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Plant-Hunting in Old Mexico

ERIC WALTHER

PART II

One of the most striking features of Mexican plant life, unescapable from even the least observant, is the great variation, in forms and species, plant-associations and life zones, encountered in often very short distances. The underlying cause is readily understood when one considers the rugged topography, with its abrupt changes in altitude leading to equally sudden and startling differences in temperature, rainfall, exposure and soil. The story of a two-day trip to the Southwest of Mexico City well serves to illustrate the great floral diversity revealed within a single two-hour auto-ride.

Over a well-aligned, asphalted highway we gradually ascend, traversing the so-called "Pedregal" or "Stony place," a fairly recent lava flow extending from the "Serrenia de Ajusco" towards the old lake bed on which Mexico City is built. Just before reaching the summit one enjoys a magnificent view of the Valley of Mexico, dominated by the two famous snow capped volcanic peaks, Popocatepetl and Ixtaccihuatl. Here our road follows the old route to Acapulco, traversed over 100 years ago by von Humboldt in the opposite direction. He stopped for the night at a place called "La Guardia"; and here we too halted, at probably the identical location, even if the straw-covered shacks housing the military guard were scarcely the same. The pass is up in the clouds, and a chill wind blows off the flanks of Ajusco, causing us to envy the soldier on guard his all-enveloping serape. Tall tussock-grasses, *Bromus pendu-*

linus Sesse and *Epicampes macroura* (HBK.) Benth., cover the levels at the root of the higher peaks; and the spot looks most unpromising to the eye of the Echeveria-collector. However, the monotony of the grass-plain is relieved by ridges and hummocks of surface-lava covered with an open stand of pine *Pinus hartwegii*. Under these pines we find such interesting plants as *Ribes microphyllum* HGW., the only true gooseberry of Mexico, here in its type-locality; *Rubus glaucus* Benth.; an unidentified *Fuchsia* in fruit; *Gentiana spathacea*; two tall species of *Eryngium*; *Pedicularis mexicana* Zucc.; a lupine; *Altamiranoa mexicana*; and also the object of our search, an *Echeveria*, presumably *E. mucronata*, but differing sufficiently to make us hope for a new species. Our host for this day, Sr. Christian Halbinger, found the first plants of the echeveria in question, peculiar in having fleshy roots as tuberous as those of any dahlia.

From here the road drops down steeply towards Cuernavaca, in a few miles descending over 3,000 feet, taking us from the Humid Transition to the Upper Tropical zone. Wishing to see more of the country than is possible from a speeding "Camion," we asked to be let off outside the town, but the obdurate driver chose his own place to stop, dropping us in a most unpromising ditch. But observe the workings of a benign fate. Right across from where we stood, on the steep bank forming one side of the road-cut, grew the very echeveria we were hunting. Here represented by numerous flowering plants, many seed-



Mangos in the famous Borda gardens at Cuernavaca



Upper, Grassland near Cima, with Pinus Hartwegii

Lower, Moss-covered rock in woods near Santa Maria, with Epidendrum Linkeanum, Peperomia Mexiae and Echeveria campanulata



Cactus country near Tehuacan, with Myrtillocactus, Pachycereus, Opuntia, Yucca, etc.

lings, etc., only one solitary further specimen of *Echeveria crenulata* Rose was found during nearly a whole day's subsequent search.

Well known to American tourists, as the home of Ambassador Morrow, favorite residence of Cortez, Cuernavaca enjoys one of the finest climates known, experiencing no frost, as is testified to by the vegetation, both cultivated and wild. The former includes mangos, bananas, rice, *Spondias lutea*, etc. Coffee has run wild, avocados are plentiful, their foliage covered with innumerable galls of an insect apparently as yet unknown in California orchards. Of wild plants one notices climbing aroids, tropical ferns, epiphytic orchids and bromeliads, a wild palm (*Sabal* sp.) various acanthads, *Ficus* sp., *Stigmaphyllon* sp., etc.; all lending a quite exotically tropical fla-

vor to the scenery. In Cuernavaca, at the excellent Hotel Maric, it was our privilege to become acquainted with Sr. Eric Oestlund, now retired, but engaged in an intensive study of Mexican *Orchidaceae*. Under his guidance we saw something of the country, exploring the numerous deep barrancas peculiar to the region, found the first wild plants seen of *Cercus dumortieri* Scheidw.; our first wild *Zinnia*, a fine, tall *Salvia*, presumably *S. muralis* Fernald; etc.

Early next day visited the woods near Santa Maria, consisting of a curious mixture of the tropical and temperate zones. With oaks and madrones occur epiphytic orchids and *Peperomia*'s; and even the *Echeveria* species found here, presumably *E. campanulata* Kunze, frequently was seen growing as an epiphyte on moss-cov-



Looking down our trail through the cliffs at Tepoxtlan

ered tree-trunks. The afternoon found us ascending the sheer cliffs of Tepoxtlán, famous collecting grounds of Dr. Rose, C. G. Pringle, etc. The village of that name, reached over a road scarcely deserving the name, still retains its ancient Aztec pavements, characterized by level stretches alternating with sloping ramps, never designed for wheeled vehicles. The steep trail leads up the gorge here pictured, the effort of our climb being relieved by discovery of many interesting and novel plants. At the foot of the cliffs *Taxodium mucronatum* grows truly wild, next to a cool spring of sweet water; other plants worth mentioning were *Cestrum parquii* (?), *Lobelia laxiflora*, *Fuchsia arborescens*, and on the sheer cliffs many perching *Bromeliads*, an *Agave* of the Section *Littaea* in flower, etc. These cliffs are the only recorded locality for the interesting monotype *Cremnophila* (*Sedum*) *nuttans* Rose, but none were seen, not surprising in view of their inaccessibility. On our arrival at the summit no time was left to search for *Echeveria fimbriata* C. H. Thomps., also known only from this one location, but the tale of our return on another occasion may well follow here. From the railroad station at El Parque a trail leads towards Santo Domingo, and passes near some still higher cliffs dipping their feet into woods of oak, madrones, etc. Here we found numerous plants of the species sought, growing in a dense cushion of moss cloaking the shadiest, moistest places. In its company grew also *Sedum longipes* Rose, its brownish blossoms and greatly enlarged nectar-scales certainly justifying the question-mark placed after its generic name in the "North American Flora." Other interesting inhabitants of this same moss-cushion were *Pinguicula caudata*, most regrettably nei-

er in flower nor in seed; a dwarf *Lamourouxia*, a showy genus unfortunately impossible to cultivate for reasons similar to those applying to the related genus *Pedicularis*; *Begonia gracilis*; a *Dahlia*; and of trees, *Clethra mexicana* and *Comarostaphylis polifolia*. Of possible garden-value we must also mention *Eupatorium areolare* var. *leiocarpum* with long, graceful 8-foot foliage-sprays bearing in the upper axils clusters of pure white, intensely fragrant flowers scenting the whole neighborhood. Returning we passed the ruined church of San Juanico Tlacotenco, its walls, arches and even spire bearing numerous plants, mostly in full flower, of what may be typical *Echeveria gibbiflora*. Two plants of this we bought for all of 8 cents American, from a tipsy charcoal-burner full of political wisdom, or the opposite.

Of course not every excursion was equally successful. From our study of herbarium-records we felt that a most fruitful spot to visit should be the "Hacienda San Diego de Los Alamos" near Puebla, where less than 20 years ago Brother Arsene had collected all of 5 *Echeveria* species. Aside from a charming chapel little was left of its former glories but tumbled-down walls. The uncontrolled woodcutting of charcoal-burners supplying the nearby market of Puebla had left only dead stumps to testify to the formerly wooded nature of the region; and not a single *Echeveria* did we find. Numerous goats continue the denudation, and recently started erosion is rapidly turning the Hacienda into a desert. However, most of the plants sought were found later, largely on what was the most productive trip undertaken, the one from Tehuacan to Esperanza.

Tehuacan lies at the edge of the



Epiphytic association of the orchid, Hartwegia purpurea with Echeveria nuda, ferns, mosses and lichens



The peak of Orizaba, with the extinct lower cone and edge of lava flow near Esperanza

hot and dry region stretching to Oaxaca, where the giant cacti are at home. While waiting for our Indian guide Manuel, perforce we killed time, finding some of the *Echeverias* looked for in the Public Square, but not wild. Other plants of interest seen were a pink form of *Sphaeralcea umbellata*, and of course the striking columnar *Pachocereus chrysomallus* and *margi-natus*, native in the immediate environments of the town, as are also *Fouquieria formosa*, a tall arborescent *Yucca*, *Hechtia sp.*, a terrestrial *Bromeliad* with viciously spiny-margined foliage, various spiny *Leguminosae*, including *Mimosea biuncifera*, etc.

Finally getting started early next morning, our road leads northeast, and soon we espy the Peak of Orizaba, its foot our destination. This is the second-highest mountain in North

America, exceeded in elevation only by Mt. McKinley in Alaska. Our second halt yields us *Echeveria nodulosa* and the third *E. nuda* both occurring with *Sedum stahlii*. The latter inhabits a higher, moister region, with its vegetation strongly reminiscent of California, witness such items as *Juniperus*, *Baccharis*, *Quercus*, etc. At times the species even occurs as an epiphyte, one interesting colony found growing on an oak containing *E. nuda*, an orchid (*Hartwegia purpurea*) *Polypodium lanceolatum*, as well as a moss and a lichen. Nearing Esperanza some very dry limestone ridges yield *E. heterosepala*, here growing with *Ceanothus greggi*, *Cercocarpus fothergilloides*, *Sophora conzatti*, etc. Esperanza proper is a division-point on the Vera Cruz-Mexico City line and the end of its electrified portion



Our guide Manuel with Echeveria rubromarginata, Rose

that ascends the steep scarp at the foot of Orizaba. After a belated lunch we continued towards the base of the mountain with our retinue, now grown to imposing proportions and consisting of the chauffeur and his assistant, the latter doubling as assistant-photographer, our Indian guide Manuel, a volunteer local guide and a local interpreter. The latter had gathered a few words of English while washing dishes at San Antonio, and was dismissed when we found his English vocabulary even more limited than our own very small Spanish one.

At a time beyond memory of the present generation the lesser volcanic cone to the west of Orizaba proper, (Citlalpetl) had subsided with a final eruption which had sent a lava-flow towards Esperanza, stopping in a steep slope taller than many a house, strewn with a profusion of boulders. On these rocks were found two more species of echeveria, *E. rubromarginata* and *E. akontiophylla*, the last

described only quite recently by Dr. Werdermann, but without any definite locality. From the known predilection of echeveria to hybridize in gardens, one might expect to find some natural hybrids under the circumstances, but wherever we found two different species in nature, they always flowered at distinct seasons.

By now both time and funds were beginning to run short, our very successful day had left us with a burden of collections needing attention, and so we reluctantly had to turn back without either ascending to the higher levels of the mountain or being able to visit the most interesting tropical valley of Orizaba and Cordova. To see *Abelia floribunda* in its native haunts, to collect *Echeveria subalpina*, *E. microcalyx* and *rosa* we shall have to await another opportunity and future return. On the midnight train we came back to Mexico City, and the same week to our home.

(To be continued)

The Campanulas of North America

ROBERT M. SENIOR

The average gardener who raises Canterbury Bells in his border, or possibly *Campanula garganica* or *portenschlagiana* in his rock-garden, little realizes how widespread the genus *Campanula* is throughout the north temperate zone. Altogether there are probably over 300 species, as well as an endless number of varieties.

