn areas; they introduce no out-of-place note. Of the species tested so far, the best are *O. japonicus* and *L. spicata,* each a rhizomatous species. The former is more widely used, because it is more readily available, not because it is a particularly better plant, though its lower stature does appeal to some. If either of them is planted 6″ x 6″ or 8″ x 8″ apart, good coverage can be had in two growing seasons. Elsewhere it is indicated that the best time for planting is either late autumn in the South or early spring farther north. After they have covered the ground they require no more attention than turnips or beans to keep them looking well! It has been found, particularly with *L. spicata,* that it is best in spring to cut back the plants in all areas where used as ground covers to within an inch or so of the ground. This is advisable because the winter season sometimes makes them appear ragged by spring. The new leaf growth quickly recovers the greenery.

The question is sometimes asked whether these ground covers will withstand mowing. Over a period of several years, a narrow strip of *L. spicata,* has been regularly mowed with the rest of the lawn, and the plants have persisted although the lawn grasses have made their way among them. They are still there and apparently unhurt and add something with their dark green color to the appearance of the strip. In another garden, *O. japonicus* has invaded a centipede lawn from an edging, and is regularly mowed. There is no damage from the mowing and the invasion continues, but in the spring when the new leaves are tender, the cut leaf tips turn white and show the damage of cutting; later mowings seem not to produce this effect.

Although the writers at this time do not have any significant number of reports from northern areas, there is reason to believe that these same plants can be used as ground covers far from the Deep South. It is known that nurseries exist as far north as Connecticut that carry all the cultivars to be discussed later on. Our reporter does not say in what part of Connecticut they were observed but that all needed a good trimming in the spring.

It may be pointed out that as these plants are mostly of Japanese origin, or so the species were, that should be a good omen for their general use throughout the Northeast. This is not a safe criterion any longer, as we are

Liriope muscari 'Big Blue'
Medium sized plants with racemes well above the foliage

beginning to discover that some plants from northern Japan are not happy in our South and that plants which appear to be indigenous in the Kyoto area of Japan are not necessarily happy in our South in comparable climates. It is a sad thing to lose this old rule of thumb, but it is safer to record its present fallibility.

It may well be that the ease with which these plants are grown in coastal areas in the South will not be matched when they are taken inland and to higher elevations.

It may be pointed out that the Lilyturfs are not particular as to the kind of soil in which they are planted, but to secure best results, the soil, of whatever kind, should be enriched from time to time. This is particularly true on light soils which leach easily, or under trees where there is root competition. In fact, they should be treated as well as are grasses for lawns. They are particularly valuable on slopes to prevent washing and in shady places where grass is difficult; in short, Lilyturfs are useful for any area where grass is a problem to establish and maintain. Of the two species mentioned, *O. japonicus* with its short leaves not over eight inches high when grown in mass, makes a more pleasant surface over which to walk, if one must traverse it.

In rock gardens, *Liriope* makes an excellent subject, if one chooses the clump-forming types. *O. jaburan* is useful, but it is much larger than most kinds of *Liriope,* even to two feet or more high when happily placed, so it should be pushed back to the rear or to marginal areas. Other kinds may be used for accent, of course, but one should have a particular sensitivity in choosing the kind and the site. In any case, one should consider the plant as giving a dark green color, with lavender or white bloom in season, and often a vase or mound-shaped mass of evergreen foliage. Once established, Lilyturfs need little additional care.

For edgings, the caespitose cultivars of *Liriope* are best. They are not prone to interfere with the growth of shrubs or

other plants adjacent to them, though they make very solid root masses. Among cultivars of *Liriope* commonly available, some of the best are 'Big Blue,' 'Majestic,' 'Lilac Beauty,' and 'Blue Spire.' Of the variegated sorts, 'Variegata' is the most striking, although the newer cultivars, such as 'Silvery Midget,' 'Silvery Sunproof,' and 'John Burch' are worth a trial. In some quarters, any variegated plant is suspect or else is written off as a sign of poor taste, but of this more later. Certainly one should hesitate before making extensive lines of variegated foliage in his garden unless especially designed for such elements. On a smaller scale, there are two very interesting cultivars 'Monroe White' and 'Christmas Tree.'

While kinds of *Ophiopogon* and *Liriope* have been used more extensively in the South than elsewhere, indications are that their use may be extended successfully farther north. William A. Strong, landscape architect in Cleveland, Ohio, has used *L. spicata* and found it to be satisfactory where it is usually covered with snow in winter. *O. japonicus* has been used in the Washington, D. C., area with success in some recent gardens, although it was well established on the Old Mall before that was redesigned. Frederic P. Lee reports some twenty-three species and cultivars as successful in his garden in nearby Maryland, and in *Baileya,* the survival of *L. graminifolia* at Glenn Dale, Maryland, a locale much colder than the District of Columbia, speaks well for its hardiness. L. H. Bailey reported various aspects of hardiness in his paper on Lilyturfs in *Gentes Herbarum* (1929). The writers have been told of other gardens in the North where all kinds survive, *O. jaburan* less happily, though all kinds look shabbier by spring than even the most enthusiastic owners desire.

When not in flower all kinds of *Liriope* are rather similar in garden effect, but when the racemes of buds and flowers appear their differences are easily seen and the beauty of some as flowering plants is particularly striking. This is especially true of the garden varieties originating from *L. muscari* of which there will be more from time to time. The racemes bear quantities of flowers but these do not open, many at one time, and the opening may be irregular over the total area, not a development from base to tip; but the buds are as deeply colored and make as much show as do the blooms. Buds of the cultivar 'Christmas Tree' or 'Monroe 2' never open, but the mass of color they make is as fine as a grape hyacinth in the North. Many buds in other cultivars never open and fall off as closed buds. The deepest color is probably found in the cultivar 'Variegata,' though this may be more apparent because of the colored leaves, which certainly augment the beauty at blossoming time.

In the Gainesville, Florida, area, *Liriope* bloom for about two months, July and August, the same time as in the Gulf Coast area of Mississippi, overlapping the blossoming season of some other garden plants of major importance. For example, the time agrees with the last weeks of bloom of *Lilium speciosum* 'Rubrum' and allies, and matches exactly the full period of the Formosan form of the *L. philippinense.* If all goes well the herbaceous hybrids of the common mallow are in fine show. In a lesser way, and related to rains, one may have great masses of the commonest of the rain lilies, *Zephyranthes grandiflora,* and equal lots of a species still available in trade as *Z. macrosiphon* shortly to be renamed *Z. miradorense.* This last self sows freely and comes up even in grass.

Again depending on conditions of weather, one may have secondary masses of fragrant white blossoms from *Cooperia pedunculata,* stray blooms from the earlier *Habranthus robustus,* even a few from *H. brachyandrus,* but whether or not the newer hybrids, *H.* × *floryi* and 'Sparkman's Beauty' will fit into the scheme remains to be seen. They are temporarily in pots but it is hoped that they will be as cold hardy as the others. *H. cardenasiana* will also be given a trial. And if courage holds, *H. concolor* in yellow, and *H. immaculatus* in white will join the crew.

If the season is propitious, meaning rainy and warm, the annual *Torenia* will be making its first masses of clear lavender flowers marked with pansy purple. Here, the white form has not maintained itself, and as yet, the yellow species has not been discovered.

Elsewhere, perennial phloxes, stokesia and false dragonheads are well in bloom, so one could multiply combinations variously depending on location.

Liriope muscari 'Monroe White' with pure white flowers

As yet, in the Mississippi garden no bulbous plant has been discovered that may be planted through a mass of *Liriope,* although a few narcissus have lived unhappily, and the invasive *Alstroemeria pulchella* that no one really covets, will live in spite of all.

Cut Flowers

Flower racemes of *Liriope* and *Ophiopogon* are very useful and attractive although there is usually some shattering on the second day after cutting. The color range is from pure white to deep violet, almost indigo, and a combination of several kinds with their own or comparable foliage makes a delightful bouquet of the old-fashioned "flowers in water" type. Because the leaves are rather stiff, have a definite and characteristic curve, they, with the flower racemes can also be made into striking stylized arrangements, or the flowers alone can be used with other flowers to add a secondary note of lavender that will accentuate the pinks of polyantha roses or the like. And, should the season be one in which there is heavy fruiting, the racemes of shining black berries may be used with fine success, in any sort of combination.

Pot Plants

In the colder parts of the country, garden varieties of *L. muscari* make good pot plants for indoor or greenhouse use. A temperature of 40 to 50 degrees F. in winter is satisfactory, though the plants will tolerate a higher one. In warmer areas, they may be potted and used on patios. Compact growing varieties make the best plants as they will give more bloom per clump. The cultivars 'Silver Banded' and 'Majestic' are suggested; 'Variegata' with its striped leaves, makes a handsome pot plant, or a specimen in box, planter or urn, if one still owns such. One may use either the green or the variegated form of *Ophiopogon jaburan.* A five inch pot will accommodate two or three divisions of *Liriope* and the number can be increased in larger pots. A mixture of equal parts of good soil, sand, and peat, plus dairy fertilizer

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Liriope exiliflora has racemes carried well above the foliage

makes an excellent potting soil. Plants may remain in the same pot for two or three years, by giving them small amounts of commercial fertilizer two or three times a year. When repotting becomes advisable, the plants are knocked out, the soil and drainage chards removed, and reset, in a somewhat larger pot, although if some of the older root masses are cut away, a pot of the same size may again be used. After repotting, plants should be watered well. Early spring before growth starts is a good time for repotting.

Propagation

If one tries to buy Lilyturf plants, he will find as a general rule, only a few of the most common kinds are available and these may be offered as growing potted plants or as any other perennial, dormant roots packed with sphagnum around the roots, often with the foliage somewhat cut back as in iris. Many of the named sorts one might wish to find in his local shop do not yet seem to have reached the lower levels of retail business. If he insists, his retailer can certainly find the wholesale sources of all.

If one buys only a few plants of each kind, intending to propagate his own, it is important to remember that if they are clump-forming or caespitose types, the sooner one starts to divide them, the easier the task. Old clumps, with a mass of roots, and almost woody center, take a strong arm and a sharp tool to make them into separate units, even after washing away as much soil as possible. It is possible to divide such into single fascicles of growth, but this will call for greater care in the next stage, regular watering and if possible a location in a semi-shaded area.

An old clump of *L. muscari* eighteen inches in diameter, may give as many as one hundred and fifty separate pieces, sometimes erroneously called "pips." In the lower South, this division should be carried out in autumn before the winter dormant season; in colder northern sections of the country, division is better in spring before growth starts. Proliferations sometimes develop on the rachises of *L. muscari* as they do on some clones of *Hemerocallis,* appearing after the buds and blooms have fallen off; these may be removed carefully and planted to produce new plants, using the same care in planting to induce rapid root development.

Ophiopogon and *Liriope* produce seed that can be sown if one wishes, although not all garden forms are equally productive and some species seem to produce few seeds that reach maturity. If one wishes to raise Lilyturf plants from seed, there is no special problem if the seed is sown as soon as it is ripe. Planted in boxes, pots or in the open ground, germination will commence in a month or so, and if the soil in each pot, box or bed is well prepared the seedlings will be large enough to use in two years. Any soil will do, but the better the soil, the better the plants will be. Outside, seed should be sown about ¾ of an inch deep and the bed thinly mulched with leaves. Bamboo leaves are excellent as they are light, easily scattered and do not interfere with the young plants as they appear. The soil should be kept moist until germination begins and after that care must be taken to keep the bed from drying out.

There is little variation in the growth and appearance of young seedlings of most of the different species and seedling populations result in fairly uniform lots of plants. Among seedlings of *L. muscari,* wide differences may show up when the seedlings attain size, not only in the foliage, flowers and color, but in the raceme of buds and bloom. Differences in stature and vigor may appear as well. This is attested by the numerous cultivars now in the trade obtained by seedling selection.

If one does not want to bother with sowing seed, more than likely, he will find seedlings appearing in many places in his garden, sown there by birds or other creatures.

It would delight the authors if they could conclude this report with a descriptive list of all known Lilyturfs. The list that follows contains descriptions, in so far as we can give them, of the species and garden cultivars with names taken from published lists either in catalogues or horticultural papers as well as in the *Baileya* reference already cited. Our data have been supplemented by data from Frederic P. Lee.

Species

Ophiopogon jaburan. A clump forming species, with masses of dark green leaves up to ½" wide and 13 inches long, somewhat striate, forming a moundlike mass, up to 10 or more inches tall; scapes 8 to 10 inches tall, overtopping the foliage. Not dependably cold hardy in the North.

There is a variegated cultivar known as 'Vittata' similar in all respects, except that the foliage is striped with yellowish bands of varying widths that does not carry its color through the entire season. It is possible that the plant offered as 'Argenteus Vittatus' is the same.

Ophiopogon japonicus is a stoloniferous species of low habit, forming carpets of grass-like leaves, not over 12 inches long, and not over ⅜ inch wide, dull surface, dark green; the flowers are not conspicuous and are usually hidden in the foliage masses, followed by round blue fruits, with white seeds. This is *the* ground cover plant of the genus.

Liriope exiliflora is a rhizomatous species forming dense turf-like masses, but at greater height than in the popular *Ophiopogon japonicus;* the leaves are dark green, up to 13 inches long and ⅜ inch wide, glossy; flowering scape is violet-brown, up to fifteen inches tall, rising well above the foliage masses; the flowers are violet in color, showy, fol-

Liriope spicata, being used as a ground cover, the third season after planting

lowed usually by abundant fruiting; the fruit is black.

Liriope graminifolia is a rhizomatous species with leaves up to 12 or more inches long, narrow, about 1/4 inch wide; the scapes are 9 to 10 inches tall; the flowers are pale, almost white; fruiting is not recorded. Probably not in commerce.

Liriope gigantea is a new species certainly not yet in the trade, with wide spreading rhizomes, forming in time a densely matted turf, of dark green leaves 1/2 to 3/4 of an inch wide, up to 2 feet long; the scapes barely overtop the dark green foliage; the light violet flowers are produced earlier in the season than any other species growing in the same or comparable situations.

Liriope muscari is best known by the named cultivar 'Big Blue' described below.

Liriope spicatus has rather wide spreading rhizomes, but forms a good turf. The leaves are up to 1/2 inch wide and 24 inches long, dark green and glossy; the scapes are not over 10 inches long and barely overtop the foliage masses, more of less tinted with dull violet, and carrying a short mass of pale, almost white flowers; the fruits are shining black.

Cultivars of *Liriope muscari*

In so far as is now known, nearly all Lilyturf selections are derived from *L. muscari.*

'Big Blue.' This is the garden name for the species, *Liriope muscari.* The plant makes strong clumps in time, with leaves up to 1/2 inch wide and 14 inches long, dark green and glossy. When young, or newly planted, the flowering scapes are taller than the foliage masses but with age they rarely rise much above the leaf masses. The blooms are typical, freely produced and excellent. Fruiting varies from year to year, with the usual black berry-like fruits.

'Blue Spire.' This cultivar grows in compact mounds of foliage, producing racemes well above the foliage masses, often broader at the base and sometimes forked at the tip in such a fashion as to

Liriope muscari 'Lilac Beauty'
Scapes are dark colored; flowers abundantly

suggest the cockscomb. Earlier than 'Big Blue.'

'Border Gem.' Not seen by the authors, but reported to be a cultivar of *L. muscari* with broad glossy leaves ½ inch wide, and up to 24 inches long, forming a foliage mass not over 18 inches tall. Flowers not reported, but it it safe to assume they are lavender as in all cultivars of *L. muscari.*

'Christmas Tree' (sometimes known as 'Monroe No. 2'). Close tight clumps of somewhat narrow, ascending yellowish leaves, to 6 inches long, which make an excellent background for the flower scapes that rise well above them, and the crowded masses of flower buds, often so thick at the base, from branching, that they appear as a Christmas tree in shape. Sometimes the flower masses are merely club shaped and stolid-looking. The flowers do not open, but the buds, light violet in color, are showy. This cultivar may not be a derivative of *L. muscari.*

'Cockscomb.' Not seen by the authors, but reported by Frederic P. Lee as a plant with somewhat dull leaves, not over ½ inch wide, and 15 inches long, forming a mound about 10 inches tall. No report on flowering.

'Curly Twist.' A strong growing cultivar, characterized by its unusual yellow-green rather than dark green leaves, many of which are curled and twisted on their axes, giving a curious effect in mass. The short flower scapes do not rise high above the foliage, and are not particularly abundant in either garden reporting.

'Eleven-o-three.' A chance seedling found in Hume's garden in Gainesville, blooming usually after 'Big Blue.' The leaves are long and rather narrow forming a somewhat open clump. The flower scapes rise to a height of about 10 inches, with light violet flowers.

'Grandiflora.' In Morrison's Mississippi garden this is the tallest cultivar, with narrow yellowish green leaves up to 14 inches tall. The flower scapes are well down inside the masses of leaves and are rather late to appear. As they develop it appears that the flowers will

be white, but with growth, a light lavender color shows first in the rachis, starting from the base, and eventually colors the whole inflorescence. This cultivar is practically deciduous in Mississippi. As reported from Maryland, the plants there are very different, with thick leathery typical dark green leaves. The Mississippi plants came from the originator.