Anyone starting to study these plants in a scientific way, would at once be struck by the endless number of synonyms for so many of the different species. Probably it is due to the size of the genus, as well as the confusion of nomenclature, that no one, up to the present time, has written a complete monograph on these plants. Indeed, anyone attempting the task, would probably have to spend several years of painstaking work.

The number of species found in north America is much fewer than in Europe: in all, there are probably not over 30 different kinds. I have attempted, in the list described below, to include every species. Incidentally I might mention that I do not include a certain number that are escapes from Europe, such as the "Creeping" or "European Bellflower," *C. rapunculoides*, the "Nettle-leaved Bellflower," *C. trachelium*, the "Clustered Bellflower," *C. glomerata*, and the biennial *C. patula*.

The most ubiquitous species is no doubt the harebell, "Blue-Bell of Scotland," or as it is scientifically known, *C. rotundifolia*. This plant is widely distributed over the north-temperate zone, and has endless varieties, which often mask under misleading names. It seems as if anyone finding a slight variation in the harebell, possibly in

leaf, height, size of bloom, or some other trifling difference, immediately rushes into print with an announcement of the discovery of a new species.

The following plants may be classed either as subspecies or varieties of *C. rotundifolia*:

C. petiolata is found in Arizona New Mexico, Utah, and northward. It has somewhat heart shaped basal leaves on long petioles, from which characteristic it no doubt received its name. The flower is violet-blue, rather large, with broadly ovate lobes. Many people having *C. rotundifolia* in their garden, probably purchase *petiolata* in the expectation of adding a new species to their collection.

C. linifolia has been reported as growing in Oregon, the islands of Behring Strait, and Greenland. It is also found over a wide area in Europe, and in the catalogues of nurserymen is frequently called *C. carnica*. It is a perennial having the somewhat heart shaped basal leaves of *rotundifolia*, spreading or reflexed calyx lobes, and one erect flower, occasionally 2-3, on the end of each stem.

C. heterodoxa is found in British Columbia, Alaska, and its islands. The stem is decumbent at the base, then curves gracefully upward, often to a height of 16 inches. The corolla is about twice the length of the narrow sepals, and is long bell-shaped, with broad ovate lobes. I might add that a plant described as *C. rotundifolia* var. *Alaskana* seems to be but a synonym for *heterodoxa*.

C. rotundifolia var. *intercedens* found in Canada, Minnesota, Michigan, Indiana and probably neighboring States has the appearance of a rather

tall, stiff *rotundifolia*, with long, very narrow stem leaves, nodding flowers and erect or spreading sepals. Var. *arctica* is a dwarf form, one too few-flowered, with thickish leaves. It has been found in India, Labrador, Newfoundland, the White Mountains, and, I believe, in Alaska. Var. *olympica* is a very good horticultural form found in the northwestern part of our country, that has good sized violet colored flowers, with slightly recurved ovate lobes. Many nurserymen now list this plant.

In Idaho there is a campanula called *C. Mac Dougalii*, that has some of the characteristics of *rotundifolia*, but with its smaller corolla and long exserted style, might possibly be classed as a distinct species.

Before closing this account of the various forms of *rotundifolia*, I should like to emphasize that there are numerous synonyms for the above mentioned subspecies and varieties. Suffice to say that if the reader ever encounters in the catalogues of nurserymen such names as *C. dubia*, *Giesekiana*, or *Langsdorffiana*, he may be reasonably certain they are all forms of the "harebell."

C. uniflora is a species that generally has its habitat in proximity to snow and ice. It ranges northward from the Rockies to Alaska, and is also reported as growing in Labrador. It is a relatively low plant, seldom over 6 inches high, with thickish linear stem leaves, and one blue, narrow-throated flower at the end of each stem. As it is an inhabitant of high altitudes in the Rockies, it proves to be a difficult subject for the rock-gardener east of the Mississippi. I have raised it several times from seed, only to see it languish and die during our hot summers. Britton & Brown in their "Flora of the U. S. and Canada" have a picture of it.

The following plants are only found east of the Rocky Mountains:

C. divaricata has a range from Virginia, West Virginia, and Kentucky, southward to Georgia and the Carolinas. This is a perennial that grows from one to three feet high. The flowers are not large but the general appearance of the plant is light and graceful. Here in southern Ohio I have had no difficulty in raising it. *C. flexuosa* which grows in the Carolina Mountains, and is sometimes listed in the catalogues of nurserymen, is probably only a variety of *divaricata*.

C. americana is an annual or biennial that is found as far west as Kansas and South Dakota, as far east as New York, and as far south as Florida. It varies in height from 2-6 feet, and is the tallest of all our American Campanulas. It has an erect stem, along the upper portion of which are clustered innumerable bluish wheel-shaped flowers, that form a dense spike. Although it is generally found in somewhat shaded situations, it can be grown in full sun. If naturalized in woodland, it should require no further attention, since it sets numerous seeds, which germinate readily.

There are three campanulas found east of the Rockies that grow in swamps and marshy places, which have no particular horticultural value. *C. aparinoides* has small, open, white or bluish-white flowers, small narrow leaves, and thin weak stems, covered with rough tiny bristles. *C. uliginosa*, often called the "Blue Marsh Bell-flower," is somewhat similar to *aparinoides*, but its branches are less spreading. It too, has tiny bristles along the flexuose stem, and a small blue corolla, with darker veins. *C. floridana*, found only in Florida has low, diffusely spreading stems and branches, axillary flowers, and sepals about as long as the corolla.



C. lasiocarpa

C. divaricata

C. aparinoides

C. Parryi



Campanula obliqua = *Americana*
N. J. Jacquin = *Plantarum rariorum*.
Hortae Schoenbrunnensis, Vol. III,
 Table 336

There are two annual campanulas east of the Rockies that have comparatively localized habitats. *C. Reverchoni*, found in central Texas, is a low, diffusely branching plant, with thin stems,—each branch bearing one erect terminal flower with rather narrow, deeply cut lobes. *C. Robinsiae*, growing in Hernando County, Florida, has many erect, slender, low branches, small axillary flowers, and sepals less than one-half the length of the corolla.

Practically all other North American Campanulas are found in the Rocky Mountains and westward to the Pacific, in the Canadian northwest, and Alaska.

C. Parryi grows in Wyoming, New Mexico, Arizona, and Colorado. In its native habitat it is generally found growing in grass, about 5-14 inches high. It is an attractive perennial, with thin creeping root stocks, narrowly spade-shaped basal leaves, and one good sized violet-blue flower to a stem. I have grown it in my garden, but here in the Central States, it seems to lose its rather erect habit, and has a tendency to sprawl. It seems to do best on a rock wall with an eastern exposure.

C. prenanthoides, frequently called the "California Harebell," is a perennial that grows in California, northward to Oregon and Washington. It has a rather slender, erect stem, about one to two feet high, often much branched, with flowers mostly in clusters on short pedicels, and a style that considerably exceeds the length of the rather narrow, recurved corolla lobes. Jepson, in his "Manual of The Flowering Plants of California" has a picture of it.

C. Scouleri has slender stems, mostly simple, about 6-12 inches high. It has a deeply cleft corolla, with re-



Campanula Scouleri
From Herbarium, N. Y. Botanical Garden

curved ovate-oblong lobes, and, like *prenanthoides*, has a style considerably exceeding the length of the flower. It is found in California, thence northward, as far as Alaska.

There are four *Campanulas* indigenous to California that have no horticultural value:

C. exigua, a diffusely branched annual, is about 2-6 inches high, with numerous small light blue flowers. *C. linnaeifolia* is a perennial, varynig in height from 4-12", with slender stems and pale blue solitary flowers: it is found in swampy places along the coast. *C. angustiflora* is an annual, about 4-12" high, with sessile, ovate leaves, and small tubular, axillary flowers, on rather stout peduncles. *C.*

Wilkinsiana is a low annual, with a single, medium-sized flower on the end of the stem.

And now we come to three of the most attractive *campanulas* in North America,—*C. Piperi*, *C. lasiocarpa*, and *C. pilosa* var. *dasyantha*.

C. Piperi is a charming low perennial, found only in the northwestern United States, in the Olympic Mountains. It is about 1½ inches high, with clusters of tiny, sharp-pointed, holly-like leaves, and attractive soft china-blue broadly bell-shaped flowers. For the eastern rock-gardener this is not an easy plant to grow. I have raised it in an alpine house for several years, but in all this time it has not yielded a single bloom. Moreover

it doesn't seem to bear up well under our hot, dry summers. It was only with constant attention, last year, that I was able to save a couple of plants. A picture of it can be found in Gabrielson's "Western American Alpines."

C. lasiocarpa, which is found in the Canadian Rockies, and northward to Alaska, is certainly a gem, and, with me, is more amenable to cultivation than *C. Piperi*. It forms tufts of rather small, bright green, spoon-shaped leaves, and flower stems that rise about 5-6 inches, each stem bear-

ing a fairly erect, graceful blue bell at the top. There is also a white variety.

C. pilosa var. *dasyantha*, or as it is often called, just *C. dasyantha*, is a low plant with spoon-shaped basal leaves narrowing into a petiole, and large deep blue, slightly nodding terminal flower on the end of each stem, —the margin of the corolla, as well as the calyx being somewhat soft-hairy. It has been found on Unalaska Island, and the islands of Behring Strait.

Cincinnati, Ohio.

The Propagation of Some Deciduous Trees From Soft-Wood Cuttings

C. C. THOMAS

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The increasing interest in shade and ornamental trees is giving rise, through selection, to a large number of forms, the breeding and selection of vigorous, rapid-growing types of our timber trees and the introduction of new species from foreign countries. As a result there is an increasing demand for more information relative to the vegetative propagation of a large number of deciduous trees.

Budding and grafting are commonly employed, but these methods are often far from satisfactory for propagating selected types. Stocks may not be available, or if available they may not be compatible. Suckering of the stock is a serious difficulty, because of the danger of having the bud or scion crowded out or lost. The small size of the buds makes budding difficult in some plants.

If uniform plants that are true to type are to be propagated, the surest means is from cuttings. For many of our ornamental deciduous trees little information is available relative to their propagation from cuttings and

their subsequent behavior on this own roots.

The writer having a considerable number of species and varieties of maples available, attempted in the spring of 1933 to propagate some of them by cuttings. Dormant hardwood cuttings, 3 to 4 inches long, were used in the first test, with the results shown in Table I.

The benches in which the cuttings were grown were covered with glass cases 24 inches high, one side of which was made of glass doors the full height of the case. The benches were heated electrically by thermostatically controlled lead-covered cables. The thermostats were set at 72° F. and the sand temperature varied 2 or 3 degrees above and below this point. The overhead temperatures in the cases were generally about 5 degrees less, although at times they reached that of the sand. Forty cuttings were used in each lot, and these were set to a depth of 1½ to 2 inches in sharp washed sand which had a reaction of pH. 6.22.

From the data in Table I it is evi-

TABLE I
HARDWOOD CUTTINGS

| | Cuttings made | Number of days required to root | Percentage rooted |
|-----------------------|------------------|------------------------------------|----------------------|
| Acer barbinerve | 3- 8-33 | 65 | 20 |
| caudatum ukurunduense | 2-27-33 | 28 | 80 |
| cissifolium | 4- 4-33 | 36 | 20 |
| rufinerve..... | 4- 5-33 | 40 | 80 |
| rufinerve | 4- 9-33 | 36 | 75 |
| tschonoskii | 4- 5-33 | 36 | 80 |



Left, *Cornus florida*. Two-leaf heeled cuttings showing rooting at the lower end and one inch above on the stem.

Center, Hybrid chestnut. Roots came from the stem above the large callus.