'Lilac Beauty' is a tall grower with sheaves of high ascending leaves up to 12 inches long. The dark brownish violet flower scapes carry the flower racemes well above the foliage masses, with dark violet flowers, that seem nearer the color of the traditional lilac. The leaves are up to 20 inches long and to ¾ inch wide.

'Majestic.' This produces masses of somewhat narrow leaves, to 13 inches long and to ½ inch wide, held in high ascending curves, to 10 inches or more. The flower scapes are freely produced and often bear fasciated heads of violet flowers. Sometimes this is confused with 'Big Blue,' but it is lower in stature and possibly less robust.

'Monroe White' (sometimes listed as 'Monroe No. 1') is the most distinct cultivar raised from *L. muscari* and a charming garden plant, but it must have some shade as its foliage burns in full sunlight. The somewhat narrow leaves rise to 12 inches high in ascending curves, but not overtopping the scapes. The light green flower scapes produce somewhat open masses of pure white buds and flowers.

'New Wonder.' This cultivar, according to Frederic P. Lee, is furnished with leaves to 23 inches long, and to ⅜ inch wide, glossy above and rather more erect in carriage than most.

'Purple Bouquet.' This makes a good clump with narrow leaves to 10 inches long, but more broadly spreading in carriage than some of the others; it is free-blooming with erect flower scapes bearing rather typical pinkish lavender flowers.

Cultivars with Variegated Foliage

'Gold-Banded.' This makes a compact tuft of firm leaves that form a somewhat spreading clump mass. The line of variegation is gold when the leaf is new, but lightens toward white as the season advances. It disappears entirely on old leaves. The scapes are about 10 to 12 inches in height with buds and flowers of a violet-purple hue, sometimes with a few narrowing masses toward the tips of each raceme.

'John Burch.' Plants produce leaves about the size and character of 'Big Blue,' but a little darker green, rarely over 10 inches long, spreading rather than erect; each leaf is edged with a definite white line. It is free blooming in the Mississippi garden, which is its chief advantage over 'Silvery Midget.' As all plants are grown in passing shade, no premature fading has been noted, but by late autumn, all white color has disappeared.

'Silver Banded.' A slow growing cultivar forming low compact masses of strongly arching leaves, each with a well defined narrow yellowish line on each margin, later turns white and finally disappears. The strong flower scapes with compact racemes of dark violet flowers and buds are buried among the leaf masses.

'Silvery Midget.' A cultivar that rarely makes leaf masses higher than 8 inches. The leaves tend to be spreading rather than ascending as in other cultivars. The leaves are broad, dark green, with a thin white line on the edge only which in the young stage of leaf development shows some yellow tint, but later turns white and lasts well. The flower scapes are low, barely overtopping the leaf masses. Flowers light lavender.

'Silvery Sunproof.' A cultivar that makes a tall vase-shaped mass of ascending leaves to 12 inches high or more. Each leaf, as it develops, is heavily striate with gold, but later the gold lightens toward white as the leaf matures in summer. The whitish striation is not completely lost in cold weather, but the leaves lose their rigidity and so do less credit to the plant. It has not been very free-flowering in the Mississippi garden.

In a poorly designed garden under live oak shade, it makes the most striking effect of any plant used there.

'Variegata.' A cultivar with leaves green in the center and yellow or whitish-yellow on the margins when young, turning green throughout with age. Leaves to 16 inches or more tall, the flower scapes not as tall, with fascicles of dark violet flowers. In *Baileya* (*l.c.* p. 156) this cultivar is reported to be of

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Liriope exiliflora used as a ground cover at the base of the Agricultural Building, University of Florida at Gainesville

obscure origin, doubtfully a seedling of *L. muscari*. Possibly this needs critical comparison with the cultivar known as 'Silvery Sunproof,' or some other variegated cultivars. In any case, 'Variegata' is a most useful plant when the planting is well designed.

Use of Lilyturfs in Modern Garden Design

Although it is not known to the writers, someone may already have made a special study of the uses to which lilyturfs can be put as a basic element in the contemporary stylized gardens. Since the caespitose forms are almost static evergreen plants, with or without variegation, they could be employed in making patterns of almost geometric form.

For a garden of the type mentioned, it was proposed to a certain owner that she consider it for a series of beds she had in mind, that were to decorate a level area near the very modern house, brown in color, with an undertone of red. She wished a plant that would tie together a bed of salmon-pink floribunda roses, but she wanted other blooming shrubs used as accents. A pattern was worked out, along a basis of a modified Greek key, using bottle-brushes for the accent shrubs and roses for the mass effects. The outlines of the key-pattern called for the use of a lavender-flowered *Liriope*. After much study the idea was abandoned, since the owner felt her house was not "that modern." But the idea remains sound.

It might be suggested that block areas of contrasting kinds of *Liriope* be used, approximating the long abandoned idea of carpet-bedding, a style that came into disrepute because of poor use in design. In spite of unfavorable reactions against carpet-bedding that arose when the "naturalistic style" was the vogue, it is useful in special places. This reaction against it was also responsible for the abandoning of variegated plants, a loss of a genuine style of value. Possibly the time has come to make a reevaluation of the style properly used, which frequently means only "with restraint."

FREDERICK G. MEYER

La Mortola Gardens

A small temple with dome of ornamental iron grille. Large specimen of Yucca elephantipes in background. Specimens on left of the Mediterranean Cypress, Cupressus sempervirens

Some Horticultural Centers of the Riviera *

FREDERICK G. MEYER**

To many people, a visit to the Riviera of France or Italy leaves pleasant memories of flower-decked roadsides, picturesque villages and mountains above the sea, warm people, and, not the least, handsome villas and gardens. Where else in the Northern Hemisphere at a latitude of Portland, Maine, and Nova Scotia is it possible to find orange trees, oleanders, date palms, and jacarandas growing as street trees and cacti that vie in size with any of their kind to be found in Mexico.

What was once a rocky, barren, uninviting wind-swept coastal strip, known to the Romans as the shortest chariot route to France, in about 80 years has become a verdant, subtropical oasis, only a short distance from snow-capped alps. While the work of enterprising entrepreneurs brought prosperity to the Riviera, the heavy hand of commercialism has not destroyed an aura of sophistication which still prevails, nor has the natural beauty given way in the wake of the bulldozer's blade. On the contrary, this is one area in which man's influence on Nature appears to have been an embellishment rather than a scourge.

Since the 1880's, when the French Riviera was first developed as a holiday retreat by British interests, royalty, dowagers, movie stars, the idle rich, and millions of plain citizens have consorted together in an atmosphere in which constructive relaxation has become a way of life. In time, all this has brought not only splendid villas that overlook the blue Mediterranean, but also it has brought many fine gardens often full of rare and unusual plants of interest to keen plantsmen.

The Riviera, locally called the Cote d'Azur (Blue Coast), extends from Hyeres, in France to San Remo, in Italy, a distance of about 200 miles. Strictly speaking, the area between Cannes and San Remo, including the Principality of Monaco, is the most interesting to horticulturists. At various points, the Maritime Alps rise several thousand feet almost sheer from the sea and effectively shelter the region against cold northern winds. Frost and snow are rare events. In the salubrious climate, it is possible to cultivate a wide selection of subtropical plants, giving to the coastal region a decidedly subtropical atmosphere. But the area is not without climatic shortcomings. All plantsmen of the Riviera fear the winds of the "mistral," which bring the most inclement weather to the otherwise balmy seacoast area of the Cote d'Azur. The mistral is a dry, cold north wind from the Rhone River valley which normally veers westward toward Spain upon reaching the sea, but occasionally it turns eastward toward Italy, effecting the palm-tree belt of the Riviera. When this occurs, winds of the mistral bring a sudden drop in temperature, which in winter may bring frost or rarely snow, as in the winter of 1956.

The writer invites his readers to join in a short tour of gardens and horticultural establishment of the Riviera visited in 1957 during a plant exploration trip for ornamentals in Mediterranean countries of southern Europe.

French Riviera

Villa Thuret, Cap d'Antibes

The Villa Thuret is well known as one of the leading horticultural institutions of France. The arboretum of subtropical and Mediterranean plants dates from about 1860, when Gustave Adolphe Thuret, artist-diplomat, purchased the property for reasons of health and developed on the grounds of his village the

* Selected articles revised from *Plant Explorations: Ornamentals in Italy. Southern France, Spain, Portugal, England, and Scotland,* by Frederick G. Meyer, ARS 34-9, October 1959, U. S. Department of Agriculture in cooperation with Longwood Gardens of the Longwood Foundation, Inc. See also *Am. Hort. Mag.,* July 1961. Photographs by the author.

** U. S. Department of Agriculture, Agricultural Research Services, New Crops Research Branch, Plant Industry Station, Beltsville, Maryland.

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Palms at the Villa Thuret, in clockwise position: Sabal sp., Chamaerops humilis, Jubaea chilensis, and Butia capitata. The Bunya-Bunya tree, Araucaria bidwillii, in left background

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Villa Thuret, Cap d'Antibes

first large garden of exotic plants on the French Riviera. Upon the death of Thuret in 1875, the property with an arboretum of 10 acres, was willed to the people of France. Now it is known as the National Institute for Agronomic Research, one of the most complete in southern France for research in horticulture. Perhaps no other garden of the area is so rich in subtropical specimen trees, many of which are 80 or more years old. Excellent laboratories and an extensive library are provided for research workers. Greenhouses also are available for use in plant breeding and in physiological studies.

A visitor to the garden will soon discover a wealth of interesting trees. For instance, a specimen of the Bunya-Bunya tree, *Araucaria bidwillii,* is now 80 feet tall; the Chilean Wine Palm, *Jubaea chilensis,* is 50 feet tall; and the Syrian Juniper, *Juniperus drupacea,* from Greece and Asia Minor, is 60 feet tall. A grove of towering Stone Pine, *Pinus pinea,* near the Villa dates from a planting about 1870.

Serre de la Madone, Val du Gorbio, Menton

Many of the finest gardens of the French Riviera have been created by British settlers attracted to this area for climatic or health reasons. One such garden, the Serre de la Madone, at Menton stands as the legacy of one man's unending enthusiasm for gardening and rare plants. The late Major Lawrence Johnston, over a span of 40 years, assembled an unusually fine collection of rare species from his many visits abroad to South Africa, China, India, and Burma in quest of plants for his Riviera estate.

The garden stands on a series of terraces of an abandoned olive grove at the foot of towering peaks of the Maritime Alps with the shore of the Mediterranean only a few kilometers away. Evergreen trees and shrubs of ornamental merit abound, the best of which are mentioned below.

Oreopanax. Three Mexican species are grown of this highly ornamental group

of small spreading trees of the Ginseng Family [Araliaceae]: *O. echinops,* with large digitately divided and felted leaves up to 10 inches across; *O. capitatus,* with leathery undivided leaves, 6 to 8 inches across; and *O. dactylifolius,* a fine plant with digitately divided leathery and felted leaves, 8 to 10 inches across. In a climate with frost these plants could be used for pot and tub culture, since they are closely related to *Schefflera,* an indoor plant now widely used for this purpose.

Banksia integrifolia is an Australian small evergreen tree of the Protea Family [Proteaceae] now 25 feet tall with bottle-brushlike heads of yellow flowers, 3 inches long. This plant is one of the few members of an otherwise highly interesting family easy to cultivate in gardens. A well known plant of the family is the Silk-Oak, *Grevillea robusta,* often grown in pots.

Hedera chysocarpa is the yellow-fruited ivy from the Caucasus rarely seen in cultivation.

Mahonia lomariifolia is an extremely attractive broadleaf evergreen shrub 10 to 12 feet tall. It was introduced by Major Johnston from Upper Burma and grown first by him in his garden at Menton. During the writer's visit in April, the 8-foot plants were loaded with large grape-like clusters of blue berries borne at the branch tips among tufts of lustrous pinnately divided leaves. The plant flowers in late autumn or winter. Some say it is the finest of mahonias yet introduced; it is now in the United States where it may be expected to thrive best in the southern states and Pacific coast areas.

Mahonia siamensis is a highly attractive species from Upper Burma, collected by Major Johnston and raised by him at Menton. The thick pinnately divided broadleaf evergreen leaves are 24 to 30 inches long with leaflets 6 to 7 inches long; a less handsome plant than the preceding, but just as hardy.

Decumaria sinensis is a striking evergreen scrambling plant from China closely related to *Hydrangea.* Its less handsome cousin, the so-called Climbing Hydrangea, *D. barbara,* a native of the American southeast, is rarely grown in cultivation. At the Serre de la Madone, plants of *D. sinensis,* which scramble over a banister, were covered in April with frothy-white and perfumed flower panicles, 3 to 4 inches across. This plant gem deserves to be widely tested in the United States, because we have nothing quite its equal now in cultivation.

Buddleia crispa var. *farreri* is a beautifully refined Chinese species of butterfly-bush of low habit, with pale rose-lilac delightfully fragrant flowers with a yellow eye. This plant is recommended over *B. davidii,* the plant commonly cultivated but too coarse for many small gardens.

Sarcococca ruscifolia is a Chinese species and perhaps the showiest of the genus, making a shrub up to 4 feet tall with leaves an inch or more long. The dark-red cherry-like pulpy fruit, 3/8 inch in diameter, adorns the plant in the spring months. *S. saligna,* a Himalayan species, while not an unattractive relative, with narrower, light-green lanceolate evergreen leaves and purple fruit, does not equal *S. ruscifolia.* The sarcococcas, relatives of boxwood, are known mostly in this country by *S. hookeriana* and varieties, all useful plants as low evergreen ground covers.

In July at the Serre de la Madone, oleanders in full kaleidoscopic array are conspicuous through the garden. The so-called Yellow Oleander, *Nerium oleander* 'Aurantiacum,' with orangish yellow flowers is a delightful shade among color forms of this plant less frequently seen.

Villa Roquebrune, Cap Martin

The superbly terraced garden of the Villa Roquebrune at Cap Martin stands with an unmatched setting on the edge of a precipice several hundred feet above the Mediterranean facing the Principality of Monaco. Twisted and wind-swept Aleppo Pine, *Pinus halepensis,* and spire-like cypress, *Cupressus sempervirens,* enhance the rugged setting around which the garden has been constructed.

Acacias and bulbous plants from South Africa are prominent among the plants that flower in spring at the Villa. Masses of *Diplopappus fruticulosus,* an elegant relative of *Aster* from South Africa, with lavender-rose ray-flowers, is conspicuous during April in several parts of the garden. Also, cacti and other succulents are prominently displayed. The floral wealth of geraniums

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Serre de la Madone, Garden of the late Major Lawrence Johnston

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Garden of the Villa Roquebrune, Cap Martin, French Riviera

is always hard to match. *Pelargonium zonale,* the common species, and *P. peltatum,* the Ivy Geranium, are planted in profusion over walls and ledges. The little known, *P. acetosa,* with blue-green deeply cut leaves and bright salmon-pink flowers, deserves wider cultivation among the fleshy-leaved members of the genus. Lantanas with yellow, lavender, and white flowers contribute to the spectacular color array of floral wealth at the Villa Roquebrune in April. Among scabiosas, *Scabiosa cretica* is perhaps unknown in gardens of this country, but nonetheless, it is an elegant shrub 3 to 4 feet tall with azure-blue flower heads an inch or more across; it is native of Sicily.

The Mexican Trumpet-vine, *Phaedranthus buccinatorius,* is represented at the Villa Roquebrune by an outstanding color form with burgundy-red flowers. This plant is found to vary with flowers almost clear orange to deep red. *Thunbergia gibsonii,* probably little known to most, is a charming tropical African species with bright orange flowers an inch across, planted in several places over walls. Many people already grow the Black-eyed Susan, *T. alata,* with a black eye-spot at the base of the corolla. *Bletilla striata,* a ground orchid, native of Japan and China, and known in southern areas of the United States, is grown with considerable effect in large terra cotta pots on the patio. *Romneya coulteri,* the Matileja Poppy of California, is justifiably much-planted, since few plants are more distinctive when used in the correct position. Another plant, the Spurge-Olive, *Cneorum tricoccon,* a native Mediterranean evergreen shrub with boxwood-like leaves is planted in various parts of the garden as a substitute for boxwood. In addition to the dark green leaves of the Spurge-Olive, the red fruit in late summer is highly attractive. *Lagunaria patersonii,* a handsome flowering tree of the Mallow Family [Malvaceae] from Australia, appears to be suited to the Mediterranean climate. The several specimens, now 20 to 25 feet tall, are laden with mauve to rose-pink flowers, 2 inches across, for several weeks in midsummer.

The garden of the Villa Roquebrune was developed over many years by Mrs. G. Warre, British resident of the Riviera.

La Leonina, Beaulieu-sur-Mer

La Leonina, site of an outstanding terraced garden devoted largely to economic plants, is located about midway between Nice and Monaco. Arpad Plesch, owner of the property, has brought together an outstanding collection of over 2,000 kinds of subtropical fruits, vegetables, and medicinal plants, grown on a series of 7 broad terraces overlooking the Mediterranean above the villa. An olive grove near the villa is reputed to be 1,000 years old. Here one has an opportunity to see a wide assortment of plants used for special purposes, such as: plants with edible flowers; plants with edible stems or petioles; spice plants; starch and fat producing plants; spinach plants; plants with edible pods; plants with edible pulpy fruits; medicinal plants; oil-bearing plants; beverage plants; plants with edible roots; sugar-producing plants; and plants with edible seeds. Tropical fruits, such as mango, papaya, and lychee, are grown in a greenhouse.

A collection of old specimen trees and a greenhouse for orchids and other tropical plants are located near the villa. At least 10 species of palms are represented in this section, including large specimens of Canary Island Date Palm, *Phoenix canariensis,* 50 feet tall; California Fan Palm, *Washingtonia filifera,* 80 feet tall; a species of *Erythaea;* Mediterranean Fan Palm, *Chamaerops humilis; Chamaedorea elatior;* Chilean Wine Palm, *Jubaea chilensis,* 40 feet tall; and *Livistona australis,* 30 feet tall.

A giant specimen of the Moreton Bay Fig, *Ficus macrophylla,* is 50 feet tall; the blue-flowered Jacaranda, *Jacaranda acutifolia,* is 40 feet tall; and *Oreopanax floribundum,* a fourth species of the genus found in Riviera gardens, is 40 feet tall.

A large conservatory contains orchids, aroids, and many other tropical species. *Phymatidium tillandsioides,* a diminutive orchid from Brazil, only a few inches tall produces extremely fragrant small white flowers. A specimen plant of *Hoya angustifolia* with clusters of pink flowers was in full bloom; although smaller, the flowers are fully as attractive as those of the well known Wax-Flower, *H. carnosa.*

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Jardin Botanique, Les Cedres, Cap Ferrat
Flower border with brilliant orange Gazania × splendens against a backdrop of Aleppo Pine, Pinus halepensis

Jardin Botanique, "Les Cedres," Cap Ferrat

The garden of Monsieur Julian Marnier-Lapostolle is well known among the newer gardens of the French Riviera, although some plantings exist from an older garden on the property. Old Lebanon cedars, *Cedrus libani,* undoubtedly suggested the appropriate name "Les Cedres," as the garden is called by the present owner. Since the end of World War II, the garden has greatly expanded to what must be the largest collection of subtropical and succulent plants in southern Europe. Groves of Aleppo Pine, *Pinus halepensis,* and Holly-Oak, *Quercus ilex,* both native plants, enhance the terrain as a natural backdrop for the plantings of cultivated plants. About 10,000 kinds of plants are cultivated, inclusive of wild species and horticultural selections of garden origin.

Located a few miles east of Nice, on Cap Ferrat, the garden occupies a site along the mild "La Petite Afrique" sec-

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Jardin Botanique, Les Cedres, Cap Ferrat
Cissus jutae, a succulent member of the Grape Family
from southwestern Africa, left foreground

tion of the French Riviera. Nearby the towering Maritime Alps shield the coastal section from north winds, and the Mediterranean Sea surrounds the narrow peninsula on three sides.

A simulated jungle contains bananas, palms, begonias, tropical lianas, and other rainforest-type ornamental species. Bamboos are 30 feet tall. A water garden includes tropical water-lilies, *Nymphaea* species; Indian Lotus, *Nelumbo nucifera;* Water-platter Lily, *Victoria cruziana;*

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Jardin Botanique, Les Cedres, Cap Ferrat
Water-Platter Lily, Victoria cruziana, the only place along the Riviera where this plant is grown in the open

and *Typhonodorum lindleyanum,* an aquatic aroid [Araceae] from Madagascar. The wide borders near the villa are planted with Australian species of *Acacia, Grevillea, Hakea, Callistemon,* and *Metrosideros.*

In a series of greenhouses, *Nepenthes,* the tropical pitcher plant, begonias, orchids, aroids, gesneriads, and ferns form part of the tropical collections under glass. The Madagascar Lace-Plant, *Aponogeton fenestralis,* with leaves nearly 2 feet long, is grown to perfection in deep concrete tanks.

The collection of succulent plants includes both Old and New World species. Cacti of South America are abundantly represented. Plants of the Madagascar desert include several members of the Didiereaceae, a small family of succulent trees and shrubs restricted to Madagascar. The principal genera are *Didierea* and *Alluaudia.* A curious succulent of the Melon Family [Cucurbitaceae] from Madagascar is *Xerosicyos,* represented at Les Cedres by *X. danguyi* and *X. perrieri.*

The collections of *Kalanchoe* are among the most comprehensive of succulent genera cultivated at Les Cedres. Species of this genus offer promise as subjects for hybridization and breeding studies to produce types suitable as pot plants, since one witnesses, among the various species, great diversity in habit and in range of flower color. For example, *K. pumila* is a low plant with orchid-colored flowers, while *K. manginii* is provided with tubular scarlet flowers on a low spreading plant. Tall growing species also exist, such as *K. marmorata,* with white flowers up to 3 inches long.

Villa Casa Rossa, Menton

The garden and villa of Casa Rossa is a good example of a modern Riviera estate constructed in the Provençal style. Subtropical and Mediterranean plants predominate among the species grown; rows of Canary Island Date Palm, *Phoenix canariensis,* are planted along the drive as one enters the grounds. Handsome specimens of *Echium fastuosum,* Vipers-Burgloss, an arborescent species, 10 feet tall, of the Borage Family [Boraginaceae], produce in April torch-like panicles 6 to 8 inches long of

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Garden of the Villa Casa Rossa, Menton

azure-blue flowers. A tree-*Datura* with trumpet-like white flowers up to 8 inches long, forms a handsome specimen up to 10 feet tall against the brown stuccoed walls of the villa. A grove of tangerines is planted on a lower terrace near the villa, which in most seasons is highly productive. But a note about this: Citrus trees in most Riviera gardens fruit poorly, because the trees usually are badly defoliated by persons who gather the leaves for the perfumeries at Grasse. *Phlomis fruticosa,* Jerusalum-Sage, a shrubby eastern Mediterranean species of the Mint Family (Labiatae), 2 to 3 feet tall with bright-yellow flowers, is one of the most conspicuous plants that bloom at the Casa Rossa in spring.

A note about the use of olive trees, *Olea europaea:* Throughout the Riviera area these trees are much used on the precipitous slopes to control soil erosion. The abundance of fine roots of this plant effectively control the worst aspects of erosion in places where control would otherwise be difficult or impossible.

Nurseries and Flower Growing on the French Riviera

Nurseries. The nursery trade on the French Riviera is the most extensive in southern France. Here about 50 nurseries operate mostly within the relatively flat coastal region between Cannes and Nice. Most firms manage on a few acres, but around Nice larger firms sometimes operate on 75 acres.

Oleander. Nerium oleander is a floriferous evergreen shrub much used for roadside planting along the coastal areas of the Riviera. At Monaco, for example, oleanders are grown as small street-trees, 10 to 15 feet tall, with single trunks. Flower color varies from pure white to yellowish pink, deep pink, and burgundy-red.

Acacia. In the area surrounding the city of Cannes, about 5,000 people gain a livelihood in growing acacias for the cut-flower market and for the perfumeries at Grasse. Most widely grown are named selections of 3 Australian species, namely *A. decurrens* var. *dealbata, A. baileyana,* and *A. podalyriaefolia.* Cultivars of *A. decurrens* var. *dealbata,* include 'Mireille,' 'Soleil d'Empel,' 'Gaulois,' and 'Mirandole,' all grown for the bright yellow flowers. As foliage plants, *A. podalyriaefolia* 'Denis Boden' and *A. howittii* 'Clair de Lune' are outstanding. The most serious threat to acacia planters is an occasional freeze, such as the

one of February 1956, which nearly wiped out the old established plantings. After such a disaster, 5 years is required for complete recovery of the plants.

Carnations. Carnations are much grown in open-air nurseries and on mountain terraces, mostly between Nice and Cannes. Flowers with split calyces and weak stems are the types most commonly grown, but carnations with such defects apparently are of little concern to French growers or to the public that avidly buys them. Large quantities are shipped daily to the Paris flower stalls and to other parts of France. The main cutting season lasts from early winter until May.

Roses. Roses are grown extensively as a field crop in the area between Cannes and Nice. Hybrid teas are the kinds most commonly cultivated. The well-known rose nursery of Meilland at Cap d'Antibes, covers several acres under glass used for experiments in rose breeding. The Roseraie d'Mielland is the home of the rose 'Peace' and other introductions that have won universal acclaim among rosarians in recent years.

Principality of Monaco

Casino Gardens, Monte Carlo

The subtropical plantings of the Casino gardens, dating from the latter part of the 19th century, are among the oldest on the Riviera. Palms, cacti, water gardens, flowering trees, and large well-kept flower beds in the sunken garden form the principal features of this, the largest public garden of the Principality. Among 25 species of palms are large specimens of the Canary Island Date Palm, *Phoenix canariensis;* the Wild Date Palm, *P. reclinata;* Chilean Wine Palm, *Jubaea chilensis;* and the Queen Palm, *Arecastrum romanzoffianum.* A long avenue of California Fan Palm, *Washingtonia filifera,* with plants 50 feet tall, line both sides of the sunken garden leading to the Casino. Specimens 40 feet tall of *Brachychiton populneum,* a semi-deciduous species of Bottle-Tree from Australia, are planted in long rows parallel with the California Fan Palms. An evergreen Australian species of Bottle-Tree, *B. luridum,* more than 50 feet tall with maroon-colored flowers, is one of the most attractive of flowering trees grown here. Fine specimens, 20 to 25 feet of *Oreopanax capitatus* and *O. dactylifolius,* two evergreen trees mentioned earlier, are among the most handsome of evergreen trees in the Casino gardens. Arborescent cacti, 20 feet tall, are prominently displayed and bougainvilleas scramble to the tops of some of the tallest trees.

Jardin Exotique, Monaco

The Jardin Exotique of Monaco is well known among the succulent gardens of the world. The garden of about two acres was founded in 1913 during the reign of the late Prince Albert I, a beloved and liberal patron of biological sciences. The plantings occupy an extraordinary site on the edge of a jagged and somewhat terraced precipice, 300 to 400 feet above the adjacent Mediterranean shore. Created for spectacular effect, the Jardin Exotique or Exotic Garden, amply fulfills the role of a modern hanging garden. Construction problems and maintenance of the collections bring forth a host of problems unique to this garden. For example, all soil for growing the plants, must be carried in by hand. The large collection of species cultivated is, indeed, of great interest to collectors, but the spectacular setting and the grouping of the plants manifestly is of greater interest to most visitors; over one-half million visitors enter the garden each year.

Giant cacti often overwhelm other features of the garden. For example, 20-foot specimens of *Trichocereus pasacana, Pachycereus marginata,* and *Neobuxbaumia polylopha* are conspicuous among the arborescent species. Arborescent members of the Lily Family, such as *Aloe grantii, A. salmdyckiana,* both African, and *Nolina recurvata* from Mexico, are conspicuous. Specimens three feet tall of the Mexican Barrel-Cactus, *Echinocactus grusonii,* planted in groups, are hardly less striking at close range. Bizarre even among cacti, the Argentine Snake-Cactus, *Trichocereus thelogonus,* winds circuitously over rock ledges. Small growing cacti, such as *Opuntia microdasys* and many species of *Mammillaria* assist in the checkered display in a garden where plant form obviously manifests the leading role.

Succulent members of the Sunflower Family [Compositae] are represented by

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Casino Gardens, Monte Carlo
Oreopanax capitatus, evergreen Mexican tree of the Ivy Family

species of the blue-stemmed *Kleinia* from South Africa which spread to fill small valleys and nooks. Species of *Glottiphyllum, Conophytum,* and *Ruschia* of the Carpet-Weed family (Aizoaceae) form large mats of succulent foliage over rock ledges. The succulent, foot-wide rosettes of *Echeveria gibbiflora,* resembling heads of luxuriant lettuces plastered against bare rock faces, are perhaps the most striking among the various relatives of *Crassula* grown here.

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Cacti in the Jardin Exotique and the rock of Monaco

The preponderance of succulents in the Jardin Exotique is subtly relieved at various points by small pools, caves, and springs for moisture-loving plants, such as *Monstera deliciosa,* African Violets, ferns, peperomias, and philodendrons. A giant plant of *Bougainvillea glabra* 'Sanderiana' covers a pergola and is then allowed to scramble over a rock bank. This latter plant provides a welcome splash of brilliant color in midsummer.

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Echeveria gibbiflora in the Jardin Exotique resemble heads of luxuriant lettuces plastered against bare rock faces

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Silhouetted opuntias against ornamental iron grille Jardin Exotique

Italian Riviera

La Mortola Gardens, Ventimiglia

La Mortola, located near Ventimiglia on the Italian Riviera, is perhaps the best known among the older Riviera gardens. As a monument to its founder, Sir Thomas Hanbury, the garden stands as a gem of the gardeners art. La Mortola dates from 1867, when Hanbury, an English merchant with a fortune made in the Far East, purchased 100 acres on "La Punta della Murtola," so-called for the many native myrtles, *Myrtus communis,* growing there.

His son, Sir Cecil, and Lady Hanbury were largely responsible for the architectural embellishments as found in the garden today. During World War II, the property several times suffered damage, and since that time it has become increasingly difficult to maintain this garden masterpiece on anything like prewar standards.

Horticulturists know La Mortola not only for the large and varied plant collections but also as a garden skillfully designed. Essentially, La Mortola is an English flower garden on an Italian theme. Wide latitude was always allowed in the use of the best in flowers, shrubs, and trees. For many years, an exchange of students with Kew Gardens in England brought a lively academic spirit to La Mortola.

Under Alwin Berger, superintendent of the garden under Sir Thomas, the collections of succulents developed into the most complete of any in Europe, but only the larger kinds of *Aloe, Dasylirion, Euphorbia, Nolina, Opuntia,* and *Yucca* have survived. Conifers, flowering-trees, shrubs, and vines are the most prominent among the plantings nowadays. The finest conifers are trees dating from the early years of the garden. A specimen of *Abies cephalonica,* the Greek Fir, is 120 feet tall. Specimens 50 to 75 feet tall of Lebanon Cedar, *Cedrus libani,* Deodar Cedar, *C. deodara,* and Atlas Cedar, *C. atlantica,* are found in various parts of the garden. Long avenues of Mediterranean Cypress, *Cupressus sempervirens,* many up to 75 feet tall, are among the most impressive plantings at La Mortola. Many old and gnarled specimens of native Aleppo Pines, *Pinus halepensis,* add an aura of sophistication as a backdrop for many of the plantings. Large olive jars, various Roman antiquaries, small amounts of statuary, and skillfully wrought ornamental iron grille gates are used for accent at various points.

The pink-stuccoed villa high above the Mediterranean, now enlarged over the original 14th century Palazzo Orengo, commands a prominent focal point from many vantage points in the garden. Features of interest near the villa include a series of small hedge gardens, called "giardetti" with patios paved in genuine Roman brick, and a small garden with scented foliage-plants located at the foot of a 20-foot brick wall below the monument to Thomas Hanbury. The prostrate-growing Rosemary, *Rosmarinus officinalis* 'Prostratus,' overhangs the wall for nearly its 20-foot height, and *Trachelium caeruleum,* a native campanula relative of the Mediterranean region with corymbs of deep blue flowers, grows from the crevices of the weathered bricks. A bush of Wintersweet, *Chimonanthus praecox,* is planted in one corner of this garden near a plant of Lemon Verbena, *Aloysia triphylla,* known for its tantalizing lemon-scented leaves.

A garden of cycads is of special interest to all who may be aware of the interest these plants command as relics from the geologic past. Included are specimens of *Cycas revoluta, Encephalartos lehmannii, Dioon edule, D. spinulosum,* and *Zamia* spp. In July, *Romneya coulteri,* the Matileja Poppy of California, with white flowers 4 to 6 inches across, makes a striking display against hedges of dark green cypress. Of the bulbous plants flowering in midsummer, long rows of white and blue *Agapanthus* are much in evidence.

Stazione Sperimentale di Floricultura, San Remo

Located in the heart of the commercial flower fields of the Italian Riviera, the Experiment Station for Floriculture at San Remo is the leading institution in Italy for research in flower crops. Since 1925 when the station was founded by Professor Mario Calvino, investigations on flower-crop plants have been of inestimable value to the now thriving horticultural trade of the San Remo district. The Experiment Station is largely a cooperative organization supported by the commercial growers themselves.

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White-flowered Agapanthus planted around a palm trunk
La Mortola Gardens

Since roses and carnations are the leading flower crops of the area, these plants are constantly under investigation by members of the research staff. Research is undertaken on several other crops, such as *Gladiolus, Freesia, Strelitzia, Primula,* and *Pelargonium,* all grown commercially on terraces overlooking the Mediterranean near San Remo.

Under glass some warm climate species are being tested for possible use as house plants. Two plants of the Acanthus Family [Acanthaceae] show promise, *Crossandra nilotica,* a colorful East African plant with dull-green leaves and orange flowers, and *Hypoestes sanguinolenta* with pink-mottled leaves, a showy foliage plant when kept growing vigorously. *Peperomia resedaeflora,* a native of Colombia, is a small plant 5 to 6 inches tall with glistening dark green leaves and white flowers that resemble the mignonette.

Plants of interest in the nursery include *Convolvulus mauritanicus,* a native of North Africa with powder-blue flowers, useful for growing in hanging baskets or on a sunny bank in a mild climate. *Bosea amherstiana* 'Variegata' is a scrambling evergreen shrub of the Amaranth Family [Amaranthaceae] with white-variegated foliage. *Cissus striata,* a grape relative, is a showy climber with dark-green shiny leaves that deserves wider distribution in the United States as a pot plant. A magnificent specimen of *Beaumontia grandiflora,* a Himalayan species with several hundred white flowers the size of Easter lilies, is the most spectacular plant in flower at the Experiment Station in June.