Right, Plants resulting from softwood heeled cuttings rooted in the spring of 1933 and photographed December 6, 1935. Left to right, *Acer rubrum* (1 and 2), *Acer palmatum* (3), *Acer pictum mono* (4)

dent that hardwood cuttings of the five species of maple used were rooted in from 4 to 9 weeks, and that the percentage of rooting was from 20% to 80%.

When the young stems developing from the buds of these rooted cuttings were about one inch long and had 4 or 5 leaves, the oldest of which was not more than half developed, they were pulled with a heel and inserted in the sand bed under the same conditions provided for the hardwood cuttings. As the season advanced similar young twigs were pulled from plants growing out of doors. All of the leaves were left on these cuttings and the lower portion of the petioles of some of them were in the sand. The leaves and stems continued to increase in size, and a good percentage developed roots as is shown in Table II.

It is evident from Table II that for the seventeen species of maple

represented, the percentage of rooting of soft-wood heeled cuttings varied from 35% in *Acer rubrum* to 100% for 3 other species. The time required for rooting varied from 18 days with *Acer negundo* to 55 days with *A. argutum*. With small lots of 10 to 15 cuttings of each of *A. rufinerve*, *A. caudatum ukurunduense* and *A. negundo*, the time has been ten days for rooting 50 to 90%. This quick rooting is undoubtedly due to the condition of the cuttings since they were grown at the same time as others that required 3 or 4 weeks to root, and under the same conditions.

A few of these soft-wood heeled cuttings from horticultural varieties of Japanese maples were tried with the results shown in Table III. The potted plants from which these cuttings were taken were received from Japanese and English nurserymen. The slow growth of such plants made

TABLE II
SOFT-WOOD HEELED CUTTINGS

| | Cuttings made | No. days to root | Percentage rooting |
|------------------------------------|---------------|------------------|--------------------|
| <i>Acer barbinerve</i> | 4-25-33 | 28 | 80 |
| <i>barbinerve</i> | 4-20-33 | 30 | 70 |
| <i>carpinifolium</i> | 4-25-33 | 28 | 80 |
| <i>cissifolium</i> | 4-25-33 | 21 | 85 |
| <i>ginnala</i> | 4-25-33 | 21 | 85 |
| <i>mandshuricum</i> | 4-25-33 | 28 | 75 |
| <i>miyabei</i> | 5- 1-33 | 37 | 50 |
| <i>palmatum</i> (stock plants).... | 5-11-33 | 21 | 65 |
| <i>pictum mono</i> | 4-25-33 | 28 | 90 |
| <i>pseudo-sieboldianum</i> | 4-25-33 | 21 | 90 |
| <i>rufinerve</i> | 5-11-33 | 30 | 87½ |
| <i>rufinerve</i> | 7- 3-33 | 24 | 67½ |
| <i>tschonokii</i> | 4-25-33 | 21 | 85 |
| <i>negundo</i> | 2-25-33 | 18 | 100 |
| <i>rubrum</i> | 6- 1-33 | 35 | 35 |
| <i>argutum</i> | 5-14-34 | 55 | 50 |
| <i>caudatum ukurunduense</i> | 4-26-34 | 30 | 100 |
| <i>mandshuricum</i> | 4-26-34 | 28 | 80 |
| <i>micranthum</i> | 5-14-34 | 21 | 100 |
| <i>psuedo-sieboldianum</i> | 4-26-34 | 30 | 85 |
| <i>pseudo-sieboldianum</i> | 6- 1-34 | 35 | 80 |
| <i>triflorum</i> | 4-26-34 | 28 | 75 |

it impossible to get more than a few such cuttings from one plant so that the number used varied from one to not more than five.

These results are given merely to show that the varieties of *Acer palmatum* can be rooted from such cuttings. The slow growth of such plants is

reflected in the longer time required to root the cuttings, the time varying from 35 to 140 days with all but one rooting within two months.

OTHER PLANTS

The Chinese redbud, *Cercis chinensis* has been rooted from soft-wood

TABLE III
SOFT-WOOD HEELED CUTTINGS OF JAPANESE MAPLES

| | Cuttings made | No. days to root |
|---|---------------|------------------|
| <i>Acer palmatum decompositum</i> | 6-19-33 | 35 |
| <i>sanguineum Chishio</i> | 3-13-33 | 140 |
| <i>siegenii</i> | 6-19-33 | 35 |
| <i>trifidum</i> | 4-21-33 | 37 |
| <i>atropurpureum</i> | 4-19-34 | 57 |
| <i>reticulatum</i> | 4-30-34 | 59 |
| <i>sanguineum</i> | 4-30-34 | 56 |
| <i>scolopendrifolium</i> | 4-30-34 | 59 |
| <i>Shishigashira</i> | 6- 3-35 | 64 |



Acer cissifolium. Heeled cuttings after 5 weeks in the cutting bed.

heel cuttings that were about 3 or 4 inches long and a little older than those used in Table II, usually having one leaf that was almost full grown and the remainder in various stages down to ones that were one fourth to one-half inch across. In these cuttings the growing tip was always present and drooped somewhat the first few days they were in the cutting bed. This type of cutting taken in June and July from outside plants has rooted from 75% to 90% in three to four weeks.

Cuttings of this same kind taken from a black locust tree growing outside were 75% rooted in four weeks.

Both the typical *Cornus florida* and the red form have been rooted from heeled cuttings taken in May, June,

and July. These cuttings usually have two leaves, although some from the top branches have four, and occasionally six. In pulling these from the branches on the tree, only a very slight heel or none is obtained, but they were placed in the cutting bed just as they came from the tree. The ones taken in May about the time the trees were through flowering were 100% rooted in three weeks, while those taken in July were 52% rooted in 5 weeks, and 80% in seven weeks. Four leaf cuttings rooted more quickly and had more roots than two leaf cuttings. Cuttings taken in July from large trees with large leaves rooted 10 days sooner than those taken from young trees, less than 4 feet high, with leaves that were approximately

1/3 smaller. As shown in the photograph the roots develop not only at the lower end of the cutting but well up the stem.

After many trials with a great variety of types of cuttings and attempts at layering, one small lot of chestnut cuttings has been rooted. We believe this is the first reported success with chestnut. Stem cuttings about four inches long with the tip were used. These cuttings were taken in July and were from hybrid plants growing in a greenhouse. Chestnut cuttings always develop a large thick callus and the roots in these cuttings came from the stem above the callus. (See photograph page 104.) It is interesting to note that one lot of chestnut root cuttings left in the cutting bed for one year did not produce any top growth, but several of them were alive and one had new growth from the tip about three inches in length as well as a good many new smaller side roots.

Peat moss has not been found beneficial when used as a part of the rooting medium. In fact the response of the cuttings is slower where peat is used, resulting in slower rooting and a much lower percentage of rooting.

There is some variation in the way these soft-wood cuttings root. Most

of them root at or near the callus, but frequently roots are produced farther up the stem. As shown in the photograph, *Acer cissifolium* developed an excellent root system in five weeks. These cuttings were 85 per cent rooting in 21 days.

The subsequent growth and development of such plants is important. The plants developing from these soft-wood heeled cuttings are growing at least as rapidly as seedlings of the same species. Annual increase in height during 1934 and 35 for plants rooted in 1933 has been from 6 or 8 inches in some of the varieties of *Acer palmatum* to 12 or 18 inches in *A. rubrum*, *A. pictum mono* and others.

The later development of the root system as shown in the photograph is ample. Some of these roots at the time of digging were followed in the soil for a distance of three feet almost straight down. At that point the roots were $\frac{1}{4}$ inch in diameter.

This photograph shows that good trees with well developed tops and roots can be produced from soft-wood heeled cuttings.

The results here reported are sufficient to indicate the importance of soft-wood heeled cuttings in the propagation of deciduous trees.

A Standardized Metal Marcot Box for Plant Propagation

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The multiplication of plants by marcottage is an ancient practice of the Oriental plant propagator. In Occidental countries the method generally has been considered too laborious to be practical in extensive operation. In India the English term "Gottee" has been used in place of marcot; while in China it is usually spoken of as an "air layer" to distinguish it from the common Western ground layer or cutting.

In spite of the mechanical difficulties involved in controlling heat, light, air, and moisture conditions both before and after removing marcots from a parent tree, there is probably no better method of securing in a short time well established, vegetatively propagated plants on their own roots. Much progress has been made in recent years in the successful propagation, in electrically controlled, even temperature, high humidity chambers, or in solar frames, of leafy cuttings and marcotted tips of many subtropical, woody plants. Under field conditions one of the chief difficulties of successful marcottage has been the necessarily persistent, moderate, almost daily watering of the soil medium surrounding the ringed branch before it is severed from the parent. A metal marcot box is a great aid in preventing the drying out of the medium, and in encouraging callus and root formation by absorbing heat.

In the handling of *Citrus* and *Litchi*, and many other genera of subtropical fruits and ornamentals, marcottage is

particularly effective, and is extensively used by nurserymen in the Orient. A ring of bark is removed from the branch selected for the operation. When the establishment of large trees is desired the branch operated upon may be an inch or more in diameter. A ball of heavy clay soil, reinforced with chopped straw or grass, is then tied around the wound; and this is most faithfully watered while callus and roots develop. Leaves are not cut back or removed so extensively as in cuttings where the supply of water is largely cut off and no adequate check is put upon transpiration. In marcotting young tip growth, mature leaves should be retained so that they may function in the elaboration of carbohydrates which nourish the base and hasten the formation of roots. When roots fill the ball of earth, or the soil medium, usually on from one to four months, the branch or twig is severed from the parent tree, and the new plant is hardened off in the nursery.

Adaptations of this method of marcottage are particularly applicable in the introduction and distribution into new areas of plant forms which are difficult to transfer by seeds. The reproduction of desirable varieties is best assured by vegetative propagation. When new plants are thus established upon their own roots there is no danger of influence or transfer of forms used for stock. Young tip growth is the most suitable in propagation for transport purposes, not only



Plate I

Orange twig, ringed at A, ready for marcot (upper left). The same twig balled with mud and rice straw in the Chinese fashion. The same twig (lower right) with a halved flower pot filled with a suitable medium. The same twig with a metal marcot box.

because the young wood roots the most readily, but also because such material is relatively free from insects and disease. To meet these requirements of propagation for overseas shipments a gradual evolution of an ancient practice is now taking place. Today modern marcottage gives promise of extensive use by scientific plantmen, nurserymen, fruit growers, florists and door yard gardeners in many climes.

The first step away from the application of the ball of mud was to improve the soil medium through the proper mixture of sand, pulverized sphagnum or peat. Next an ordinary flower pot or tin can was severed into two halves and tied around the ringed or wounded portion of the branch, after which it was filled with soil. In this stage the chief difficulties encountered were in the construction of the containers, and in the rapid drying out of the medium.

The second step was in the design of a pasteboard box, with bottom and lid so constructed that each could be filled with moistened soil medium and fit snugly around the ringed branch. The two halves were then bound together with raffia, string or tape. Eugene V. May and Robert J. Bullen, plant propagators of the Bureau of Plant Industry, first devised this method for use in the Washington greenhouses. Public Service Patent 1,655,731 was granted on their design January 10, 1928. The writer has successfully used several sizes of these paste board boxes which were made by George P. Killian Company of Washington, D. C., at costs ranging from \$30.00 to \$40.00 per thousand. Difficulties in the use of these boxes have been: (1) labor involved in tying; (2) rapid drying out of the medium in dry atmosphere, necessitat-

ing the opening of the boxes to re-moisten; (3) breaking off of young roots in opening and removing the new plant from the two halves of the box, particularly when it was desired to save the box for future operation; and (4) the very rapid deterioration of the boxes even when paraffined or when used under comparatively dry conditions.

While propagating plants at Canton, China, where summer rains are very intense, and humidity is very high, the idea was conceived of using brass sheeting as material for the construction of the marcot boxes. Chinese brass workers were employed in making the boxes by cutting out the form from sheets of thin brass, folding and soldering across the edges. In the use of these brass boxes in the open we soon discovered that they neither became too wet in heavy rains, nor dried out too rapidly in dry weather. They absorbed the heat of the air and sun better, producing at times the equivalent of bottom heat often available in greenhouse propagation. They were longer lived than pasteboard boxes. However, the parts, handmade, lacked uniformity in size, and were not all interchangeable. Furthermore they readily split apart at the soldered edges, and had to be frequently repaired.

Recently while engaged in the propagation of citrus fruit trees for shipment to China, at the Subtropical Fruit Production Laboratory of the United States Department of Agriculture at Orlando, Florida, improvement in the design and construction of metal marcot boxes has been studied. Blue prints and specifications of a new design were drawn up through the interest of Mr. B. D. Kunkle of General Motors Corporation, Detroit, Michigan. Blanking dies

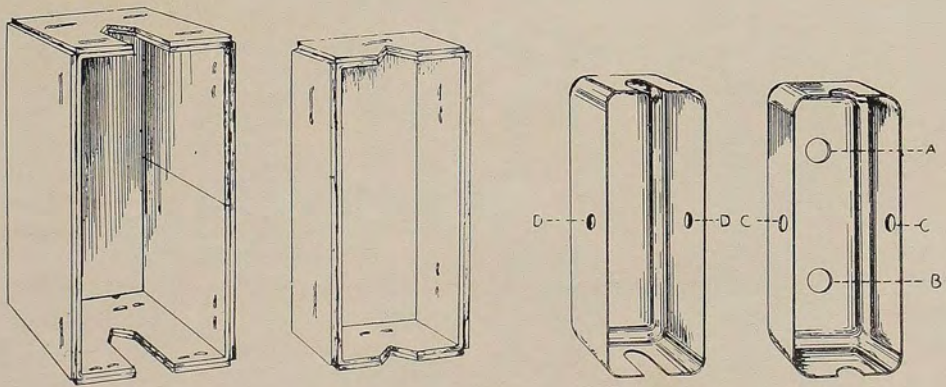
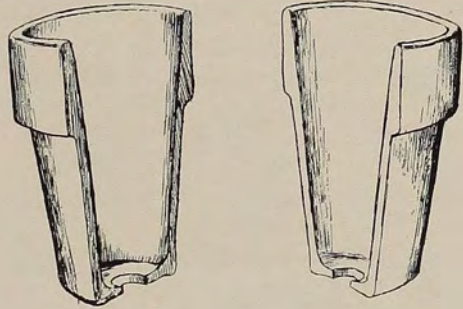


Plate II—Evolution of marcottage

The Chinese marcot; the halved rose-pot; the pasteboard marcot box (May and Bullen); the new box. In the latter, the upper hole A is for watering if needed; B for observation; C and D indicate the fastenings.

have now been made by the latter firm whereby the boxes are constructed by machinery in two seamless drawn pieces of .021 inch brass with rounded edges. The dimensions of the halves are such that they fit snugly together over a branch about the size of a pencil. The outside measure of this marcot box is 4" x 1 $\frac{3}{4}$ " x 1 $\frac{1}{2}$ ". The ready insertion of the branch is made possible by suitable cut-outs in the ends of lip and box, whereby an almost perfect circular hole, 3/8" in diameter, appears in the center of both ends of the box when the lid is fit snugly into position. This hole accommodates the branch. In the pasteboard box designed by May and Bullen the lid is the larger portion, and must be partly filled with medium before using it to cover the bottom portion which is completely filled with the medium. In the present design the lower half of the box is the larger portion and contains all the medium. The lid fits over this into a natural position, and is readily freed from the section containing the medium without seriously disturbing any roots that may have formed.

At the time of boxing the twig, the bottom portion of the box is first packed with the prepared medium to a depth somewhat above the curved base of the incisions for the twig. This is then placed around the twig so that the ringed portion is in a position slightly less than half-way down the box, being somewhat below the upper hole in the lid when the latter is fitted into position. The twig then rests in the medium in such a way as not to be jammed down against the edges of the incisions, in which case the bark may be cut. The latter can be protected, however, by strips of paper or cut rubber tubing. The box is finally filled and packed tightly

with the medium, and the lid is clamped into place.

An empty box weighs 3 1/5 ounces; and one filled with a suitable mixture of one part pulverized German peat and three parts clear river sand which has been moistened to the point of saturation, but with no water exuding upon pressure in the hands, weighs 9 3/5 ounces. A weight as light as this will not bend down the branches under operation to any great extent.

Two holes each 3/8" in diameter have been stamped out in the cover of the box, serving for ready inspection, aeration, and possibly watering. When roots begin to fill the box they can be seen protruding from the lower hole, indicating that the time has come for severing the new plant from the parent. If the soil medium becomes too dry, as in exceedingly dry weather, the holes in the lip can be taped over to prevent evaporation. Water can be applied, without opening the box, through the upper hole by fountain pen filler or small syringe.

An additional, important feature of the machine-made box makes tying unnecessary. This was incorporated by Mr. Kunkle of General Motors Corporation. A slight spherical raised surface of the brass has been stamped into the middle of the sides of the box portion, with corresponding holes in the cover, so that when the two parts are pressed together they tend to hold in place without binding. This is important, for tring is difficult and laborious, especially for one working alone.

Boxes of the present type are especially designed for the rooting of small plants from immature wood. Such are especially benefitted by a combination marcot-cutting method whereby the ringed twigs are callused for

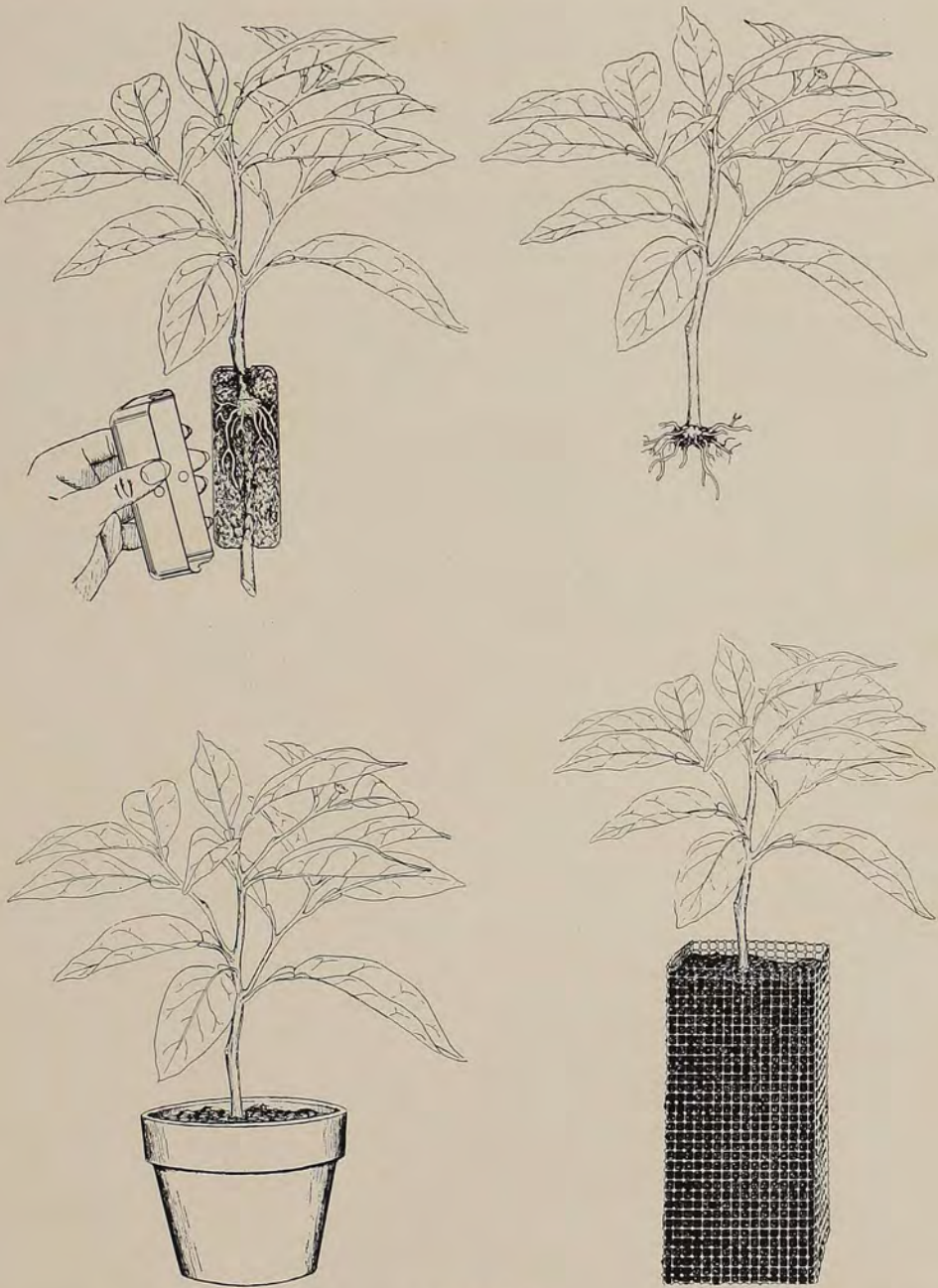


Plate III

Removal of marcot box after rooting; the rooted cutting washed free of the rooting medium; the cutting potted; the cutting planted in wire-mesh containers for compact shipments.

a few weeks, then severed from the parent plant, cut back to the callus, and thereafter treated as cuttings plunged in sand or slightly organic medium, under bottom heat and high humidity facilities. The writer has found, in handling subtropical forms, that generally speaking, the new plants prosper better when severed from the parent plant at about the time the roots begin to form. The marcot is then planted in thumb, rose, or azalea pots in soil medium of slightly heavier nature than that employed in the marcot boxes. These are then plunged in sand in the solar or electrically heated frame when roots quickly fill the pots. The plants are thereafter transferred to larger sized pots, wire baskets, or wooden boxes until they are ready to set out in the open. Many temperate and tropical plants can readily be propagated by these methods with a minimum of equipment. Daily interest and attention is advantageous, especially at the time when first removing the marcots from the trees.

Larger marcot boxes suitable for the propagation of larger branches and more mature wood could be designed

and made of materials other than brass. Aluminum and bakelite has been considered. Thin glass could be inexpensively moulded into desired size and shape, and broken when roots fill the space, thereby entailing a minimum of disturbance to the newly established root system.

Standardized marcot boxes, as described above, are not as yet available through seed houses, nurseries, or distributors of garden equipment. Additional experience will no doubt bring about further changes in size and design. The present type, brass, machine-made boxes are light in weight, uniform in construction, and durable. In addition to their application to the rooting of plants for foreign plant introduction, they are also well adapted to the multiplication of dooryard and greenhouse woody plants, and to experimental work in plant propagation. Present manufacture is in quantity of not less than one thousand. Until further introduction through retail houses quotation for smaller quantities can be secured by addressing American Foundation, Lingnan University, 150 Fifth Avenue, New York City.