A visit to the flower markets of nearby Ventimiglia and Bordighera to witness the daily pageant of flowers and to listen to the cacophony of auctioneers selling to the highest bidder might be an appropriate finale to an otherwise memorable tour of gardens and horticultural institutions of the Riviera. In these two small towns located in the heart of the San Remo flower-growing district, tons of cut flowers are disposed of daily, except in midsummer, later to appear on the flower stalls all over Italy.

PETER WHITNEY

Yucca aloifolia, the Aloe Yucca

Yucca—A Lily Surrounded by Daggers

ROBERT A. VINES
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The yuccas of the southwest, variously known as Spanish-bayonets, Dagger-plants, Don Quixote's Lance, and Palma Pita, have been called the sentinels of the desert. This title is indeed appropriate as they stand guard in awesome solitude over the vast reaches of mesas, buttes, and desert sands. Their grotesque upraised arms brandish hundreds of dagger-like leaves as they seem to defy man, beast, and Nature herself.

Not until they raise their huge candelabra of radiant, white flowers is this militant aspect softened. By then their beauty is so startling, that even a 70 mile per hour tourist automatically slows to take a second look. In their natural habitat the yuccas serve a useful

Yucca arkansana, Arkansas Yucca

purpose. The poor Mexican peons who live along the dry arroyos cook the flowers like cabbage, and eat the banana-like capsules (*datiles*) of some species. The leaf fibers are tough and are made into twine and rope. Also, his simple folklore has taught him that nothing is better for a rattlesnake bite than to jab a strong leaf spine into the wound. This induces profuse bleeding and the poison is drained away. He also knows that he can wash his clothing with the root of the Soaptree Yucca.

Landscapemen of the southwest sometimes refer to the yuccas as plants with a "dominant accent," meaning that they so completely dominate a garden with a bold sort of rugged beauty that surrounding plants look ineffectual. Rather startling effects can be created by judicious use of these woody evergreens of the Lily Family. They are very often planted to enhance the western atmosphere of ranch, or Spanish type, homes. They appear in much park and street planting in the southwest. The smaller

stemless species make good tub plants for patios and terraces.

The many species of *Yucca* vary considerably and can be used for a variety of purposes. There are stemless dwarfs only a foot or so high, and there are tree-like giants up to 25 or 30 feet high. Some have drooping flaccid leaves, and some stiff dagger-pointed ones. A number have dry, erect fruit which splits open at maturity, and others bear large, pendant, fleshy, indehiscent fruit. The white, or greenish flowers are composed of 3 petals and 3 similar sepals (collectively called tepals), these usually drooping and cup- or bell-shaped. The stamens are six in number, and the shape, size, and color of the pistil is of some importance in the taxonomy of the group. Many species of *Yucca* are dependent upon the yucca moth, *Pronuba yuccasella,* for adequate pollination. In fact, in cultivation, some species bear little or no fruit unless this moth is present. The moth stuffs the pollen into the stigmatic cavity. She then lays her eggs in the ovary, and the young larvae feed on the maturing seeds. Artificial hybrids of the yuccas can be produced easily by hand pollination.

Some Southeastern Yuccas

Although the arid southwest is the natural habitat of the genus, there are some attractive species which are grown in gardens along the eastern half of the Gulf Coast plain, and lower Atlantic Coast plain. The most popular one appears to be the Aloe Yucca, *Yucca aloifolia.* It has a rather dense-leaved stem up to ten feet high, and bears a compact heavy panicle which is quite showy. It is found at its best in sandy or loamy soils from the Texas coast, eastward to Florida, but apparently can survive as far north as Virginia. A number of interesting horticultural varieties of it are known, such as 'Marginata' with yellow-margined leaves, and 'Tricolor,' with yellow and white stripes in the center of the leaf, and yellow leaf margins.

Another noteworthy species of the Gulf Coast is the Curveleaf Yucca, *Yucca recurvifolia.* The rather broad drooping leaves are quite attractive. It raises a leafy stem from 3 to 6 feet high, which is simple or branched, and supports a narrow panicle of white flowers, which are elevated slightly above the leaves. Some of its garden forms are 'Rufocincta', a low plant with reddish brown leaf margins, and 'Tristis,' with blackish purple bracts. The cultivar 'Elegans' has a median reddish stripe on the leaves. Some botanists feel that the Curveleaf Yucca itself is only a variety of the Moundlily Yucca, *Yucca gloriosa,* which is indigenous on the coastal dunes of South Carolina, Georgia, and northeastern Florida. The Moundlily Yucca also has a number of variegated or striped leaf forms.

The Desert Giants

Probably the most magnificent of all the yuccas are the giants of the southwestern deserts. Beginning in central Texas, and the lower Texas coast, they increase in number of species westward to the Pacific. About eleven species are large enough to be classed as trees by the United States Forest Service. The arborescent species most commonly cultivated in Texas gardens is the Trecul Yucca, *Yucca treculeana.* It is rather common in the lower Rio Grande Valley, and in the vicinity of San Antonio. It frequently branches, and each branch may bear a large panicle of beautiful flowers. After crossing the Pecos River westward into the Texas Big Bend country the grandfather of all yuccas can be seen. It is the Carneros Giant Yucca, *Yucca carnerosana.* It is a native of Brewster County, but large specimens have been dug up and replanted along the highways from Sanderson to Alpine. It generally grows on hills from 2700 feet to 6300 feet altitude. It may attain a height of 15 feet or more, with a very symmetrical head of leaves, which are very stout and up to 4½ feet long. The huge lower panicles are raised well above the leaves. The large trunks are used for fences and walls of huts by the Mexican people along the Rio Grande River. To them it is known as the *Palma Salmandoca,* or *Pita Grande.*

Growing in association with the Carneros Giant Yucca is the Torrey Yucca, *Yucca torreyi.* It may be distinguished by its stout and untidy leaves, and the large flower cluster which scarcely raises itself above the level of the top leaves. Compare the plates of the Torrey Yucca and the Carneros Giant Yucca.

A third large *Yucca* of West Texas, New Mexico, and Arizona, is the Soap-

Yucca carnerosana, the Carneros Giant Yucca
A close-up of the large panicle of flowers. The large flower panicle is lifted well above the leaves

tree Yucca, *Yucca elata*. It differs from the Carneros Giant Yucca, and the Torrey Giant Yucca, by having much narrower flattened leaves with the margins bearing filiferous threads. It also tends to have a more slender trunk, and the great length of the flowering scape is particularly noticeable. Going westward from Texas through Arizona, Utah, Nevada, and southern California another famous big-tree *Yucca* is met with. It is the Joshua-tree, *Yucca brevifolia*. It has numerous branches, and is a conspicuous feature of the desert landscape. A forest of these unique trees has been set aside as a National Monument, and attracts many tourists.

Some Dwarf Stemless Species

One of the most attractive stemless yuccas is the Louisiana Yucca, *Yucca louisianensis*, which grows in the sandy

Yucca carnerosana, the Carneros Giant Yucca
Often planted along highways in western Texas

pine lands of western Louisiana and eastern Texas, as far north as Oklahoma and Arkansas. It grows to a height of 4 to 8 feet and the inflorescence and scape are densely pubescent. An interesting feature is the basal rosette of long, slender, thread-margined leaves, which often flex downward at the tips. It is often dug up from the wild, and cultivated in the yards of people living in the sandy pine woods of East Texas.

One of the neatest of the small stemless yuccas of the dry uplands from central Texas to Oklahoma and Arkansas is the Arkansas Yucca, *Yucca arkansana*. The trim, pendant, bell-like flowers are borne in a narrow raceme, the flowering portion of the scape being 1 to 2 feet long. This delicate little *Yucca* prefers chalky or gravelly hillsides, or dry prairies. It is sometimes cultivated in the gardens of the central Texas area.

Some botanists consider it to be very closely related to the Small Soapweed Yucca, *Yucca glauca* of the great plains region.

Horticultural Availability of Yuccas

All of the yuccas may be propagated by seeds, offsets, or cuttings of rhizomes. Some of the more fleshy ones can be started from stem cuttings. Damp sand is generally satisfactory as a rooting medium. Various species are grown in the southwest, but most of the plants are dug up locally and transplanted. The group, as a whole, does best when good drainage is provided, and will not tolerate standing in water.

Forty-two species of *Yucca* are known from the United States. The majority of the species are found in the warmer and dryer areas of the southwest. Texas has eighteen species. About the only ones which can stand severe frost are *Y. baccata, Y. recurvifolia, Y. gloriosa, Y. filamentosa, Y. aloifolia,* and *Y. flaccida*. The last named is probably the only truly hardy *Yucca* in northern horticulture. A good idea about the hardiness of the various species can be obtained by checking each plant's natural distribution in the following list, and then obtaining the local weather records.

Yucca louisianensis Showing an individual plant of the Louisiana Yucca, and close-up views of the inflorescence

The following list of the native species will also give some indication of the soil preferences in their indigenous habitats; however, there may be considerable adjustments made to other soil types when under cultivation. Also the list indicates whether the plant is stemless (acaulescent), or has a pronounced stem (caulescent), in some cases even tree-like:

A List of Native Yuccas

Sandy or Loamy Soils

Aloe Yucca, *Yucca aloifolia*
Tree-like. Often cultivated. On dunes and shell mounds of the Gulf Coast. Texas, Louisiana to Florida, north to North Carolina.

Trecul Yucca, *Y. treculeana*
Tree-like. Coastal and Central Texas.

Curveleaf Yucca, *Y. recurvifolia*
Stemmed or tree-like. Cultivated on the Gulf Coast. On coastal dunes. Louisiana to Georgia.

Moundlily Yucca, *Y. gloriosa*
Short-stemmed or tree-like. On coastal dunes. Florida to North Carolina.

Narrowleaf Yucca, *Y. angustissima*
Stemless, or with a short procumbent stem. Arizona and New Mexico.

Louisiana Yucca, *Y. louisianensis*
Stemless. Western Louisiana, East Texas, Arkansas, Oklahoma.

Freeman Yucca, *Y. freemanii*
Stemless. North-central Texas.

Navajo Yucca, *Y. navajoa*
Stemless. New Mexico and Arizona.

Small Soapweed Yucca, *Y. glauca*
Stemless. West Texas, Oklahoma, Colorado, Montana, the Great Plains.

Plains Yucca, *Y. campestris*
Stemless, or short-stemmed. Sandy South Plains, Texas Panhandle.

Paleleaf Yucca, *Y. pallida*
Stemless. North-central Texas. Usually on black-land prairies, sometimes in sand.

Harriman Yucca, *Y. harrimaniae*
Stemless. Arizona, Utah, Colorado.

Adam's-needle Yucca, *Y. filamentosa*
Stemless, or short-stemmed. Mississippi to Florida, northward to North Carolina.

Small's Yucca, *Y. smalliana*
Stemless. Louisiana east to Florida and north to North Carolina and Tennessee.

Confined Yucca, *Y. confinis*
Stemless. New Mexico, Arizona, on desert flats.

Arizona Yucca, *Y. arizonica*
Stemless, or short-stemmed. On desert flats. Arizona.

Green Yucca, *Y. verdiensis*
Stemless or short-stemmed. Arizona and New Mexico.

Intermediate Yucca, *Y. intermedia*
Stemless, or short-stemmed. New Mexico.

Kanab Yucca, *Y. kanabenis*
Stemless or short-stemmed. Utah and Arizona.

Yucca torreyi, Torry Yucca
Note that the flower panicle is set deeply among the leaves in contrast to the manner in which Yucca carnerosana flowers

Spoonleaf Yucca, *Y. concava*
Stemless, or short-stemmed. Dunes or sandy woods on the Coastal Plain. Georgia to Delaware.

Calcareous, Caliche, or Alkaline Soils; Rocky or With High Mineral Salt Content

Giant Carneros Yucca, *Y. carnerosana*
Tree-like. West Texas, Brewster County. Often planted along highways in West Texas.

Faxon Yucca, *Y. faxoniana*
Tree-like. West Texas, abundant on low hills near Van Horn.

Torrey Yucca, *Y. torreyana*
Tree-like. West Texas, Big Bend area.

Thompson Yucca, *Y. thompsoniana*
Short-stemmed, or tree-like. West Texas and New Mexico.

Beaked Yucca, *Y. rostrata*
Tree-like. West Texas, Brewster County.

Soaptree Yucca, *Y. elata*
Tree-like. West Texas, New Mexico, Arizona.

Schott Yucca, *Y. schottii*
Tree-like. Southern New Mexico and Arizona.

Joshua-tree Yucca, *Y. brevifolia*
Tree-like. Arizona, California, Utah, Nevada.

Buckley Yucca, *Y. constricta*
Stemless, or short-stemmed, often prostrate. Central and southern Texas.

Datil Yucca, *Y. baccata*
Stemless or short-stemmed. West Texas, New Mexico, Arizona, Colorado, Nevada, Utah, California.

Twistleaf Yucca, *Y. rupicola*
Stemless. Central Texas.

Arkansas Yucca, *Y. arkansana*
Stemless. Texas, Louisiana, Arkansas, Oklahoma.

Thornber Yucca, *Y. thornberi*
Stemless or short-stemmed. Arizona, on foothills or mountain slopes.

Schidger Yucca, *Y. schidigera*
Stemless or short-stemmed to 12 feet. California, Arizona, Nevada (Also listed as *Y. mohavensis*).

Whipple Yucca, *Y. whipplei*
Stemless or short-stemmed. On rocky soil. California.

Newberry Yucca, *Y. newberryi*
Stemless. Arizona. Hillsides among granitic rocks.

Peninsula Yucca, *Y. peninsularis*
Stemless. Lower California.

Utah Yucca, *Y. utahensis*
Stemless or with procumbent stems. Utah, northwestern Arizona, on open hillsides.

Standley Yucca, *Y. standleyi*
Stemless or short-stemmed. Arizona, New Mexico, on rocky hills.

Weakleaf Yucca, *Y. flaccida*
Stemless or short-stemmed. Appalachian region. Alabama to North Carolina. Rocky soil.

A few Mexican species have also been introduced along the border and are in the southwest, notably the Elephant Yucca, *Y. elephantipes,* with a swollen base, spineless leaves, and baccate fruit. It is a species of south-central Mexico and reaches large size. It is doubtful, however, if it is very hardy. Another Mexican species, from Coahuila and Tamaulipas, sometimes seen in the border towns in cultivation, is Southern Yucca, *Y. australis.* It becomes quite tall, up to 20 feet, and bears a number of branches.

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Small-leaved evergreen viburnums. Two varieties of Viburnum atrocyaneum (A) from India, (B) from China. (C) V. utile. (D) V. calvum. (E) V. harryanum

Leaves of evergreen viburnums. (A) Viburnum cinnamonifolium. (B) V. davidii. (C) V. coriaceum. (D) V. rigidum. (E) V. propinquum. (F) V. henryi. (G) V. sempervirens. (H) V. propinquum var. parvifolium. (I) V. japonicum

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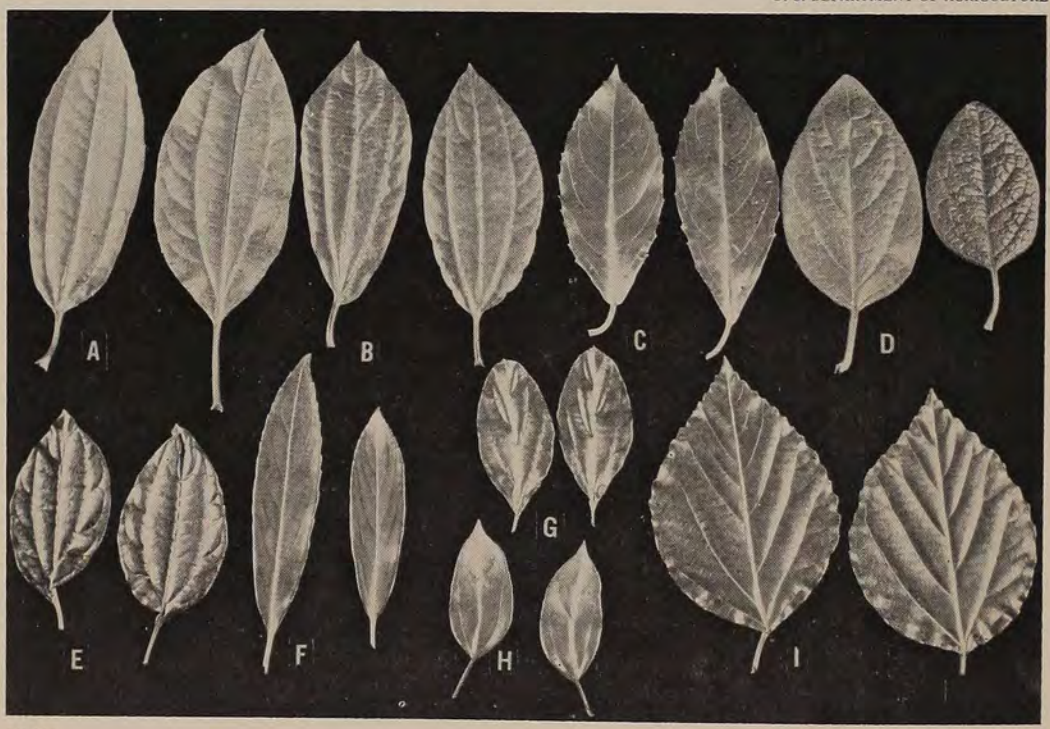

Evergreen Viburnums

Donald R. Egolf[1]

The evergreen viburnums are as ornamental and versatile as the flowering[2] and fruiting[3] viburnums. The term evergreen is often reserved for the conifers such as pines, spruces, and firs that are referred to in a broad sense as narrow-leaved evergreens. There also are broad-leaved evergreens such as rhododendron, mountain laurel, and holly, which are just as evergreen as pines, spruces, and firs. By definition an evergreen is any plant remaining green in its dormant season. Among the diverse viburnums are a number of species that are true evergreens and others that display a gradation of the evergreen characteristic and may be classed semi-evergreen. In this article evergreen species cultivated as ornamentals are emphasized.

Culture

The evergreen viburnums require protection from wind, deep, rich, loamy soil, moisture, and partial shade. The cultural procedures will differ little from those for deciduous viburnums. In establishing a planting, consideration should be given to exposure and soil. As to be expected species like *Viburnum rhytidophyllum* and *V. utile* are hardier than *V. odoratissimum, V. propinquum,* and *V. rigidum* and can be successfully grown at more northern latitudes. Only exceptional specimens will thrive north of Zone 6.[4] Unless a plant is in a north exposure, near a building, within an enclosed patio, or protected by surrounding plants or windbreak, it is quite unlikely to become established in another climatic zone. Should such a microclimatic niche be available, however, the gardener should accept the challenge and plant an evergreen viburnum.

Regardless of geographic location all evergreen viburnums benefit from a windbreak and partial shade. An evergreen has foliage throughout the year and continuous transpiration causes loss of water from the plant. During the winter loss of water from the leaves may exceed water uptake by roots from soil and foliage consequently becomes dessicated. No plant can look more dejected and disreputable than a brown, partially defoliated, wind-swept viburnum. A plant on a north exposure and protected by shade will be exposed to less sunshine with the result that less water is lost through the foliage and drying will be much less frequent. A carefully selected planting site, such as the north side of a building or woodland slope will be ideal. Of course, in more temperate areas the exposure is less important. If a north exposure is unavailable, protection can be obtained from a burlap or lath screen erected about the plant during the winter.

The evergreen species tolerate a wide range of soil types, but thrive best on a slightly acid soil, pH 5.5-6.5, that contains abundant organic matter. A moist well-drained soil is preferred. A heavy mulch of sawdust, shavings, peat, or other similar material, will conserve moisture and promote a fibrous root system.

Plants may be transplanted any month of the year provided the necessary precautions are taken to prevent drying. Bare-root plants can be planted in late fall or early spring, but balled-and-burlapped plants will give the best results. Balled-and-burlapped plants moved during the summer demand an adequate moisture supply and light shade until established. A wilt-proof spray applied to the foliage, before transplanting, will be beneficial. A mulch will retain moisture and provide protection from freezing and heaving.

As the general culture and propagation of the evergreen viburnums are not significantly different from those of other viburnums, the reader is referred to the discussion of viburnum culture in the October 1962 issue of *The American Horticultural Magazine.* Species such as

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[2] See Ornamental Deciduous Flowering Viburnums, *Amer. Hort. Mag.,* July 1962.

[3] See Ornamental Fruiting and Autumnal Foliage Viburnums, *Amer. Hort. Mag.,* Oct. 1962.

[4] Hardiness zones for the species described in the text are given in parentheses after the species names, and are in accordance with the scheme outlined in the *Plant Hardiness Zone Map,* U. S. Dept. Agr. Misc. Publ. 814. See *Amer. Hort. Mag.,* Oct. 1960. A suffix b with the hardiness zone indicates that the plant is hardy only in the warmer parts of the zone.

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Viburnum cinnamomifolium, the Cinnamon Leaf Viburnum, with deeply 3-veined, coriaceous, leaves has the same characteristics as V. davidii, but may grow to a small tree 20 feet high.

The compact Viburnum davidii, David Viburnum, with leathery, 3-veined leaves, and metallic-blue fruits, is a select shrub for rock gardens, or foreground specimens in the woodland

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V. atrocyaneum, V. davidii, V. odoratissimum, V. propinquum, V. sempervirens, V. suspensum, and *V. tinus* are suitable for pot culture. Lack of proper conditions and garden facilities may prohibit the growth of outdoor specimen plants, but a specimen in a container can provide the needed garden focal point. A 10- to 18-inch container will accommodate a 3- to 4-foot plant. A good potting soil containing loam, sand, and peat will produce luxuriant growth if occasionally supplemented with a balanced fertilizer, such as 5-10-5.

A container-grown plant can be readily trained as a bonsai, a formal pyramid, or a naturalistic shrub. Pinching the terminal buds induces branching, and produces a dense-foliage plant. Pinching will promote a greater number of flower buds, which will make the plant in flower and fruit more spectacular. Since many of the species set flower buds in late summer and fall, little or no pruning should be done after mid-July. Container-grown plants can be carried over the severe weather in a cool basement or garage. A plant of *V. tinus* brought into a cool greenhouse in January or February will flower in about four weeks and be a choice pot plant. In a cool room a flowering plant will continue to bloom for three weeks, but in a dry, heated atmosphere it will drop flowers within a few days. A few container-grown evergreen viburnums could greatly enlighten the atmosphere of a patio.

The evergreen viburnums offer many possibilities for utilization in the landscape. The low-growing *V. davidii, V. atrocyaneum,* and *V. harryanum* are adaptable for foreground plantings or rock gardens. Specimen shrubs of medium or tall stature can be selected from such species as *V. cinnamomifolium, V. henryi, V. odoratissimum, V. propinquum, V. rhytidophyllum, V. suspensum, V. tinus,* and *V. utile.* The combination of foliage and plant textures can compliment and accent the landscape in many pleasing patterns. The evergreen viburnums tolerate pruning, and species such as *V. tinus, V. odoratissimum,* and *V. rhytidophyllum,* can be trained as dense hedges and screens. A few evergreen viburnums combined with deciduous species can compliment the autumnal fruit and foliage display, as well as brighten the landscape during the bleak winter months. Among the many and varied viburnums is one to qualify for most landscape requirements.

Species and Cultivars

Although this discussion concerns the evergreen viburnums it is necessary to comment on a few borderline species, because in the North a plant may be entirely deciduous, at an intermediate point semi-evergreen, or in another environment nearly evergreen. Four species in this category are *V. buddleifolium* Wright (6), *V.* × *burkwoodii* Burk. & Skip. (5b), *V. foetidum* Wall. (8), and *V. macrocephalum* Fort. (7). The velvety, green leaves of a 6- to 8-foot high *V. buddleifolium* produce a globose specimen that is not very hardy in the Northeast, but will grow well south of Baltimore, Maryland. The glossy, rich, dark-green leaves of *V.* × *burkwoodii* persist on the plant in the South and only the older leaves become orange to crimson before being defoliated. In northern areas previous to total defoliation, the orange and crimson foliage highlights the autumnal landscape. *V. foetidum* is a handsome shrub with scarlet fruits but rather tender. The plant is more often semi-evergreen than evergreen, but during a mild winter many leaves may persist only to be shed before the buds break and new leaves are produced. The large-flowered Chinese Snowball, *V. macrocephalum,* in areas north of Washington, D. C., will be deciduous, but in milder zones will be semi-evergreen.

Although it might appear that the evergreen foliage is the prime attribute of evergreen viburnums, it would be erroneous to minimize the ornamental characteristics of flower, fruit, and growth habit. Representatives among the evergreen viburnums combine effective flower display, brilliant fruit, and compact growth habit with luxuriant foliage characteristics. Species that are entirely evergreen will be considered in detail, as follows in alphabetical sequence:

V. atrocyaneum Clarke (8) is a Himalayan, fine-textured plant resembling boxwood. A mature plant may attain a height of 10 feet but more often the plant will be seen as a specimen 3 to 4 feet tall. The glabrous, oblong leaves,

2 inches long, are tinted maroon during cool weather. The white flowers are sparsely borne in terminal cymes. The mature steely blue-black fruits are ellipsoidal and very smooth. It is hardy only in extremely mild areas, such as those south of Norfolk, Virginia.

V. calvum Rehd. (7b), a native of western China, and one of the rarest evergreen viburnums, has ornamental characteristics. The only cultivated plants located by the author were grown at the Royal Botanic Garden, Edinburgh and at the nursery of Hillier and Sons, Winchester, England. The Royal Botanic Garden specimen is less than 4 feet tall. The elliptic leaves, 1½- to 3-inch long, acuminate at the tip, cuneate at the base, are dull gray-green above and pale green beneath. In early May all terminal shoots bear cymes 2 to 3 inches in diameter of greenish-white flowers. The fruit matures to blue-black. The fine-textured foliage and compact growth combine to provide a low ornamental plant for the shrub border.

E. H. Wilson introduced *V. cinnamomifolium* Rehd. (7b), Cinnamon Leaf Viburnum, from China in 1904. A specimen plant may be seen as a large shrub or a tree 20 feet high. The dark reddish-brown branches are covered with prominent lenticels. The glabrous, coriaceous, elliptic-oblong, long acuminate, cuneate leaves have a few small teeth toward the apex and are conspicuously three-veined. The terminal inflorescences, up to 7 inches in diameter, are composed of many small white flowers in April. The ovoid fruits are a lustrous blue-black. It has similar foliage to *V. davidii* and resembles a large, broad-leaved rhododendron.

V. coriaceum Bl. (7b) is native of China, Yunnan, India, and Java at elevations up to six thousand feet. In cultivation specimens seldom exceed 15 feet tall, but in native habitats a height of 40-50 feet is not uncommon. The species was introduced from India to Kew in 1881. The warty branches bear 3- to 8-inch long, oblong to obovate leaves, which are acuminate and cuneate or rounded at the base. The leaves somewhat resemble those of *Aucuba;* however, the upper surface is dark dull green and covered with a thin, waxy layer that turns gray when the leaf is bent. This waxy layer permits one to autograph the plant with a pencil. The white flowers, about 1/5 inch long, are produced in cymes 3 to 5 inches across during mid-summer. From each tubular flower protrude the lilac anthers, which are numerous enough to give the inflorescence a lilac cast. At no time are the fruits striking as the clusters mature from green to a dull black. It is a large rather coarse growing, multiple-stemmed plant useful for background or screen planting. The synonym for this species is *V. cylindricum* Ham. ex Don.

The low, compact *V. davidii* Franch (7b), David Viburnum, 2 to 3 feet tall, provides the landscape architect with one of the most adaptable evergreen viburnums. Armand David discovered this species at Mupin, Western Szechuan, China in 1869, but it was not until 1904 that the plant was introduced by E. H. Wilson. The deeply three-veined, leathery, rugose, dark green, 2- to 6-inch long leaves, are narrowly oval to slightly obovate, and approximate those of *V. cinnamomifolium.* The leaves often are obscurely or shallowly toothed near the apex and are glabrous on both surfaces except for small tufts in the vein-axils beneath. The densely crowded, 1/3-inch-diameter flowers compose a stiff cyme 2 to 3 inches in diameter. Since certain plants tend to be dioecious, that is staminate and pistillate flowers on different plants, a small colony of several plants will insure cross pollination. The clone *V. davidii* 'Foemina' is a plant that has predominately female flowers and fruits heavily. The numerous dull-white flowers in May and June are followed by small fruits of a bright turquoise blue with a metallic sheen. The fruits are often hidden by the vigorous young foliage but the vivid color shows through. To be effective the plant should be planted near a walkway where it can be closely observed as the blue fruits and green foliage provide poor contrast and are not noticeable at any great distance. The fruit will persist on the plant for six months to a year unless discovered by some cunning bird. The David Viburnum is a select plant for foreground planting among rhododendrons and azaleas, adaptable to the rock garden, and suitable for containers. Unless given some shade and protection it will not be luxuriant. Likewise, the plant will respond to a humid atmosphere and will not tolerate heat and drought. Even though it may have more rigid environmental requirements than most other

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The panicles of Viburnum henryi, the Henry Viburnum, are held above the foliage and well display the white flowers in May and the coral-red fruits in September

The luxuriant, dark-green foliage of Viburnum japonicum, the Japanese Viburnum, provides a sharp contrast for the glossy, scarlet fruits during autumn and winter

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species, it rates high among ornamental viburnums and should be more widely planted.

In 1904, when on his second journey for the Veitch Nurseries, E. H. Wilson discovered *V. harryanum* Rehd. (8) in western China. The plant was named in honor of Sir Harry Veitch. The species is a bushy shrub 6 to 8 feet high. The privet-like, 1-inch-long leaves are glabrous, orbicular-ovate or obovate, obtuse at apex, broad cuneate at base, margins entire or with a few teeth, are dull green above and paler beneath. The 1- to 1½-inch-diameter terminal cymes of white flowers are freely produced. The ovoid black fruits are inconspicuous among the green foliage. It is a rare evergreen and is distinct from all other cultivated viburnums.

V. henryi Hemsl. (7), Henry Viburnum, was first reported from the Patung district of Hupeh in central China by Augustine Henry in 1887 and was introduced into cultivation in 1901 by E. H. Wilson. It has a somewhat stiff, open-branched trunk up to 10 feet high, which develops into a rounded bush or small tree. The plant is usually classed an evergreen, but during severe winters it has been known to shed all leaves. The decorative, narrowly elliptic-oblong to oblong-obovate, 2 to 5 inches long, acuminate at the tip, cuneate to rounded at the base and shallowly toothed leaves are dark shining green above and paler beneath. The stiff, pyramidal panicles, 2 to 4 inches long, are covered with flowers ¼ inch in diameter in May. The coral-red fruits retain color for a few weeks in late summer before they turn black. The plant is distinct and striking on account of the paniculate inflorescence, which is similar to that of the deciduous *V. sieboldii* or *V. fragrans*. It provides a tall upright shrub for accent planting or a background specimen in the shrub border.

A chance cross between *V. erubescens* and *V. henryi* at Hillier and Sons Nursery, Winchester, England, in 1950 produced *V.* × *hillieri* Stern 'Winton' (7). The hybrid is intermediate between the parents. The wide-spreading shrub has dark green foliage and grows 6 feet high. It is evergreen at least during mild winters. The persistent leaves are copper tinted in summer and bronze red in winter. The cream-colored panicles of flowers in late May are followed by fruits that ripen from red to black. It was given an Award of Merit by the Royal Horticultural Society in 1956.

In 1859 *V. japonicum* (Thunb.) Spreng. (7), (Syn. *V. macrophyllum* Bl.), the Japanese Viburnum, was introduced from Japan. It is an upright-glabrous shrub, up to 6 feet high and one of the hardiest evergreen species. The winter buds are covered by red-brown scales. The broad- or rhombic-ovate, 3- to 6-inch, acute, broadly cuneate, remotely and shallowly dentate above middle, glabrous, dark-lustrous-green leaves are abundantly borne on the glabrous branches. The fragrant white flowers are produced in short-stalked cymes, up to 4 inches in diameter. The bright red fruits, resembling those of *V. dilatatum*, form a pleasing contrast to the lush green leaves in the autumn sunshine. The species will thrive in sun or partial shade but is at its best in woodland. This first rate ornamental which is practically unknown in this country, is not the plant sold as *"V. japonicum"* by most nurserymen. That plant is a variation of *V. odoratissimum* with heavy leathery leaves. A plant of true *V. japonicum* is a must for any viburnum collection or landscape planting.

A plant of *V. odoratissimum* Ker-Gawl. (8), Sweet Viburnum, will grow 10 to 25 feet high depending on the environment. It is native of Japan, China, and India and was introduced about 1818. Plants of this species have withstood winters in the Washington, D. C., area but it is not a foolproof hardy plant as it will be injured, particularly the current season's growth, during a severe winter. The stout, dark, red-brown branches are well clothed with heavy coriaceous leaves, which resemble those of a broad-leaved rhododendron and are just as handsome. The elliptic-oblong, 3- to 6-inch long, acute, remotely serrate toward the apex, obtuse or rounded base leaves are bright glossy green above and paler beneath. The fragrant, pure-white flowers are produced in stalked, broadly pyramidal panicles, 3 to 6 inches high, and 2½ to 5 inches wide in late May. The pendant clusters of red fruits, which ripen to black, are soon devoured by birds. Great diversity of form occurs in native populations of this species. Several types have been recognized by Japanese botanists,

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Dark, glossy-green, thick coriaceous leaves of Viburnum odoratissimum closely resemble those of broad-leaved Rhododendron

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The inflorescence on the second type of V. odoratissimum has medium green, thin-textured leaves and a panicle of fragrant-white flowers, succeeded by red fruits that ripen to black

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The widely cultivated Leatherleaf Viburnum, V. rhytidophyllum, has deeply rugose leaves and cream-white flowers in large inflorescences

The ovate-lanceolate, 3-veined leaves of Virburnum propinquum are bronze when unfolding but are glossy green above and paler beneath at maturity

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but these have not been available for critical study that might resolve the somewhat confused complex. Two distinct forms, one a medium-textured, pale green leaf type and the other the heavy leathery, dark glossy-green leaf type, which is similar to *V. awabuki* Nakai, are grown in many southern nurseries. The last-mentioned type may be sold as *"V. macrophyllum"* or *"V. japonicum."* The species is a choice bold-textured plant for specimen or screen planting. *V. odoratissimum* 'Variegatum,' which has leaves mottled with white, is used as a potted plant in Japan.