Bomarea, a Genus of Showy Andean Plants

E. P. KILLIP

THE traveler wending his way along a narrow mountain trail in the Andes finds the monotony of the dark green vegetation broken by great globes of brilliant red and yellow flowers. Actually terminating a long vine which clambers over the shrubs, these dependent globes seem suspended in midair, so slender is the stem which supports them. The plants belong to *Bomarea*, of the Amaryllis family, a genus little known to North Americans and only infrequently introduced into cultivation anywhere.

During the middle years of the past century several species were brought into cultivation in England, arousing the interest not only of horticulturists but also of taxonomic students. It is natural, therefore, that the principal systematic work on the genus should have been done by English botanists. Many species were first described from living material in the Royal Botanic Gardens at Kew, and we have numerous illustrations of *Bomarea* in such publications as the *Gardeners' Chronicle* and *Curtis' Botanical Magazine*.

The first comprehensive monograph of Amaryllidaceae was the beautifully illustrated work of Dean William Herbert, published in 1837, in which 44 species were listed under *Bomarea* and 10 under *Collania* and *Sphaerine*, groups which usually are considered subgenera of *Bomarea*. Several were proposed as new in succeeding years, mainly by Baker, Masters, and Kränzlin, and all known species were

brought together by Baker in his monograph¹ of the family, which is the most recent treatment of Amaryllidaceae as a whole and in which 75 species of *Bomarea* are recognized. This number has been greatly increased during the present century as a result of the studies of Kränzlin and Sodiro.

Early in my Andean travels my interest was aroused by these showy plants, and our expeditions to Colombia and Peru have brought back a great amount of herbarium material. The attempt to classify this brought realization that the genus was greatly in need of critical study, and I have therefore undertaken the preparation of a monograph of *Bomarea*. Some of the new species detected as a result of these studies and described formally in a recent paper² are illustrated in the present article. More field work is necessary, and I hope that this account will inspire travelers to the native haunts of *Bomarea* to make collections of these interesting plants and to bring back seeds or young plants for horticultural purposes.

Not all bomareas are high-climbing vines with masses of red and yellow flowers, such as I have described. Some have stiff wandlike stems only a foot or two high; others, growing among grasses, have lax stems and are nearly procumbent. The roots of certain species (*B. ovata* and allies) bear large edible tubers. The leaves are usually resupinate, that is, the petiole is twisted, so that the upper

¹Baker, J. G. Handbook of the Amaryllidaceae, 1888.

²Journ. Washington Acad. Sci. 25:370-377-1935.

surface of the blade is turned toward the base of the plant and the under surface toward the apex. The upper side of the leaves is glabrous in all but a few species, and the under side glabrous or pubescent. Near the tip of the stem, which is unbranched, is an involucre of bracts, which may persist a long time or soon fall off. In most species the flowers are borne in an umbel, but in a few the floral axis is elongate, the pedicels spreading at nearly a right angle. Two or three Peruvian species are strictly 1-flowered. The rays of the umbel are unbranched, hence 1-flowered, or they are one to four times forked, each fork bearing a flower, though sometimes the flowers of the lower forks do not develop. At these forks there usually is a bractlet. The ovary is inferior in most of the species, but in some it is so merged with a greatly enlarged style base that it may be considered partly superior. The perianth consists of six segments, the three outer (sepals) of one form, the three inner (petals) of another form. The sepals are generally of an oblanceolate outline and red, pink, or rose in color. The petals, which in some species greatly exceed the sepals, have an oblong or cuneate blade, which tapers to a long claw. Their color is yellow, orange, or red, rarely green, white, or scarlet, with or without spots or blotches of purple, brown, or red. Both sepals and petals are often greenish toward the apex; in only one species are both greenish white or cream throughout. The fruit is a 3-celled capsule, longitudinally dehiscent in most of the species, but apparently indehiscent in a few. When the capsule bursts open, exposing the numerous bright red seeds, the effect is almost as striking as at flowering time.

Bomarea is most abundant in the Andes from Venezuela to Peru, at altitudes between 4,500 feet and timber line. A few species are found at lower elevations and several inhabit the high mountain plateaus, or páramos. Brazil and Argentina have about a dozen species; one is known from Chile, and one from British Guiana. *Bomarea edulis* grows on some of the larger islands of the West Indies, and a few species occur in southern Mexico and Central America.

About 18 species belong to the well-marked subgenus *Wichaurea*, which by some authors has been considered a separate genus under the name *Collania* or *Wichaurea*. These plants grow at high elevations, and are commonest in Peru and Bolivia. They have stiff, nearly erect stems and a nodding inflorescence. The leaves are usually very narrow and revolute, and are often strongly ascending. In *B. involucrosa* the flowers are green or cream-color; in the others the sepals are red or pink and the petals yellow. *Bomarea campanuliflora* has bell-shaped flowers, with very broad sepals. *Bomarea zosteræfolia* has long slender leaves, which are somewhat spreading, and an open umbel of flowers. Among other species of the subgenus *Wichaurea* are *B. fiebrigiana*, *B. uniflora*, *B. dulcis*, and *B. glaucescens*, the last being the best known if not the only species of this group occurring in Ecuador.

Another subgenus which sometimes has been treated as generically distinct is *Sphaerine*, which contains about 25 species and ranges along the mountains from Venezuela to northwestern Argentina. The leaves vary from linear to ovate; the umbel rays are simple or forked; the fruit, so far as known, is indehiscent; the stems are either erect or lax and somewhat de-



Bomarea involucrosa (Herb.) Baker
Kalenborn 5, from Oroya, Peru



Bomarea campanuliflora Killip
The type specimen, Raimondi 10299, from Puno, Peru



Bomarea zosteræfolia Killip
The type specimen, Martinet 742, from Ancachs, Peru

cumbent, never climbing as in true *Bomarea*. To this group belong *B. pumila* of Peru, the smallest bomarea known, and *B. squamosa*, an Ecuador plant with scalelike leaves. The largest-flowered representative of this subgenus is *Bomarea salicifolia* Killip, sp. nov.³ In this plant, which is glabrous throughout except for an indument on the sepals and petals, the stem is straight, or nearly so; the leaves are linear-lanceolate, acuminate at both ends, and are about 35-nerved; the outer bracts are leaflike and somewhat falcate, the inner ones linear-lanceolate; the umbel has about 10 ebracteolate unforked rays; the oblanceolate rose-colored sepals and the cuneate-spatulate, yellow, purple-dotted petals are of nearly equal length. Among other species of *Sphaerine* are *B. linifolia* and *B. incana*, of Colombia; *B. hartwegii*, of Ecuador; *B. nervosa* and *B. distichophylla*, of Peru; and *B. boliviensis*, of Bolivia.

The remaining species of *Bomarea*, about 50 in number, belong to the subgenus *Eubomarea*. Most of them are twining vines with lanceolate or oblong, rather distant leaves, red or pink sepals and yellow petals (often dotted or mottled), and 3-angled fruit, which is dehiscent along the angles. The species of this subgenus fall into four main groups, which, following

the general scheme of Baker's monograph, may be characterized thus:

Umbel rays simple.

Sepals and petals subequal (*Multiflorae*).

Sepals much shorter than the petals (*Caldasianae*).

Umbel rays forked.

Sepals and petals subequal (*Edules*).

Sepals much shorter than the petals (*Vitellinae*).

Bomarea superba and *B. formosissima*, of Peru, belonging to the group *Multiflorae*, bear large flowers, an inch to an inch and a half long; most of the other species of *Multiflorae* have smaller flowers, but as they are often very numerous the plants make a brilliant display. Here belong *B. multiflora*, of Colombia; *B. purpurea*, a species of a rather wide distribution, the flowers of which are deep orange and deep red; *B. aurantiaca*, of Peru and Bolivia, with a dense yellowish indument clothing the stem and the under side of the leaves; *B. cornigera* and *B. caudata*, of Peru, with their sepals terminating in a horn; *B. crassifolia* of Colombia and *B. setacea* of Peru, with thick leathery leaves; and *B. densiflora*, in which there is usually present a definite floral axis.

The most showy of all the bomareas belong to *Caldasianae*, for here we have plants with both many-flowered heads and large individual flowers. Especially striking members of the group in Colombia are *B. racemiflora* Killip, sp. nov.,⁴ *B. floribunda*, *B. vegasana* and

³*Bomarea (Sphaerine) salicifolia* Killip, sp. nov.—Ubique glaberrima, segmentis perianthii exceptis; caulis strictus vel substrictus, 50 cm. vel ultra altus, 2-3 mm. diam.; folia lineari-lanceolata, 11-13 cm. longa, 1-1.2 cm. lata, petiolo 8-10 mm. longo, utroque acuminata, ca. 35-nervia; bractea persistentes dimorphae, exteriores subfalcatae, 4-5 cm. longae, 7-8 mm. latae, interiores lineari-lanceolatae, 1-1.5 cm. longae, 2-3 mm. latae; radii ca. 10, simplices, teneri, 3-4 cm. longi, ebracteolati; ovarium turbinatum; segmenta perianthii subaequalia, 4.5-5 cm. longa, sepalis oblanceolatis, ca. 1.2 cm. latis, roseis, intus ad basin dense pilosulis, petalis cuneato-spathulatis, ca. 1 cm. latis, luteis, purpureo-punctatis ad basin pilosulis; antherae ovatae, ca. 4 mm. longae; pistillum staminibus subaequale.—Trujillo, Venezuela, 2,450 m. alt., *Punck & Sehlim* 729 (typus in herb. Paris.)

⁴*Bomarea (Eubomarea § Caldasianae) racemosa* Killip, sp. nov.—Caulis volubilis, crassus, 7-10 mm. diam., rufo-tomentosus; folia lanceolata vel ovato-lanceolata, 10-20 cm. longa, 3-3.5 cm. lata, apice longe acuminata, membranacea, supra nitida, subtus rufo-pilosula; bractea inferiores ad 6 cm. longae et 2 cm. latae, superiores ad 1.5 cm. longae et 3 mm. latae; inflorescentia racemosa, rachi ad 10 cm. longa, pedicellis 6-10 cm. longis, rufo-tomentellis, bracteis lineari-lanceolatis; perianthium maximum, coccineum, sepalis lineari-oblongis, 5-6 cm. longis, ca. 1 cm. latis, petalis cuneato-unguiculatis, quam sepalis longioribus, in costa puberulis; stamina 5-5.5 cm. longa, inaequalia, antheris oblongis.—Dintel, Department Cundinamarca, Colombia, altitude 3,000 meters, January 1, 1925, *Schultze* 65 (typus in herb. Berol.).



Bomarea fiebrigiana Kränzl.
Bues 2120, from Cuzco, Peru



Bomarea uniflora (Mathews) Killip
Savatier 1454, from Cajavilca, Peru



Bomarea pumila Griseb.
Bues 2151, from Cuzco, Peru

B. frondea, and in Ecuador *B. patacoccensis*, *B. lutea* and *B. saloyana*. *Bomarea racemosa* is one of the largest-flowered bomareas known. It has been confused with the Ecuadorian *B. patacoccensis*, which has much narrower leaves and petals and a sparsely pubescent stem; at least two illustrations in the *Gardeners' Chronicle* under that name actually represent *B. racemosa*. This new species has a stout stem, which is densely reddish-tomentose. The leaves are lanceolate or ovate-lanceolate, and rufo-pilous beneath. The bracts are of two forms, the lower ovate-lanceolate, the upper linear. The inflorescence is racemose, the floral rachis of the type specimen reaching a length of four inches. The stout pedicels, 20 to 60 in number, are divaricate from the rachis at nearly a right angle and, though unforked, bear near the middle a linear-lanceolate bractlet about half an inch long. The flowers are scarlet, the petals being spotted with dark brown and yellow at the base. The sepals are two to two and a half inches long, and the petals two and a half to three inches long and nearly an inch wide.