The bushy *V. propinquum* Hemsl. (8), native to central and western China, was discovered by Augustine Henry and introduced by E. H. Wilson in 1901. The small winter buds, covered by two pointed scales are borne on the reddish-brown, lustrous branches that are marked by small prominent lenticels. The ovate-lanceolate, 2- to 3½-inch long, 3-veined, acuminate, broad cuneate, remotely denticulate leaves are bronze when unfolding but become glossy dark green above and paler beneath at maturity. The handsome evergreen foliage of this compact plant is covered in May with cymes of insignificant greenish white flowers, ¼ inch in diameter. The egg-shaped fruits are glossy blue-black and not of great ornamental merit. The exceptional fine-textured foliage can be effectively combined with other evergreen or deciduous shrubs in the border. The small-leafed form, *V. propinquum* var. *parvifolium* Graebn. (8), has finer textured foliage and a denser growth habit.

V. rhytidophyllum Hemsl. (6), Leatherleaf Viburnum, is another native of central and western China introduced by E. H. Wilson in 1900. The stout upright branches and naked buds are gray with stellate-tomentum. It is a noble pyramidal to round-topped plant, up to 10 feet high with bold, textured, dark, almost evergreen foliage, which droops and curls during cold weather. In cold areas winter winds often damage the leaves and the replacement leaves are very late budding out in the spring so that for several months the plant has a very untidy, ragged appearance. For perfection the plant must be planted in good soil and in a sheltered position away from bleak, windswept locations and drought. Plants will flourish as far north as Boston, Massachusetts, but will be more luxuriant in areas south of Baltimore, Maryand. The ovate-oblong to ovate-lanceolate, acute, sub-cordate or rounded at base, entire or obscurely denticulate, 3- to 10-inch long leaves are dark green, glabrous, and rugose on the upper surface and the undersurface reticulate and covered with thick gray or yellowish stellate-tomentum. The yellowish-white, ¼-inch diameter flowers develop on cymes 4 to 8 inches in diameter, that were initiated the previous summer and remained as exposed naked terminal buds all winter before expanding in mid-May. The dull and not particularly attractive flowers are succeeded by scarlet fruits, blackening as they ripen in September.

Nurserymen commonly propagate *V. rhytidophyllum* from seed. From the great diversity of the resultant seedlings a number of distinct types have arisen; some have small leaves little more than 3 inches long while others have leaves 15 or more inches long. Although these individual variations exist, little attempt has been made to propagate them asexually. *V. rhytidophyllum* 'Aldenham' (6) is a choice plant with luxuriant foliage, discovered at Aldenham House, Elmstree, England. The pink-budded *V. rhytidophyllum* f. *roseum* (Gard. Chron.) Rehd. (6) has buds that are a medium pink, but by the time the flower has fully expanded the color is near the typical cream-white of *V. rhytidophyllum. V. rhytidophyllum f. aureovariegatum* Boom has leaves variegated with white and pale yellow. A young plant has many variegated leaves, but as the plant matures the proportion of variegation decreases and the plant may be entirely green. One of the finest abundant-fruiting forms is grown at Crathes Castle, Scotland. Plants of the species which are valued for the evergreen foliage and brief but spectacular fruit display, serve as fine accent specimens or dense large hedges.

Two hybrids, *V.* × *rhytidocarpum* and *V.* × *rhytidophylloides,* have many of the characteristics of *V. rhytidophyllum. V.* × *rhytidocarpum* Lemn. (6), produced about 1936 from a cross between *V. buddleifolium* and *V. rhytidophyllum,* is an inferior plant that has characteristics intermediate between those of the parents. *V.* × *rhytidophylloides* Suring. (6), a cross between *V. rhytidophyllum* and *V. lantana* made in the

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The dense, oval leaves of Viburnum suspensum, the Sandankwa Viburnum, produce a compact plant that is a suitable container-grown specimen for patio or cool greenhouse

Netherlands and in the United States, has produced hybrids of identical form.

V. × *rhytidophylloides* 'Holland' was in cultivation in 1927. Henry Tubbs of Willowwood Farm, Gladstone, New Jersey, made the cross about 1928 in an attempt to recombine the evergreen foliage of *V. rhytidophyllum* with a particular fine plant of *V. lantana*. *V.* × *rhytidophylloides* 'Willowwood' shows no winter injury and opens flowers virtually every month of the growing season. A mature plant 8 to 10 feet high will be as wide and have wide arching branches. The elliptic-ovate, 4- to 8-inch long leaves are similar to those of *V. rhytidophyllum* but broader, less wrinkled, and semi-evergreen, persisting well into the winter. The cream-white flowers of late May are succeeded by small clusters of red fruits that ripen to black. *V.* × *rhytidophylloides* is a hardier plant which should be substituted for *V. rhytidophyllum* in northern areas.

A more recent hybrid, *V.* × *pragense* Hajek & Krouman (*V. rhytidophyllum* × *V. utile*), is a more refined plant that should be a valuable landscape addition. The hardiness range is unknown, but can be predicted to be hardy in Zone 6. The cross was made at the Prague Municipal Gardens, Prague, Czechoslovakia. The plant is slightly larger than *V. utile* from which it inherited the arching branches and the glossy upper leaf surface. From *V. rhytidophyllum* the plant inherited larger leaves, 2 to 4 inches long, rugose upper surface, the felt-like lower surface, and frost resistance. The flower clusters are smaller than those of *V. rhytidophyllum*.

The dwarf, loosely branched *V. rigidum* Vent. (9) (*V. rugosum* Per.) is closely allied to *V. tinus*. Plants were introduced from the Canary Islands in 1778. It is less hardy than *V. tinus* and suitable for culture only in temperate regions. The bushy plant, 6 to 10 feet high and as wide has the branches, young shoots, and leaves covered with prominent black pubescence. The ovate, entire, acute, cuneate, 2- to 6-inch long leaves are dull green, roughened, and densely hairy beneath. The 3- to 4-inch diameter inflorescence is composed of numerous white flowers in March and April. The egg-shaped fruits are blue-black. This species is a poor substitute for ornamental forms of *V. tinus* and is primarily an evergreen foliage plant for conservatory or temperate zone culture.

From China the tender, low-growing *V. sempervirens* Koch (9) has been introduced. The glabrous, grayish brown branches become reddish brown during the second year. The elliptic to elliptic-ovate, acute, cuneate, distinctly 3-nerved, 2- to 3½-inch long leaves are glabrous, light green with minute black glands beneath. The inflorescence of small white flowers is followed by ovoid red fruits. The species is a suitable container plant but will succeed outdoors only in mild regions.

V. suspensum Lindl. (9) (*V. sandankwa* Hassk.) Sandankwa Viburnum, is native to the Liu-kiu Islands of southern Japan. The dark, brown branches are covered with numerous warty lenticels. The oval to oval-oblong, 2- to 4-inch long, crenate-serrate leaves are dark green above and paler beneath. The fragrant, waxy, cylindrical ⅜-inch long flowers, are clustered in a dense semi-globose panicle 2 to 4 inches long. The inflorescences, secluded by the terminal leaf growth and borne somewhat on the underside of the branches, are not spectacular unless seen closeup, but the fragrance well indicates that the shrub is in flower. The globose, pale-rose fruits persist for only a few weeks. It can be espaliered against a wall, grown as a specimen plant, or trained into a dense hedge. White fly and rust, which can disfigure plants, can readily be controlled by sprays.

The Mediterranean *V. tinus* L. (7b), Laurustinus Viburnum, is indispensable for southern gardens. A much-branched, compact specimen may grow as tall as 12 feet, but more commonly plants are 6 to 8 feet tall. Although the diameter of the plant may be greater than the height, the dense foliage canopy will extend to ground level. The ovate-oblong, entire and usually revolute margins, pubescent on the veins, 2- to 3-inch long leaves are dark glossy green above and paler beneath with tufts of down in the lower leaf-axils. The ¼-inch diameter, white or pale-pink-tinted flowers are densely crowded in a cyme 2 to 4 inches in diameter. Often the flowers will open in the autumn or during mild periods in winter. It is not uncommon in the north for the flower buds to turn brown and not open because of winter freezing. The ovoid, tapering toward the top, metallic-blue fruits often persist on the

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The many pink buds of Viburnum tinus, the Laurustinus Viburnum, open to waxy-white blooms during the autumn, mild winter periods, and in the spring

The metallic-blue fruits of V. tinus are well displayed in terminal cymes and persist on the plant for several months

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plant until the next flowering season. Laurustinus Viburnum will thrive in moderate shade, but will flower more freely when in sun at least part of the day. In full sun the foliage may become scorched and unsightly. White fly infestations are often severe.

This species is widely cultivated in Europe and temperate areas of the world, but does not thrive north of Washington, D. C. Often the plant will layer and thus increase to a mound of intertwined plants. Likewise, seedlings will often appear in a mass planting. It provides a specimen for the large shrub border, withstands heavy shearing for a dense hedge, and is adapted to container culture.

From chance seedlings several noteworthy cultivar selections have been made. The shoots, the flower stalks, and the bases of the leaves of variety *hirtulum* Ait. are clothed with bristly hairs. The leaves are somewhat larger and the plant less hardy. Plants of variety *lucidum* Ait. are more open and stronger growing. The larger flower trusses and pale-green leaves are ornamental, but the plants are less hardy than *V. tinus*. 'Purpureum' has purplish-tinted foliage and flower buds. 'Strictum' is a narrow, upright cultivar that is supposedly freer flowering and fruiting. 'Robustum' is a strongly upright selection reported resistant to mildew. Foliage of 'Variegatum' is mottled with white and pale yellow. 'French White' has large lacy white flowers that force well in the greenhouse. 'Exbury' is a vigorous seedling with young red shoots and larger, pink-budded, flower trusses. 'Eve Price' has flowers that are deep pink in bud and open to nearly white. A densely leafy selection with large leaves was raised from seed collected in Algiers and is grown in the garden of Sir Frederick Stern, Goring-by-Sea, Sussex, England. George Jackman and Son Nurseries, Woking, Surrey, England, have propagated a broadly dense selection that has dark pink flower buds.

The last but not the least significant, *V. utile* Hemsl. (6), Service Viburnum, has many ornamental qualities that have escaped notice of even alert gardeners. This is one of the parental species of *V.* × *burkwoodii*, *V.* × *burkwoodii* 'Park Farm Hybrid,' and *V.* × *pragense*. Although it was discovered by Thomas Walters near Ichang, China, in 1879, introduction by E. H. Wilson was not until 1901. Specimen plants that exceed 5 feet in height are seldom seen. The ovate to oblong, 1- to 3-inch long, ¼- to 1¼-inch wide, obtuse, broad cuneate or rounded entire leaves are shining dark green above and whitish with stellate tomentum beneath. The white, waxy, 1/3-inch diameter flowers are densely packed in stellate-pubescent cymes, 3 inches in diameter in late April. The oval blue-black fruits mature in late summer. The species, which is less demanding as to exposure and soil than many other overgreen species, is one of the hardiest. A specimen with slender arching branches, lustrous-green foliage, waxy-white flowers, and fine-textured growth can accentuate any landscape planting.

From the diversity of evergreen species with select foliage, flower or fruit characteristics many selections could be made that would be equally effective in the landscape. To assist the home gardener with little space, the following species are recommended: *V. davidii* (7b), *V. henryi* (7), *V. japonicum* (7), *V. odoratissimum* (8), *V. rhytidophyllum* (6), *V.* × *rhytidophylloides* (6), *V. suspensum* (9), *V. tinus* (7b), and *V. utile* (6).

A Book or Two

The study of Flowers made simple

William C. Grimm, Jr. Doubleday and Company, 575 Madison Avenue, New York 22, New York. 1962. viii + 152 pages. Illustrated. $1.45 (paperback). (Library).

The paper-back volume, "The Study of Flowers Made Simple" presents to lay leaders a popular subject in a series of "Made Simple" books. The publishers argue the need to tell the story of flowers to readers of all ages in an effort to open a whole new world of pleasure and lore about the land and life around us. Certainly there are laudable objectives, which deserve considerably more coverage than they now enjoy. The methods of achieving these aims are not so clearly defined as might be suggested by the title of the present book. Nothing in nature is ever really simple. I believe it is a mistake to convey to young or old the idea of utter simplicity in nature. Simplicity is relative, for after some experience even the most complicated phenomena become less and less complex. The often repeated maxim of Louis Agassiz "study nature, not books" is still so true. But beginners and others do need books, books that cause the reader to yearn to know and learn more. The study of flowers (horticulture in the sense of this book) and botany is not easy to treat in a text; it seems to be even more difficult to treat on a how-to-do-it basis. An elementary book on botany must paint a picture and at the same time convey an image on the subject. I wish the present volume had done this. If the book fails at all, it is in terms of over simplification. Facts cannot be eliminated, but they make dull reading when presented in staccato-like fashion.

But there are good features about the book. All technical words are spelled phonetically; it seems hardly necessary, though, to labor the word "multiple" for multiple fruit. A useful glossary is included. The text is illustrated by line drawings, but not copiously so. Unfortunately, some of the illustrations look like something taken out of an incunabulum, as for instance, the drawing of a hummingbird pollinating a trumpet creeper flower on page 15. Perhaps the book could be used by a teacher for nature or other field courses in botany, but the text is not fully developed for this purpose.

Keys that one would expect for identification are not a part of the book. This lack seems unfortunate, since in the words of the publishers, The Study of Flowers Made Simple "serves as a field guide, a helpful manual that quickly teaches you to identify hundreds of wild and cultivated flowers, plants that may already be growing in your garden or in the nearest park or in the fields and woods near home." The novice will not be able to use the book to identify unknown plants. Keys are necessary for this.

The second aim of the book is to "provide a sound introduction to botany, the science of the plant kingdom." Had the book achieved its objectives, it might quickly have become a best seller in the natural history field, because botany and horticulture are among the most popular subjects. Flowers are constant companions of everyone from earliest childhood. Is there any subject more romantic, beautiful, or fact-seeking than the study of plants? Perhaps we need to weave a modern series of botany books written in the vein of the now classic animal stories written by Jean Henry Fabre a century ago. Certainly these were simple stories. The world of plant science might profit by such handling.

FREDERICK G. MEYER

The Camellia Book

John L. Threlkeld. D. van Nostrand Company, Inc. Prince, N. J. 1962. 204 pages, illustrated, in color, black and white and line. $7.75. (Library).

The author, writing from California seems to have been keenly aware of the fact that he needed to consider many other factors than might seem important to him there and he has done an excellent job in writing for the whole country, including the newer and still somewhat dubious extensions of the "camellia belt" which may or may not be permanent.

The organization of the book is clear and excellent and the presentation in the text covers all the important things that a newcomer should know, as well as the matters that will concern the advanced amateur, the breeder and the inevitable persons interested only in showing, whether in the horticultural sections or among the arrangers! The path taken seems to be the safe middle road.

There is a splended amount of last minute data incorporated in the text, and there are useful indices and appendices. The reviewer feels certain, however, that Mr. Tom Clower and not himself should have been mentioned as the important person for Mississippi on the Gulf Coast.

The only regret the reviewer has to report is that there really is no good reason for the half tone reproductions illustrating types of bloom, species, etc., should have been placed sideways on the page. They take precisely the same space as the color plates later on that are properly spaced, and to look and then read after turning the book, is inexcusable.

B. Y. Morrison

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

American Rose Annual, 1962

L. G. McLean, Editor. American Rose Society, 4048 Roselea Place, Columbus 14, Ohio. 1962. 202 pages. Illustrated. $4.50. (Library).

The annual Annual of a most important flower society contains articles of general interest on the rose and its culture such as those on soils, water, the roots and leaves, and general culture. Other general interest articles concern the types or kinds of roses as the floribundas, the miniatures, and sweetbriars. Several articles discuss grower experiences in such diverse areas as New England, Florida and Alaska.

Probably of most lasting quality are those chapters that report study and research on the problems of rose culture and development. They are the ones which contribute to our better understanding of all aspects of the rose.

The serious student of roses will appreciate the study on rose fragrance; the evaluation of *Rosa laxa* as a source of hardiness in breeding; the discussion on rootstocks; the reports on seed production; and foliar feeding as well as reports on root rot and virus diseases. Each has been written by a person who has been studying the problem, and they are of more than passing interest.

CONRAD B. LINK

Flowers-by-Wire

The Story of the Florists' Telegraph Delivery Association.

Marc Williams. Mercury House, 200 Lafayette Building, Detroit 26, Michigan. 1960. 430 pages. Illustrated. $5.00. (Library).

A history of a unique organization, The Florists Telegraph Delivery Association, for the sending of flowers by wire. This is an account of its organization in 1910 and its growth and development to the 50th anniversary in 1960. In cooperation with British and European organizations, it now provides such service over most of the world.

Weed Control: As A Science

Glenn C. Klingman. John Wiley and Sons, Inc., 440 Park Avenue, South, New York 16, New York. 1961. x+422 pages. Illustrated. $8.50. (Library).

Weed control is one of the fastest growing scientific disciplines in the biological and agricultural sciences. This well organized and well written book contains valuable and useful information on principles of weed control and the latest information on cultural, mechanical, biological, chemical, and combination methods of weed control. These subjects have been correctly, concisely, and carefully presented to enhance maximum comprehension with minimum reading time.

The book contains 24 chapters which are organized into three parts: The first part establishes important scientific principles in weed control, including discussions of such topics as weed losses; methods by which weeds spread; seed dormancy; seed viability; the penetration, absorption, and translocation of herbicides; mechanisms of herbicidal action; metabolism of herbicides in plants and their behavior in soils. Emphasis is also given to physiological responses of plants to herbicides, wetting agents, emulsifiers, spreaders, and stickers, various chemical formulations, the importance of herbicide volatility in weed control, and application equipment.

The second part of the book contains descriptions of the chemical and physical properties of individual herbicides. Fundamental data on the major herbicide classes including information on penetration, absorption, translocation, mechanisms of action, metabolism in plants, and their behavior and fate in soils are presented.

The third part of the book contains up-to-date information on cultural, mechanical, biological, chemical, and combination methods of weed control in (a) horticultural crops such as vegetables, small fruits, tree fruits, ornamentals; (b) field crops such as corn, sorghum, cotton, soybeans, peanuts, wheat, oats, barley, flax, small-seeded legume crops; (c) lawns and turf; (d) pastures and rangelands; and (e) aquatic sites and non cropland areas.

The book contains a valuable appendix which lists the common and scientific names of 690 weeds, classifies them according to length of life, and where known gives their tolerance and susceptibility to 2,4-dichlorophenoxyacetic acid [2,4-D], 2,4,5-trichlorophenoxyacetic acid [2,4,5-T], and 2-(2,4,5-trichlorophenoxy)propionic acid [silvex]. The appendix also contains an excellent section on chemical terminology and weights, measures, conversion factors, nozzle capicities, equipment performance data, and other basic information needed in the preparation of chemical sprays and their application by ground and aerial equipment.

A valuable subject-matter index is also given. The clarity and usefulness of the book have been enhanced by an excellent choice of about 200 pictures. Other visual aids have been used liberally and effectively to improve comprehension. Modern chemical terminology has also been used to simplify discussion.

This volume will serve basic needs as a textbook for undergraduate students and as a reference source for scientists and others engaged in all phases of chemical weed control research, extension, and regulatory work with herbicides.

The book will be of special interest to horticulturists, extension specialists, county agricultural agents, vocational agricultural teachers, herbicide sales representatives, farmers, highway and industrial ground maintenance crews, homeowners with lawn and garden weed problems, and aquatic and recreational area directors.

The chemistry of herbicides including structural formulas have been handled in a commendable manner. The chemical information is presented in simplified, easily understood discussions which will make the information available to those who need it without burdening those who wish to read the book with little or no interest in herbicide chemistry.

Although the author did most of the writing in a reasonably short period, some aspects of the book are already not completely current. The scientific discipline of weed control is growing so rapidly that it will be difficult, if not impossible, to write a completely current book in this field for some time in the future. Weed control students, scientists, and laymen will rec-

ognize the need for supplemental information especially on new herbicides and recently developed chemical weed control methods to supplement the book. A considerable amount of up-to-date literature has been cited. The authors have recognized the difficulty in citing the vast amount of literature that has developed recently in the field of weed control. Nevertheless, teachers using this as a textbook will find it helpful and often necessary to refer students to additional sources of literature, especially in specialized areas of interest.

At a time when it appears popular to arouse the fears of the general public on the use of agricultural chemicals which are so essential in the production of an adequate, safe food supply for the world's population, it is unfortunate that the book does not contain a more adequate discussion of the toxicological properties of herbicides and their effects on man, animals, wildlife, and soils. There is a critical need for publishing information of this type in textbooks so as to assure students and the general public of the effectiveness and safety of modern herbicides for selective weed control without damage to man, animals, wildlife and soils.

For those who are teaching weed control and for those involved in weed control as a necessity or as a business, this book supplies valuable information on cultural, mechanical, chemical, biological, and combination methods. Excellent information is given on the types of chemicals used as herbicides, the nature of their effects on plants, and soils, the impact of herbicides on improved weed control, and increased agricultural production. This book serves as a valuable source of information on the role of weed control in a future of agricultural abundance and describes the use of herbicides as modern, effective, and safe weed control techniques.

W. C. SHAW

Simple, Practical Hybridising for Beginners

D. Gourlay Thomas. St. Martin's Press, Inc., 175 Fifth Avenue, New York 10, New York. 1962. 128 pages. Illustrated. $3.95. (Library).

A chatty book on plant breeding beginning first with some general comments on hybridization and what is involved. Next a brief, simplified chapter on Mendel and Mendelian inheritance. This is followed by chapters on the breeding of Gladiolus, Sweet Pea, Daffodil, Rose, Chrysanthemum and Carnation.

In each of these chapters, comments are made on the past development of each kind and the persons who are or were involved in their development. Simple sketches illustrate the structure of the flower. Instructions are given on how the flower is manipulated in hybridizing. New or standard varieties are discussed briefly. The horticultural classification of the flowers is given where this is important as in the case of the daffodil. In a concluding chapter the reader is encouraged to visit libraries, gardens, shows, and others interested in the same flower to learn more about the plant and its possibilities.

C. B. L.

Primroses

Roy Genders. St. Martin's Press, Inc., 175 Fifth Avenue, New York 10, New York. 1959 (U.S.A. edition 1962). 171 pages. Illustrated. $4.75. (Library).

Mr. Genders writes that, quote, The book is not written for those 'experts' who must surely know far more about the primrose than myself. unquote. The author is being very modest, and his volume covers the culture of both single and double primroses—hybridizing, pests and diseases and propagation by vegetative methods. Many varieties of both single and double, plus the Jack-in-the-green and cups and saucers are listed. There are some nice illustrations in black and white and several colored plates. Mr. Genders writes in an easy-to-read style and his love for the primrose is apparent on every page.

F. P. K.

The Camellia Journal

American Camellia Society, Tifton, Georgia. Vol. 17 (No. 3), July 1962.

The July issue of the Camellia Journal has a special section of 40 pages devoted to "Greenhouse Culture of Camellias—A Symposium" edited by George M. Wheeler. Over 20 persons have written short articles or stories on their experiences in growing camellias in greenhouses. Several articles tell of owners experiences in constructing their own greenhouse using homemade or commercially manufactured structures and covered with glass or plastics. Other authors have written about their cultural practices. These are not uniform, of course, since the plant is tolerant of many conditions but this variation helps to point out the various conditions they can stand. The beginner may be somewhat uncertain as to the proper techniques to follow because of these apparent differences but will find certain conditions similar as they read the different articles. This special section would have served the beginning greenhouse owner better if there was a general summary article on culture including pest control. The other articles could then have suggested variations that other gardeners have found to work.

CONRAD B. LINK

Manual of Trees of North America

Charles Sprague Sargent. Dover Publications, Inc., 180 Varick Street, New York 14, New York. 1961 Dover Paperbound Edition in two volumes. Vol. 1 has pages 1 through 433; Vol. 2, 434 through 891. (Plus key, synopsis, glossary, index) Illustrated. $2.00 per volume. (Library).

This inexpensive two-volume paperback set of the well-known Sargent Manual is an unabridged and unaltered reprint of the second enlarged 1926 edition. Printed on durable paper that is sewn rather than glued, these volumes should bring essential information on our native forest trees to the library shelves of all interested gardeners.

The Gardeners' Pocketbook

Neodypsis decaryi

The Fairchild Tropical Garden on March 17, 1962, distributed more than 400 plants of a new palm from Madagascar which may well be the finest ornamental palm introduced to Florida in a quarter-century.

It is *Neodypsis decaryi,* a triangular-shaped palm with plume-like leaves arranged in three rows. When viewed from certain angles the gray-green leaves, with a spread of 15 feet or more, resemble the tail feathers of a strutting peacock.

Eleven seeds of *Neodypsis decaryi* were received on July 28, 1947, after a trip of one month from Madagascar by way of the U. S. Department of Agriculture's plant inspection house in Washington.

Eight of the seeds germinated and six grew to eight-inch pot size. These were set out in permanent locations in the botanical garden in June, 1951, three in part shade and three in full sun.

Those planted in full sun thrived and began flowering and fruiting in 1958. Those planted in part shade appear to have been stunted and none has flowered.

The fruits, about the size and shape of small olives and of the same green color, are borne in large clusters. The color does not change at maturity and only after the fruits began to drop did the superintendent dare to harvest them for planting.

Germination was excellent, and within a few weeks after the seeds were planted the botanical garden had hundreds of seedlings thriving as possible distribution plans for members of the Fairchild Tropical Garden Association.

When offered for distribution, this palm turned out to be the most popular plant ever offered. Nearly every one of the 450 persons requesting plants checked the *Neodypsis* as first choice in a list of 20 other plants.

Often referred to as the Triangular Palm or Three-Cornered Palm, the *Neodypsis* has become one of the most talked about palms among the botanical garden's collection, which now numbers nearly 500 species. It is exceptionally beautiful, being striking both in form and in color.

A more complete description of the palm may be found in the April, 1961, issue of *Principes* (Vol. 5, No. 2), journal of the Palm Society. The writer, Robert W. Read, is a plant taxonomist at the Fairchild Tropical Garden.

Seeds of the *Neodypsis* were collected in Madagascar by Professor H. Humbert of the Museum d'Histoire Naturelle of Paris, a friend of the late David Fairchild, famous plant explorer for whom the Fairchild Tropical Garden was named.

In a letter to Dr. Fairchild, Professor Humbert described the *Neodypsis* as "an elegant palm—native to a very restricted area at the base of the mountains on the extreme southeastern part of the island. It grows naturally in sunny and dry conditions in sandy soil."

The Flora of Madagascar describes *Neodypsis decaryi* as one of a genus containing 14 species, all native to that interesting island. Attempts by the Fairchild Tropical Garden to introduce other *Neodypsis* species have not been successful.

Because of its exceptional beauty and demonstrated adaptability, *Neodypsis decaryi* appears to have a future among the first echelon of landscape plants used in the warmer parts of the world. It probably will grow as far north as central Florida and along the east coast of Florida as far north as Daytona Beach. In 1958 it withstood without injury the worst freeze in the Fairchild Tropical Garden's history, when the temperature dropped to 28 degrees F.

The palm thrives in limestone soil, and there has been some indication that it might not thrive in acid soil without benefit of liming.

Seeds will be scarce for the next several years. Botanical gardens and other institutions in and on the edge of the tropics will have first choice.—Nixon Smiley, *Director, Fairchild Tropical Garden, Miami, Florida.*

Hypericum rhodopeum 'Sunspot'

One of the more pressing needs in modern American horticulture is for plant materials which contribute to lower garden maintenance. The use of ground covers is an ideal solution to this problem, for when established, they require a minimum of attention at in-

G. HAMPFLER, LONGWOOD GARDENS

Hypericum rhodopeum 'Sunspot'
Plants one year from cuttings, starting to bloom in May, at Longwood Gardens (Above) and covering the ground at the end of the second growing season (Close-up view of the flowers on the front cover)

G. HAMPFLER, LONGWOOD GARDENS

frequent intervals and yet contribute a finished appearance to the grounds. The need, at present, is satisfied more fully for shaded situations than for those receiving full sun for a large part of the day. *Pachysandra, Pachistima, Hedera,* and *Vinca* all establish more easily with at least light shade, though the latter two will often do well in sunny locations. The need for a satisfactory ground cover capable of withstanding full sun, hot arid conditions, and poor soil, is undeniable. *Hypericum rhodopeum* 'Sunspot' goes a long way toward answering that need.

The cultivar 'Sunspot' originated in a batch of seedling *Hypericum rhodopeum* Friv. being evaluated for possible ornamental value by R. L. Plaisted of the Plant Breeding Department at Cornell University [See *Nat. Hort. Mag.,* July 1959]. The seedlings, grown in 1957, proved extremely variable for many characteristics, including compactness, amount of indument, abundance of flowers, flower color, and size. Out of a group of these plants selected for planting in the field, 'Sunspot' alone had all these characteristics in the desired intensity. The plant was outstanding in its vegetative state by reason of its evenly spreading prostrate habit and its light blue-green color. When it bloomed it was noticeably more profuse in flowering and appeared as a mat of solid yellow.

On the basis of this preliminary evaluation, the plant was propagated and distributed to several growers in different areas. In 1960 the plant was brought to Longwood Gardens, Kennett Square, Pennsylvania, for further evaluation and trial under different conditions. It has shown up very well in this area and has proved its usefulness both as a rock garden plant and as a ground cover.

A brief description of the plant through its yearly cycle will characterize its usefulness to horticulturists. A rooted cutting, planted in late May, will form a dense, evenly spreading mat less than two inches in height and approaching one foot in diameter by the end of the growing season. The new growth arises at the center and spreads to cover the old shoots which occasionally root and form new plants. *Hypericum* 'Sunspot' is fully hardy in Zone 6 and comes through the winter in good condition with the exception of occasional matting due to heavy, moist snow. Even plants in such condition recover quickly and put on new growth up to four inches by early May when they commence flowering. From that time until early June, they are a mass of bright yellow flowers which obscure the foliage with their quantity. The individual flowers are up to an inch in diameter and are borne in three-parted, terminal cymes. After the flowers drop, the fruits are evident for several weeks, but they do not detract materially from the plant's effectiveness and are soon hidden in the new growth.

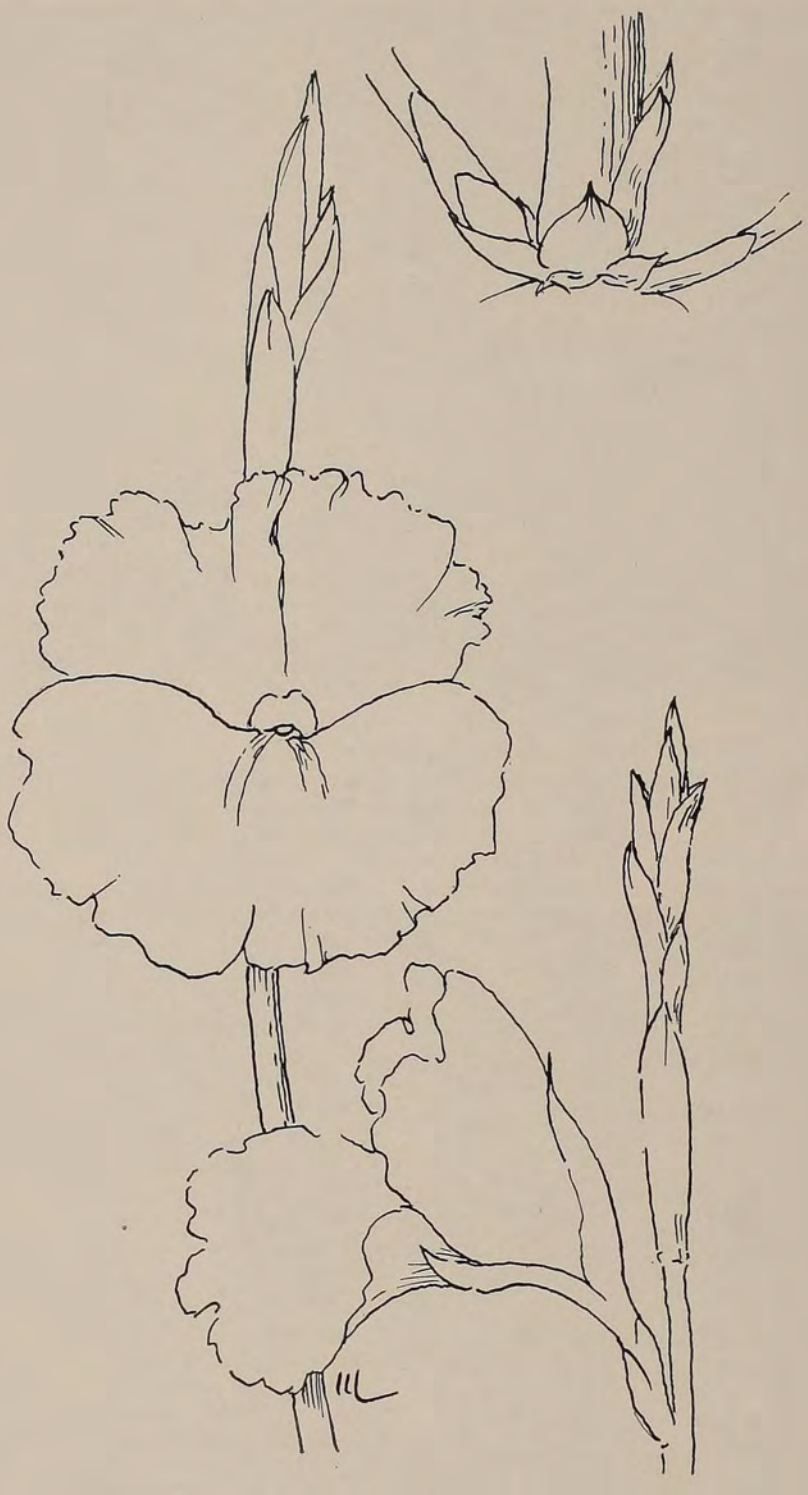
As new growth begins from the center of the plant, it again assumes its low, mat-like habit. By the end of the second summer, the plant covers twice as much area as it did the previous autumn and goes into the winter as a soft, blue-green carpet.