A single species of these large-flowered representatives of *Caldasianae*, *B. costaricensis*, occurs in the mountains of Costa Rica. The most common species of the group, however, is one with smaller and usually fewer flowers, *B. caldasii*, plants of which are growing well in Golden Gate Park.

Within *Edules* we find a group of about 20 species which are separable on rather slight differences and which have always given difficulty to the monographer of *Bomarea*. Without discussing the subject in detail I may say that *B. edulis*, the only *Bomarea* in the West Indies, is clearly not con-

specific with *B. ovata*, of Peru, with which it has often been confused. Outside of this immediate relationship the species of *Edules* are well marked. Of special interest are the small-flowered Chilean plant, *B. salsilla*, the only species described by Linnaeus within the genus now known as *Bomarea*; the linear-leaved *B. parvifolia* and *B. angustissima*, of Peru; *B. hieronymi*, of Colombia, with sharply acute perianth segments; *B. campylophylla* of Peru, with falcate leaves and bracts; *B. carderi* and *B. shuttleworthii* of Colombia, with very large flowers in a lax umbel; and *B. perlongipes*, also of Colombia, with exceptionally long umbel rays and large leaflike bractlets.

Vitellinae, the group with forked rays and unequal perianth segments, is a small one. Here belong *B. schultzei*, a Colombian species distinguished from other *Vitellinae* by the broadly ovate sepals; *B. vitellina*, a showy plant, also from Colombia; and *B. declinata*, of Peru.

Only a few of these numerous species of *Bomarea* have been brought into cultivation. In Bailey's Standard Cyclopedia of Horticulture eight are mentioned: *B. oligantha*, *salsilla*, *carderi*, *chontalensis*, *shuttleworthii*, *patacoccensis*, *caldasii*, and *vitellina*. *Bomarea racemosa* has been grown under the name *B. patacoccensis*. In an interesting account of the bomareas in the Glasgow Botanical Garden⁵ Banks lists three hybrids, *B. whittonii* (*carderi* x *edulis*), *B. matthewsii* (*edulis* x *carderi*), and *B. banksii* (*caldasii* x *patacoccensis*). Commenting on the cultivation of bomareas Banks says, "Bomareas are not as widely known as they deserve to be, especially when one considers how

⁵Garden 89:671. 1925.

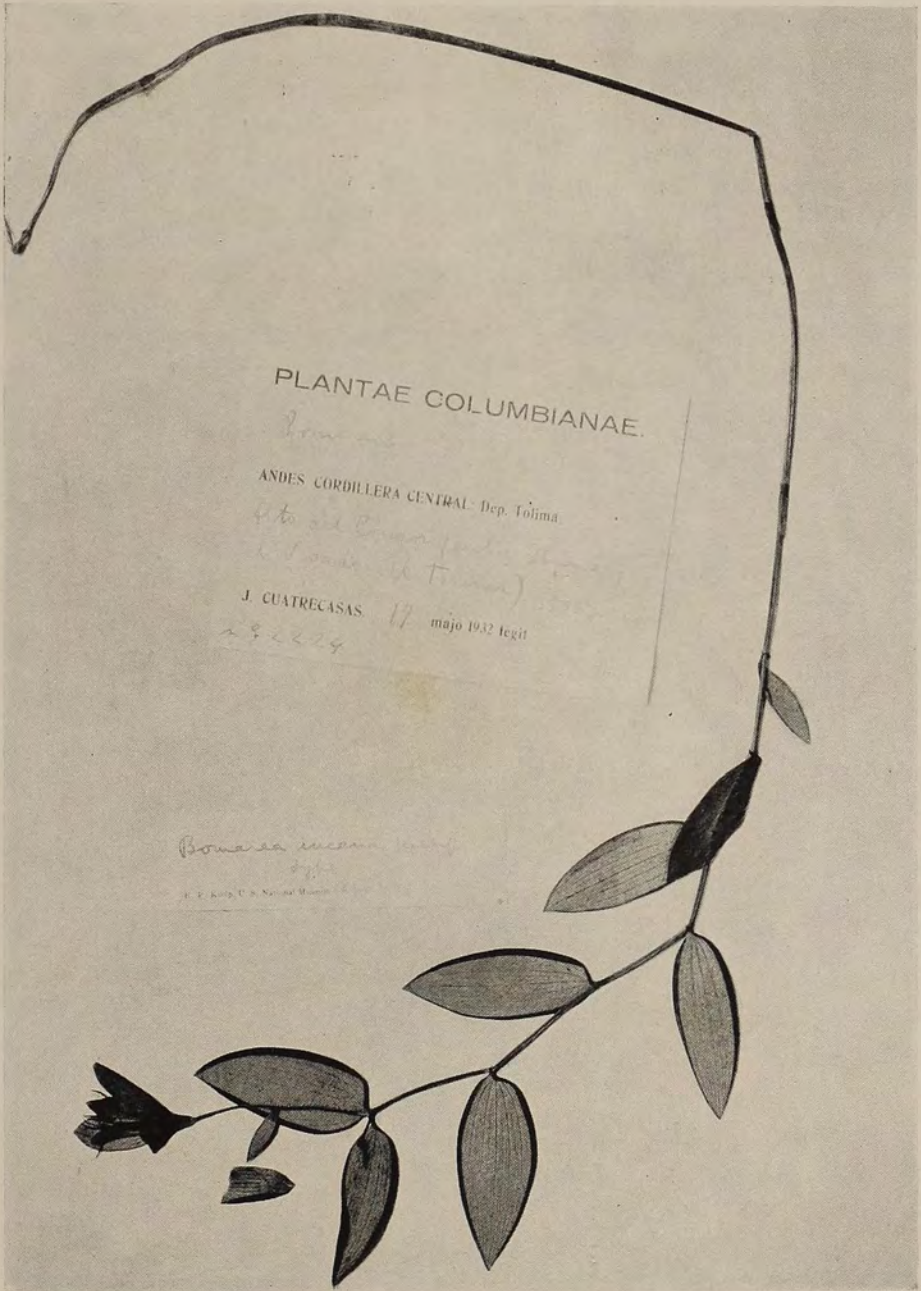


Bomarea salicifolia Killip, sp. nov.

The type specimen



Bomarea purpurea (R. and P.) Herb.
 Killip and Smith 17819, from Santander, Colombia



Bomarea incana Killip

The type specimen, Cuatrecasas 2224, from Tolima, Colombia

easily they are grown. All they need, if grown in pots, is a support for their long twining stems, and a light position in a cool house. If planted in a border and the shoots supported on wires, they will amply repay the little trouble spent upon them by producing a succession of their drooping bell-shaped flowers." In the Standard Cyclopedia we learn further that they thrive in a rich fibrous soil and require plenty of water during the

growing season, which begins early in the spring. Late in the fall the stems are cut down to the ground and the roots kept in dry soil.

Obviously *Bomarea* has pronounced possibilities in horticulture. In view of the wide-spread and intelligent attention now given to the introduction of ornamental plants from tropical America, it is hoped that there may be a revival of interest in this strikingly handsome genus.



T. E. Hazen

Bomarea linifolia (H.B.K.) Baker
Quindio mountains, Colombia

A Book or Two

Manual of Cultivated Trees and Shrubs. By Alfred Rehder. The Macmillan Company, New York. 1934. A reissue at reduced price. \$5.00.

This is a technical book but it is one that every gardener who makes any pretense of serious effort should have in his garden library. If it has any omissions, they are chiefly of plants for the Pacific Coast or the Gulf States in which areas the introduction of exotic plants has proceeded at an enormous rate in the last decade.

Now that garden clubs have undertaken such studies as the review of the cultivated species of genera commonly represented by a few well-known species, this volume is particularly useful to the amateur. For example, if one were to require a quick reference for all the wild roses, the barberries, the flowering crap-apples, the cotoneasters to name but a few genera, he would find his information here.

Cultural matters are quite properly not given first attention but there are many data included that give the key to cultural procedure.

Descriptions are given in botanist's terms but these are defined in the glossary and with a little use become familiar and valuable additions to one's working vocabulary giving one a new clarity of expression.

Dr. Rehder's distinctions are too well known to call for any comment and none is attempted here. Writing from the Arnold Arboretum he has the advantage over many systematists of writing amid a world-famous collection of living plants so that his text is not as dessicated as it might have been had he known only herbarium sheets.

Again let it be said that any garden-

er who makes a pretense of serious work should get his personal copy at once, if he is not already its proud possessor.

Vegetables and Berries. By Adolph Kruhm. Doubleday Doran and Company, Inc., Garden City, N. Y. 1936. 88 pages, illustrated. \$1.00.

One of the series of small practical volumes for the beginner, this book devotes five chapters to general discussion of what to do in the fruit and vegetable garden, one chapter to a plan for a family of five, a long chapter to a discussion of vegetables, one to berries and a final chapter to various matters that a gardener should know to make his work still more successful.

As would be expected, the text though brief is written with authority and pleasant clearness and with enough enthusiasm to make the gardener who has abandoned part of his one-time vegetable garden to flowers, seriously consider a restoration, and the novice who has never yet known the epicurean delight of his own green peas or sweet corn, set for himself a summer's work.

The Gardener's First Year. By Alfred Bates. Longman, Green & Co., New York. 1936. 246 pages, illustrated. \$2.00.

Only too often the gardener learns to garden merely by gardening. Sometimes his initiation is attended by adventures, sometimes by disasters, often both. As he surveys his grown-up beginnings he might well wonder how much better he would have done had he begun in his youth with a safe and interesting guide in his hand. Mr. Bates' book was written for children but like some other well-loved books will probably be read with even quicker appre-

ciation by adults. This does not imply that children will not like it or find it usable. They will. It is simply written, entertainingly related, addressed to their intelligence and native curiosity. The diagrams and illustrations are clear and inviting. If you want it for your boy or girl, leave it in their way; if you are wise, read it yourself and perhaps you will need two copies. Remember it is for beginners. If you have reached the stage where you are concerned only with collecting variant forms of crataegus or are bored by anything less than bi-generic cattleya crosses, don't bother with this. It is a book for the first year and deals with annuals, those most beloved and often most illy-used flowering plants, discussing them in an alphabetical order, but prefacing this with matters of garden making, nomenclature and other things one should learn early in life. Unlike the book which is written for children, this is intended only for the eye of adults.

The American Daffodil Yearbook 1936. The American Horticultural Society, Washington, D. C. 1936. 76 pages, illustrated. \$.50

It is perhaps unusual to review a publication of the Society in the pages of the JOURNAL, but so many members of the Society do not see it that perhaps for that reason alone it should be discussed. In addition it represents the year's work of The Narcissus and Tulip Committee of the organization.

Like its predecessor, the year book for 1935, this attempts to touch the interests of as many lovers and growers of narcissus in as many parts of the country as is possible. Not all are included in any issue, but in this we travel from coast to coast and from New Hampshire to Texas. What could be more inclusive? If more is needed, there is word from Canada and two

reports from the 1935 Daffodil Conference of the Royal Horticultural Society in Great Britain.

Four Seasons in Your Garden. By John C. Wister. J. B. Lippincott Co., Philadelphia, 1936. 306 pages, illustrated. \$2.50.

In spite of its alluring title, this is another garden book that tries to cover the wide field of garden endeavor. Fundamentally, it is a book of garden planning in terms of plant materials and their uses. There is, to be sure, an opening chapter, headed, "The Four Seasons," but it is mostly given over to a diatribe on misplaced trees, needed and valuable but not apropos.

The chapter on planning is routine; the chapter on soil preparation rather general but useful. Evergreen and Deciduous Trees have a chapter to themselves but even in the confines of a small chapter many old and tried friends are missing. The Small Flowering Trees fare better on the whole as do the evergreen shrubs. With chapters VII and VIII on Shrubs, the author finds a happier stride particularly with lilacs and deciduous azaleas. The chapter on Perennials has a clever division between plants not to be grown from seed and those to be grown from seed, but perhaps only those who have done the opposite will fully appreciate its worth.

Bulbs for Spring and Summer Bloom is almost as felicitous as the passages on lilacs and azaleas, and one leaves it with regret to see what is to be said about annuals. And, one hunts in vain for the thought that annuals will often rescue one from mid-summer's inertia. Lawns and ground covers have scant attention and rock gardeners won't like the chapter on that subject. Water Gardens are barely mentioned, but Roses get their inevitable share of attention. Hardy

Vines and Pests are bowed to—scarcely more.

Home Propagation is an interesting and intriguing chapter.

Winter Gardening — Indoors and Out, are short chapters, but valuable and adorned by charming pictures.

The rest is a month by month calendar.

The illustrations are most interesting. The photographs for the most part are beautiful, but curiously placed so that one looks at them from all angles, except upside down. The line drawings are clear, sometimes beautiful but often quite unneeded as for example, the drawing of *Magnolia stellata* opposite a fine full page photograph.

This is a difficult book to appraise. One's general impression is that it suffers from having included too many themes and not enough development of any one, save in those few places where Mr. Wister's personal enthusiasm broke away from space restrictions. It is difficult also to be sure to what audience it is addressed. It is apparently for the beginner and for those who live north of Washington and east of Chicago. It certainly is not, as the jacket would have you believe, "The year around book for every garden lover." If, like the reviewer, you are old and hardened in garden sin, you will not want it except as you are interested in all that this author writes, but if you are new at gardening, get it and use it as a base from which you will work away toward those phases of gardening that suit you best.

The Complete Book of Gardening.
By Ten Well Known Authorities.
Doubleday, Doran and Co., Inc.,
New York, 1936. \$2.35.

For the most part this looks like ten

books under one cover with various degrees of cement to hold them together. If you didn't like the separates that were put out first, maybe you'll prefer this. They have been reviewed before so there is no need of saying more here.

The Garden Dictionary. Edited by Norman Taylor. Houghton Mifflin Company, New York, 1936. 888 pages, illustrated. \$16.50.

It is still a matter of doubt to this reviewer as to how a dictionary should be reviewed. One can use a dictionary or read a dictionary, but review it with difficulty. Perhaps more than any other type of book it suffers from the necessities of space. Much must be included; much must be left out least the book become too huge.

The present volume was intended to include "those (cultivated plants) likely to be of interest to the average intelligent or even inquisitive amateur." To these items were added articles on all the many topics that concern gardeners, discussions of regions and geographical areas, some trade-marked articles and other matters that seemed essential. Cross-references are given without number. Pronunciation is given great care. Text illustrations are numerous and informative. There are also color plates, among them an exquisite reproduction of a Sargent water color.

Although ever present, botany as such is subordinated to gardening so that the book is useful to the gardener rather than to the systematist.

The result is such that the gardener who wants only the answer to his question finds it and in addition finds what he needs to know when he begins his search for more specialized material. In addition and just as important, the result is a readable book.

The Window Garden. By Bessie Raymond Buxton. Orange Judd Publishing Co., New York, 1936. 158 pages, illustrated. \$1.50.

This is a simple book born of experience. It has to do with plants that have been grown in house windows all their days and has little to say about those plants that are bought, stood in windows for a time, and then discarded. It makes no pretense of describing all the plants that might be grown in windows, but limits itself to those that have been grown there.

The first chapter has to do with Soil and Culture; the second, Propagation; the third, Potting and Watering. All three are developed by a discussion of examples rather than by abstractions.

Geraniums, Begonias, Bulbs and Unusual Plants each have a chapter to themselves.

No one who has had the thrill of buying a potted geranium can fail to be moved by the descriptions of all the varieties that one might have. This is particularly true of the Zonale section, and those persons to whom a geranium is a red geranium and nothing more might do well to read this chapter.

One would expect Mrs. Buxton's book to have a fair share of begonias. Since this reviewer knew a whole bay-window of begonias in his youth he does not need persuasion as to their variety or charms. At the moment he would prefer geraniums, but he commends this chapter and the many begonia pictures to all home gardeners.

The chapter on bulbs is brief and not very interesting. Apparently the author has not succumbed to the search for varieties that has led her so far with geraniums and begonias.

The chapter on unusual plants does

not include as many unusual species as does the next chapter on hanging pots.

As in all books there are some points one would like cleared up. In this case, the reviewer would like to know how often the pots are turned around to the light; how many tons of earth are carried in and out each year, and if there is any useful basis of compromise as to which windows shall have plants and which not, and as to whether or not the flowers shall be for the room or the passerby.

The Living Garden. By E. J. Salisbury. G. Bell & Sons, Ltd., London. 1935. 320 pages and index; 17 plates and numerous drawings. 10s. 6d. net.

This is one of the most instructive garden books of recent years. The author explains in clear and simple language the life history of a plant and its relation and response to soil, climate, moisture and human care. It is written by a botanist who is also a gardener, a very happy combination, since he therefore takes a wider view of his science than that of laboratory examinations and herbaria consultations. He constantly calls attention to the need of the botanist for the observations of the horticulturalist in order to arrive at a more thorough understanding of plant life.

The book is a delightful and an entrancing record of, as the subtitle expresses it, "the how and why of garden life." No better review of the book could be given than to list the headings of the chapters:—What is a Garden; The Soil; Sunlight and Shade; Cold and Warmth—Frost and Fog; Concerning Alpines and Rock Plants; The Garden under the Soil; The Spring Emergence; The Garden Cosmopolitan; Vegetable Propagation;

Seed Production; Scent and Color; Seeds and their Germination; Weeds; The Changing Year and the Changing Day; On Cutting Lawns and Hedges; Plant Names; The Span of Life.

The illustrations are especially praiseworthy. The plates are not only excellent photography but are also very beautiful, even when showing the Leaf Skin of the Crown Imperial. The line drawings which are scattered through the text are the most delightful, and at the same time the most perfectly exact, plant sketches that this reviewer can recall ever having seen. They are perfect little gems to which one loves to return to time and again for the sheer joy of their clear simplicity. So splendid a book beautifully written and sympathetically illustrated is not often found.

After reading it one returns to the garden with a keener understanding of plant-life and a far better knowledge of gardening. It is a book to enthuse over and it should be on the shelves of every one who is interested in plants of any sort or in gardening in any and all of its phases.

A. B.

Rock Garden Plants. By Clarence Elliott. Edward Arnold & Co., London. 1935. 323 pages including index; colored frontispiece and sixteen plates. American Agent, Longmans, Green & Co., 114 Fifth Ave., New York. \$3.00.

This reviewer is going to make so many little carping criticisms that it is best to start out by saying the book is very good, contains much helpful instruction as to the growing of the plants, the use of them in the various parts of the garden and, as a rule, splendid descriptions of the plants. It is refreshing to find a

book wholly devoted to the plants themselves and not loaded with detailed accounts as to how and where the rock garden should be made. There has been so much written on that phase that any up-to-date gardener knows the essentials of the art, or should know them. What is needed are books about the plants themselves; accurately written from first hand knowledge and not from botanical treatises compiled by persons who have never seen the living plant. This is exactly what the author has done.

He is, therefore, to be praised for giving us plain, honest descriptions of the plants mentioned; as he states in his introduction—only such plants as he has personally known are included. "By limiting myself to plants which I have actually known, and mostly grown—or sometimes killed—I have, of course, left out many good things. I have, on the other hand, left out a great many boring plants." The only trouble about leaving out "boring plants" is that the reader of the book may not always agree with the author as to what things should be included under this term.

The genus *Alyssum* is a case in point. The author frankly states that he does not care for the group and lists only *A. A. tortuosum*, *saxatile* and *maritimum*, this last! "like most annuals, is not quite appropriate in the rock garden proper, though it may be sown broadcast, and in strict moderation, here and there along the margins of the rock paths." With such a statement the omission of *A. A. idaeum*, *montanum*, *serpyllifolium* and even *rostratum* becomes glaring. Allium, cyclamen and iris are included yet other small bulbs and corms are left out. Among the irises, *persica* is

omitted while *I. I. reticulata*, *histrion*, *histrionoides* and *Danfordiae* are included and the pumila group is considered unappropriate.

The statement is made that seeds of cyclamen will not germinate "under twelve months, and never give up hope under two years." This is not at all the case if the seed is soaked in water for twenty-four hours before planting; this reviewer has always had germination within eight weeks since following this practice. Barr advises it on all the packets of seed and the author should have known this.

It is not clear whether the author considers *Sedum Sempervivum* as a distinct species or an error occurs in the name. It is listed in the paragraph which follows *S. sempervivoides* as though the two were separate plants—at any rate it is frowned upon because of its good red color.

Rhododendrons are sadly absent for no reason at all. The repeated story of the seed-cake smelling *Thymus herba-barona* could have been omitted so as to give space to the inclusion of *Th. Th. erectus* and *nitidus*. And *Veronica canescens* is not "a ridiculous piece of New Zealand vegetation, a mere cobweb spread upon the ground, set with brownish pinhead leaves," but a lovely and delicate bit of fine, lacy filigree which in June is covered with a continuing succession of pale blue blossoms, large for the size of the plant, which spangle the filigree of foliage in a most delightful and joyous manner. A. B.

Garden Variety. By Sir Arthur Hort. Edward Arnold & Co., London. 1935. 244 pages and an index; frontispiece portrait of the author in his garden. American agent, Longmans, Green & Co., 114 Fifth Ave., New York. \$4.20.

Some years ago, quite by accident, *The Unconventional Garden* by the same author came into my hands and, after glancing through a few pages of it, was at once purchased. Long before it was half finished it was placed second to E. A. Bowles' invaluable garden trilogy, now, alas, out of print, and it has continued to retain that place in this reviewer's esteem ever since. This post-humous volume lives up to the promise of the first book in every respect. The author's recent death will be deeply regretted by all gardeners and his terse, keen observations upon plant life will be greatly missed by those who have derived pleasure and profit from his writings.

Perhaps it is because the reviewer is so keenly in accord with the author's garden ideals as expressed in the introduction, "the garden may be looked on chiefly as a home for a choice collection of plants" as against the type of garden in which the "general effect may be the prime consideration." The author is far too much a garden lover to decry color schemes or mass plantings but wisely remarks that "a plant should surely be put where it is most likely to thrive, and the choice of position should not be embarrassed by having to consider too lover will agree with whole heartedly deeply how it fits into a scheme. It does not follow that this consideration will be ignored, but the needs of the plant will come first, and, if a little imagination is exercised, there will be few distressing results. Nature's provision of foliage as a setting will resolve the discords of colors which association in a vase without greenery might scream at each other." This is sound common sense which every plant and is the type of common sense which marks all of Sir Arthur's writing.

The book is divided into four

parts, each dealing with one of the seasons. This word being used arbitrarily, winter being that period of the year which embraces the months of November, December and January, in accordance with the milder climatic conditions of England and should be moved a month forward by American readers. The first three parts had been completed by the author before his death and the last one was compiled by his wife from the notes which he had left. There are two very interesting chapters on rock plants and one on shrubs in the parts which Sir Arthur completed and in the last part an exceptionally good chapter on plants for the "bare patches" in the garden.