Propagation by cuttings of young growth is not difficult if begun in July. Tests indicate that a mild rooting hormone, such as "Rootone," will significantly increase the percentage of rooting. A well-aerated, sterile material devoid of organic matter, such as "Perlite" or "Vermiculite," has proved to be the best rooting media.

Hypericum 'Sunspot' should gain an important place in the sunny, dry situation in our gardens, particularly in the southern states where the soil is low in organic matter. The only caution needed is against planting under conditions where too much moisture exists. The use of peat moss or soils high in organic matter is to be avoided, while poor surface drainage and heavy watering cannot be tolerated. If planted in naturally dry or well-drained situations, *Hypericum* 'Sunspot' will reward the grower with quick cover and bountiful bloom. Planting should be done at the rate of one plant for every one and one-half to two square feet to be covered. At this spacing, it might be expected to cover the area in two years. — RICHARD W. LIGHTY, *Longwood Gardens, Kennett Square, Pennsylvania.*

Kaempferia decora

Thanks to the kindness of Mrs. Frederick W. Connolly, Wyndham Hayward was persuaded to send me a root of *Kaempferia decora,* a rare species from Mozambique, that he has introduced



Kaempferia decora

into cultivation and has had in his nursery for about five years.

Planted in a rich compost, well supplied with humus with excellent drainage, the curious root with its spreading mass of permanent roots, filled a ten inch pot. Growth started in a reasonable time, with the production of a fas-

cicle of leaves, not unlike those of some of the curcumas, growing to a height of about three feet.

In time, curious points of growth started at the crown, at ground level, and slowly developed into inflorescences, standing well away from the leaf fascicle.

On July 13th, the first flower opened, a gorgeous yellow, Lemon Yellow of Ridgway, with a double mark of Lemon-Chrome just below the inner "petal" that appears to carry the stigmatic lip and covers the solitary stamen. The texture of the petals is like that of an excellent and delicate tissue, firm, yet soft. There is inconspicuous veining over all, and the edges are slightly ruffled. The flower gives off a delicate scent of ripe lemon.

Like those of other species in the genus, the flowers last but a day, dropping off cleanly, and not withering in place as some do. The flowering has continued upwards but not in daily succession. The first flower has not yet opened on the second stalk of bloom.

One can easily believe that a mass of this species would be a startling sight to see on a hot summer day!

Mr. Haywood writes that it was first described in the book, *Flowering Plants of Africa,* a large publication that comes out regularly and resembles *Curtis's Botanical Magazine* in England. It was discovered some ten or twelve years ago, in Portuguese East Africa, now Mozambique, and it occurs well down into southern Africa, in a site between Salisbury in Rhodesia and Beira.

It will not be cold hardy here in Pass Christian, and how it will continue to thrive in a pot or how well it may increase so that the leaf fascicle does not stand alone, only time will tell. Until it makes something of a mass, it will be interesting rather than spectacular as a pot plant. So far, it has been kept in the greenhouse all summer, an old fashioned structure, with a roof well shaded by reed screens and an earth floor frequently watered down to keep even higher humidity than is normal. An exhaust fan kept on all summer, day and night, to draw the air out of the house and encourage the stream of fresh air through the ventilators, is a practice that was not put into action solely for the *Kaempferia.*—B. Y. Morrison, *Pass Christian, Mississippi.*

Lachenalias in California

My earliest knowledge of these South African bulbs came through *The Garden,* a stray copy of which I picked up one time in England and to which I later subscribed.

I find the lachenalias among the easiest of the South African bulbs. Many of the South Africans will grow well here out of doors; but lachenalias, which I grow in a cool greenhouse, never fail. They bloom early and for that reason must be planted early enough to give them time to make good roots and growth. August is none too soon.

There are a number of species and even some named varieties although I doubt that the latter can be obtained in this country. *Lachenalia bulbifera* 'Superba' (syn. *L. pendula*), my favorite, is obtainable and makes a fine Christmas bloomer. The pendulous flowers, from a few to two dozen, are scattered along a scape about a foot tall. Except for color, the plants look somewhat like scillas. The large bells are coral with touches of green and purple. In my experience they need considerable sun to color up well.

The foliage of *L. bulbifera* 'Superba' is negligible, consisting of from one to three or four, long basal leaves about two inches wide. In early summer this foliage begins to yellow, a sign that the plants should be gradually dried off for their summer rest. The easiest way to store the bulbs until planting time, is to leave them in the pots of soil, and put them where they will get a good baking.

Lachenalias grow well in a mixture of leaf mold, peat and sandy soil with a little bonemeal. A six inch pot will hold six bulbs. They increase rapidly from one bulb to several in a year's time.

They are offered by bulb specialists in California and by some of the Eastern dealers in "Dutch Bulbs."—Mrs. R. G. Stapleton, *Oroville, California.*

The Tibouchinas of Brazil

Visitors to Brazil interested in plants are invariably intrigued by the numerous showy members of the melastomaceous genus, *Tibouchina,* which are such decorative subjects in the landscape during their flowering season. Indeed, it seems strange that *Tibouchina semide-*

CHICAGO NATURAL HISTORY MUSEUM

Tibouchina grandulosa*—*a model of the species constructed of hand-blown glass, wax, and a variety of plastics, in the Stanley Field Collection of Plant Models of the Chicago Natural History Museum

candra, with its rich royal purple flowers, is the only species grown in our conservatories and subtropical gardens. Strange at least when upwards of 200 species—most highly attractive—are native in tropical America. At least two-thirds of these are Brazilian and some 25 are cultivated to a considerable extent, especially in the gardens of São Paulo and Rio (roughly equivalent to the latitude of Miami). Certainly there must be some of these amenable to culture in the United States, if only they were tested.

Most tibouchinas are small trees or shrubs of somewhat open growth. Like rhododendrons or azaleas they are plants of acidic well-drained soils and occur naturally in the scrub forest that often cover the steep slopes of the coastal mountains or highlands of eastern Brazil. Related species occur in the Andes—usually in low statured highland forests close to timberline. Like all melastomes, tibouchinas sport leaves with an interesting pattern of palmate veins. In addition, the foliage may often be decorated, as in familiar *T. semidecandra*

W. H. HODGE

Flowers of an unnamed species of Brazilian Tibouchina cultivated in São Paulo

A close-up view of the large, rose-colored flowers of Tibouchina sellowiana

W. H. HODGE

with silky hairs. But it is in its inflorescence that the genus can boast its prime attraction. Individual flowers are large, sometimes over two inches in diameter and generally borne in showy terminal panicles. Colors are rich, the velvety petals running the gamut of hue from royal purple to lovely rosy shades, depending upon the species. In many species the colors change with the age of the flowers so that a given tree may sport an interesting variety of related hues at any time during its flowering season. This characteristic appears to vary in individual plants—as does flower size, floriferousness, and season of flowering. Thus there is much potential for the future breeder interested in these showy ornamentals.

Although the visitor to southeastern Brazil will find one or more species of *Tibouchina* in bloom almost at any season, the great majority—at least in the São Paulo region—put on their best display in February, which south of the Equator, is the beginning of Fall. Those which come into flower during the Easter season (April), such as *T. granulosa* and its var *rosea,* are known by the common names *guaresma, flor de guaresma* or *guaresmeira* meaning "Lent," "flower of Lent," or "tree of Lent."

São Paulo's streets and gardens claim about a dozen *Tibouchina* species that are frequently cultivated. These include *T. corymbosa, T. grandifolia, T. granulosa, T. moricaudiana, T. mutabilis, T. pulchra, T. regnellii,* and *T. sellowiana.* A collection of some 25 species of special ornamental interest are currently being tested on the grounds of São Paulo's outstanding Botanical Institute.

Unlike certain sister genera, such as *Meriania* (see this magazine for July, 1960) the species of *Tibouchina,* given the proper climate and soil, are of rather easy culture, and well deserve consideration as potential new ornamentals for conservatory culture or as garden subjects in those sections of the United States which are relatively frost-free.—W. H. Hodge, *Kensington, Maryland.*

Chonemorpha and Beaumontia

In the October 1961 issue of this Magazine, I wrote about fragrant flowers in the family Annonaceae occurring in the Old World tropics. There is another family, the Apocynaceae, much better represented in the tropics and subtropics than in temperate regions of which many representatives have fragrant flowers. One of these, *Odontadenia grandiflora* from the tropics of the New World, was described in the October 1958 issue of *The National Horticultural Magazine.* In the Old World tropics there are two genera of climbers in this family which are, or should be, equally well known in cultivation. One is *Chonemorpha,* the other *Beaumontia.*

Chonemorpha

This genus of very large woody climbers occurs throughout the Indo-Malayan region from Nepal to the Philippine Islands. Before the war I was fortunate enough to find it growing wild near the Benguet Trail on the Island of Luzon in the Philippine Islands. The species was probably *C. blancoi.* Recently, I discovered *C. macrophylla* in the Trisuli valley, at about 2000 feet, in Nepal. This species extends from the Himalayas to Ceylon and Java. *Chonemorpha* literally means funnel-mouth. The flower, four inches across, has a tube one and one-half inches long terminated by five petal-lobes arranged as the blades of a propeller, each being slightly twisted at its point of attachment to the tube. The specific name *macrophylla* refers to the very large leaves; one I collected measured 14 inches long and 11 inches across.

A characteristic of tropical lianas is that they flower when they reach the full light at the top of their support; if a liana is climbing up a tree 60 feet high it will flower on reaching its crown, if up a fence 8 feet high it will flower at that height. So, in a garden in the tropics, where man can influence the environment, *Chonemorpha* flowers at a reasonable size. Probably it would do so also in a suitable greenhouse. *Chonemorpha* grows in well-watered, shady, often precipitous valleys where the air is humid even in the dry season and where the roots never lack water. One plant I saw across a valley and identified it through binoculars by its seed pods. With difficulty I climbed the rocky face and managed to secure fruits. The branched inflorescence measures a foot in length and the numerous pods hang down in pairs; each pod is approximately one foot long and one inch thick. In another valley with steep sides

Chonemorpha macrophylla

at the bottom of which near the stream the liana was growing, earth slides had buried coils of the stem. This had encouraged rooting and I was able to dig up several natural layerings. The genus can also be propagated freely by seed.

The drawing illustrating this note deserves mention. The flowering spray was picked in the Singapore Botanic Gardens by the Director on 23rd December and brought in a polythene bag by air by my wife to Kathmandu, Nepal, and drawn on Christmas eve. The green pods of the same species were collected at Trisuli on 10th January; they were hung up to ripen their seeds, which they did slowly, the pods now brown splitting towards the end of April. The seeds were viable and germinated two weeks after sowing.

Beaumontia

The genus was named in honour of Lady Diana Beaumont of Bretton Hall, Yorkshire, England, who died in 1831. It contains four, perhaps as many as eight, species — authorities differ — of which *B. fragrans* and *B. grandiflora* are the best known. The former from Viet Nam does best in countries in which the climate is tropical the whole year round—it flowers best after a dry peri-

G. A. C. HERKLOTS

Beaumontia grandiflora

od. I have seen it flourishing in Ghana and in Trinidad. The latter is a native of the Eastern Himalaya, where the climate is determined by the monsoon—a hot wet summer alternating with a cool dry winter—and does best where there is a decided winter dry season. It flourishes in Hong Kong and I have seen it flowering and fruiting at 3000 feet in Nyasaland in Central Africa.

To my great delight, I found *Beaumontia grandiflora* growing wild in the Trisuli Valley in Nepal at 2500 feet. At one side of the valley, a long way from the river, were old river-borne deposits of boulders, gravel and sand. Through this a stream from a side valley had cut a channel, in the dry season used as a path, but in the rains no doubt it becomes a raging torrent. On a bank adjacent to land cultivated for maize in the spring and rice in summer was *Beaumontia* growing luxuriantly in full sun. It was festooned over low shrubs and in January was covered with developing inflorescences. The farmer's hoe had severed many of the roots and these had produced adventitious shoots, so it was easy to collect plants. On 30th March I returned to the district and in the blazing sun took photographs and collected flowers and buds, placed in a polythene bag, for subsequent drawing. Incidentally large plants were also found in flower at 4000 feet probably just below the winter frost level.

This very large magnificent climber produces twining shoots which will climb to the tops of trees or festoon the ground and low bushes with snake-like coils. The leaves, in opposite pairs, are nine inches long and four inches across and are glossy and attractive. The following year each shoot develops numerous short lateral branches each of which is terminated by a cyme of 6, 8 or more flowers. Each fragrant flower is five inches long and three to four inches across and is pure white tinged greenish toward the base. The five leaf-like sepals often are light buffish-green, but not always, veined with red. Propagation may be by seeds, which are rarely available, or by cuttings placed in a propagating frame with bottom heat. But by far the most satisfactory method

W. H. HODGE

***Torreya taxifolia* in the Killearn Gardens, Tallahassee, Florida**

(that inadvertently adopted by the Nepali farmer) is by means of root cuttings, taken in February. Pieces of large roots placed in a suitable compost in a propagating frame rarely fail to produce adventitious buds.—G. A. C. HERKLOTS, *c/o British Embassy, Kathmandu, Nepal.*

*Torreya taxifolia**

The Florida torreya, *Torreya taxifolia* Arn., is one of the more famous endemic relict trees of North America. It occurs in nature only along the bluffs and ravine slopes of the east side of the Apalachicola River in Liberty and Gadsden counties, Florida; in an area just over the Georgia boundary in Seminole County; and in a region west of the Apalachicola River in Jackson County, Florida, where there is a single isolated stand [H. Kurz, *Proc. Florida Acad. Sci.* 3, 66 (1938)]. A few individual trees have long been cultivated, chiefly in a relatively limited area surrounding the torreya's native haunts. Of these, two

*Reprinted from Science, June 8, 1962, Vol. 136, No. 3519, pages 900-902, by permission.

individual trees, a male and a female, in the Killearn Gardens State Park near Tallahassee are handsome specimens, much more vigorous and flourishing than other cultivated specimens.

A few years ago, a moderate-sized area along the Apalachicola River, where the Florida torreya grows naturally, was established as the Torreya State Park. A principal objective of those responsible for establishing the park was to preserve for posterity at least one place, open to the public, where the Florida torreya would not be subjected to the hazards that accompany man's civilizing influence. Doubtless there had been evidence that fire, logging, domestic animals, and the like were taking, and would continue to take their toll, and that, unprotected, this interesting plant would become extinct.

It seems unlikely, since this tree was reproducing satisfactorily only a few years ago, and since cultivated trees are for the most part also affected, that forest devastation is accountable for the demise of the Florida torreya. Be that as it may, its extinction is presently wellnigh an accomplished fact. On the original sites there remain but a scattering of skeleton trunks, a few of which have abortive sprouts at their bases. With the possible exception of the two aforementioned trees in Killearn Gardens State Park and of one other in Tallahassee, all three of which have perhaps benefited from the care given garden plantings generally, the cultivated trees known to us either are not vigorous, to put it mildly, or have already succumbed.

The culprit? Apparently a fungal disease of the stems. We know nothing more than that. It is our understanding that Erdman West of the University of Florida is attempting to identify the causative agent. It is unlikely, however, that any corrective measures can be taken to preserve the Florida torreya in its native forest. It is barely possible that the isolated cultivated trees may survive. It would seem expedient for the Florida Board of Parks and Historic Memorials, which has jurisdiction over both the Torreya State Park and the Killearn Gardens State Park, to take immediate action leading to the propagation of seedlings or cuttings, or both.

In any event, it seems clear that the relict Florida torreya, known to professional botanists throughout the world, and locally of significant general interest, is even now all but extinct in its natural habitat. Its preservation, in cultivation, can perhaps be accomplished if prompt and bold measures are immediately instigated.—R. K. Godfrey and Herman Kurz, *Department of Biological Sciences, Florida State University, Tallahassee.*

A Footnote on Torreya

A footnote to the Godfrey and Kurz SCIENCE note above is that the Killearn Garden specimens have now been found to be diseased but it is hoped that a spray program may be of help. The need for propagating this rare native is now even more urgent. Some brief remarks on the species are in order.

First of all, *Torreya taxifolia* occurs as a native in Zone 9 (specifically 9a) of the recent *Plant Hardiness Zone Map* (U.S.D.A. Misc. Public M. 814) which means it should be tried widely throughout the Gulf Coast as well as on Atlantic coastal sites, probably as far north as Norfolk—or wherever *Quercus virginiana,* the Live Oak, will grow. There are many spots also on the Pacific coast north to Puget Sound where this species of *Torreya* may also thrive. Trees are said to do best in shaded and sheltered sites where the soil is moist. Four species occur in this little known genus which commemorates John Torrey, one of the most distinguished names in early American botany. Apparently none of these really flourish in cultivation. The two oriental species (*T. grandis* and *T. nucifera*) are the hardiest and more frequently seen in horticulture. The two American species are seldom seen cultivated except in the areas of their original haunts—Florida (*T. taxifolia*) and California (*T. californica*). The seeds produced in the olive-sized fruit are normally used for propagation since they produce sizeable plants much faster than slow growing cuttings. The U. S. National Arboretum will attempt to propagate material of the female tree from the Killearn Gardens State Park near Tallahassee. W. H. H.

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Neodypsis decaryi spreads its fronds like a strutting peacock

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