In the main the plants discussed are not those mentioned in his earlier book; but he has wisely included some of them when he felt called upon to revise his earlier observations or desired to point out additional notes of interest or amplify cultural needs. While some of the plants mentioned would not generally prove to be hardy under ordinary conditions here, the lists of *Galanthus*, *Potentilla*, *Globularia*, *Allium* and *Geranium*, to mention only a few, should prove an incentive to American gardeners to widen their plant knowledge and endeavor to obtain a larger range of gardening material.

Sir Arthur's garden is on chalk which limited his garden activities to lime-loving plants but the wealth of material treated is so varied and so interesting that the omission of species demanding an acid soil is not noticed except when he calls attention to it. There is a splendid plea to grow selected forms of native plants which we Americans who have for so long neglected our native flora might do well to ponder over. There is also an excellent chapter on "The Amateur

Propagator."

It is a stimulating book delightfully written by a garden enthusiast and should take its place among the most necessary books of every gardener's library. The author's closing words express the aim of the book: "My hope has been by jottings from my own experience to encourage some to be rather more enterprising in the planting of their gardens and so to give them the charm of greater variety."

A. B.

The Romance of Gardening. Capt. F. Kingdon Ward. Jonathan Cape, London 1935. 271 pages and 16 plates. 10s, 6d.

With this book Captain Ward steps out of his role as plant hunter and shows us another side of his life, that of an earnest and enthusiastic gardener. The book is written in an easy and delightful style which gives it even more charm than his plant hunting books. He is more interested in the plant from a garden view point than from that of novelty. To quote from the blurb on the cover, "It is at once authoritative, informative and enjoyable—a permanent contribution to real gardening literature."

A listing of some of the chapter headings will give a good idea of the scope of the work and the excellent ideas which the book contains. The Lure of Flowers; The Perverseness of Plants; Shrubs and Trees; Flower Shows; The Geography of the Garden; Alpines; Where Our Plants Come From; Unfavorable Climatic Conditions and The Owner Gardener. There are also several chapters upon plant hunting and the discovery of several new plants.

The illustrations are excellent. But they are after the crude modern manner of occupying the full page or

seeming to be trimmed down in order to fit the size of the book which to this reviewer's ideas makes a book cheap and gives it an unfinished appearance. The subject matter is worthy of far better placed photographs.

A. B.

Clematis. By Ernest Markham. Country Life, London, 1935. 110 pages with an index and numerous plates. American agent, Charles Scribner's Sons, New York. \$6.00.

A most valuable little book on a genus of plants which is sadly neglected in this country. The author has had many years' experience with his subject and deals with the species as well as the modern hybrids. The book is clearly and concisely written and will be a standard manual for clematis growers for many years to come.

The first part of the book treats of cultivation, propagation, pests and diseases, etc., and is followed with a long descriptive list of species and hybrids and lists of the best clematis for various uses. The illustrations are all excellent; many of them not only show the variety clearly but are also suggestive as to the manner in which it may be used.

Probably its greatest asset for American gardeners is the chapter written by J. E. Spingarn of Amenia, New York, who has for many years been our foremost grower of this genus. Mr. Spingarn not only gives cultural directions for this country but lists those species, varieties and hybrids which have proven hardy with him in his own garden and also in several other portions of this country. With such information available it is greatly to be hoped that this lovely group of plants will be more widely grown than they have been in the past. A. B.

The Practical Garden Notebook. By Ellen Browder Bean. 5748 Harper

Ave., Chicago, Ill. 1935. Practical Edition \$1.00; Regular Edition \$2.50; Gift Edition, \$3.50.

This, in the regular edition, reminds one of a loose leaf notebook except that much more is done for one than the inclusion of blank pages. There are twenty stiff index pages to separate one's working sheets into appropriate headings and fifty-four page units carefully printed with every conceivable heading under which to record all the salient characteristics of the plant itself, its source its location in the garden, its cultivation, special uses the gardener may put it to, its liabilities and its history. Twenty-four blank pages provide for the excess of your comment. All that is needed to organize your plant knowledge is done for you. All you must do is to make the entries. If you want a record of all you know about a plant, here is a clear, well-organized way to keep it.

George Forrest. Published by The Scottish Rock Garden Society, Edinburgh, 1935. 90 pages, illustrated.

More and more the gardening world is interested in the work of plant explorers whose labors make possible the introduction of plants from all over the world. One of the most interesting and successful of such explorers was the late George Forrest who was singularly successful, enriching our gardens particularly with new species of *Rhododendron*, *Primula*, *Nomocharis* and *Gentiana*.

This small volume gives brief notes as to his life and works, followed by various reprints from his published writings, many illustrations of the country of his search and the plants particularly associated with his name. Every true lover of plants will read it with pleasure and an increased sense of his indebtedness.

The Gardener's Pocketbook

Rhododendron yedoense var. *poukhanense* (See page 140)

For the gardener who lives in the North and covets the masses of large-flowered azaleas that flourish only in the South, there are few plants to be considered and of these some are distinctly disappointing if they are measured against the southern possibilities. This species is such a plant.

Coming from Korea, it is hardy to cold and its hardiness extends not only to wood hardiness, but to bud hardiness fairly well north and inland.

What then does one have; a vigorous, widely spreading twiggy shrub almost deciduous and with a rather good range of yellow to bronzy red colors in the autumn, and in spring a mass of large purplish flowers that vary somewhat in size, form and hue. The word purplish is chosen advisedly for by no chance can one escape it. Although seedlings do vary somewhat and the kindly eye can detect in some a rosier hue than others, the mass of color is a violet pink such as one sees in red bud as it ages or in some of the old hundred-leaf roses. For some gardens, this alone, is enough to outlaw the plant, so be warned.

Hedera nepalensis

In the January issue, on page 37, is a very beautiful and interesting illustration of an ivy which is erroneously named *Hedera Helix chryso-carpa*. This plant should be called *Hedera nepalensis*; the veining and the shape of the leaves, even in the fruiting spray shown in the plate, would establish this without the de-

scription in the text of the orange berries.

This plant is a distinct species and is not a variety or a form of *Hedera Helix*. It is a native of Nepal, where it was first discovered by Nathanael Wallich in 1824; it is also a common vine throughout the southern slopes of the Himalayas. At first it seems to have been regarded as a variety of *H. Helix* and later as a variety of *H. colchica*—why such mistakes should have been made I cannot understand for its very distinct from either species. In 1853 Koch recognized it as a distinct species and gave it the name of *Hedera nepalensis* but no one seemed to pay any attention to his name for more than seventy years. Hibbred, in his ill-advised book on The Ivy, 1872, called it *Hedera Helix cinerea*. In 1884 Andre published it as *Hedera aurantiaca*. Even Dr. Tobler in his excellent monograph on the Genus *Hedera*, 1912, proposed the name of *Hedera himalaica* in ignorance of the previous name given by Koch; which error he subsequently corrected in 1927 and acknowledged the priority of Koch's name of *Hedera nepalensis*.

As far as I have been able to trace it the name *H. Helix* var. *chryso-carpa* has never been used by botanists (though it has by nurserymen) for this plant; but is a synonym for *Hedera poetarum* (Bertolini, 1827). This latter name has been used either as a specific name or as a form of *Helix*, which makes the confusion worse. Rehder uses the name as a variety of *H. Helix* and gives the naming of it to Tenore; Bean uses the name in a specific sense and gives it to Walsh—no dates are given in either case, but research has uncov-

ered the fact that Walsh was a missionary who found the yellow-berried ivy (*H. poetarum*) growing outside Constantinople at sometime during the 1820's and sent seeds or plants to the Royal Horticultural Society.

The plant in question — *Hedera nepalensis*—and as shown in the January issue, came to me from both Dr. Eric Walther of the Golden Gate Park of San Francisco and Mr. James West of San Rafael, California. It has proven to be a most excellent house plant as it does not seem to be as susceptible to the attacks of red spider as other ivies when grown indoors. It branches more freely from the base than other ivies and so forms a more compact plant. Cuttings root very slowly, and only in a rooting medium of equal parts of sand and peat moss. For this reason I have not been able to distribute it through the east in order to test its hardiness. As far as I know it is not grown in any other part of the country excepting California.

When more plants are available, I think it will prove to be a popular house plant and hope that it will prove reasonably hardy, at least in the belt as far north as Washington. This is reasonable to suppose as *Helix colchica* has proved to be hardy as far north as Mrs. Pinchot's garden in northern Pennsylvania.

ALFRED BATES.

Prunus serrulata Lindl. Oriental Cherry, Ojochin (See page 141)

Included in the rather large group of Oriental flowering cherries characterized by having white, single flowers, is an excellent variety that for some unknown reason has not yet become well known, although it has much in its favor.

While actually the flowers are sin-

gle, with an extra petal only occasionally, the roundish petals are so wavy that the flowers appear to be double, especially from a little distance. In size also, the flowers are noteworthy, being about two inches wide and they are produced in long-stalked clusters, with three to five flowers in each cluster. The Japanese name which means "large lantern," must have originated with some ardent admirer who conceived the name on some moonlit night when he saw the large white flowers swaying to and fro on their long slender stalks in the gentle breezes.

The flower buds are slender cone-shaped, and clear pink, the fully opened flowers are either pure white or have a faint pink or flesh-colored tint. They are borne very freely and remain attractive as long as other single varieties, especially in cool seasons with little beating rain.

In habit of growth the tree is upright, developing with age a well-shaped and rather wide crown, with a maximum height of about twenty feet. The bark is brownish gray. The very young leaves are coppery, appearing when the flowers are at their best.

The individual flowers of Ojochin are remarkably like those of Ariake at first glance, but in the latter variety the petals are not fluted, nor are the flowers produced so freely. Furthermore, Ojochin makes a better-shaped tree, branching three to four feet from the ground, while in Ariake the branches are likely to arise from near the base of the trunk.

Ojochin is established in a few places on the Pacific Coast and in one or two places in the East but it is not as generally grown as it should be and is offered by only a very few nurseries.

PAUL RUSSELL.

Washington, D. C.



Lilian A. Guernsey

[See page 137]

Rhododendron yedoense var. *poukhanense*

Coreopsis auriculata

In this species we have another native of the United States found growing from Virginia to Florida, yet rarely offered in the trade and not well known. Like so many of its family it seems to be found more abundantly in the open fields where the soil is not very fertile and it is in the full sunlight. Bailey's Standard Cyclopaedia of Horticulture does not mention this species but does mention the related *C. pubescens* which grows much taller and differs in foliage and flowers.

My experience with *C. auriculata* has been most favorable during the three years I have been growing it. It took two years to discover the correct name under which to list this most acceptable find and I am much pleased therefore to introduce it now to gardening friends.

C. auriculata makes a tufted rosette of basal leaves usually oval sometimes lobed at the base. The principal flowering stem has from two to four smaller leaves from the base of which come the later flowers. The flowering stalk is from eight to ten inches tall, in my experience although it is said that they may reach eighteen inches. The usual height is ten to twelve. The flowers are a clear chrome yellow, somewhat deeper at the base of the petals. The flower is about two inches across with narrow individual petals toothed at the tip.

The plant gives the effect of a clean cut *C. grandiflora* in a miniature form with shinier leaves that are less lobed. It fits well into the sunny border and can be placed well in the foreground. The foliage holds well through the entire season making a good green both before and after flowering which is from the middle of June through July and August.

In it we have a good summer-

flowering perennial that combines well with *Nepeta* Souv. de André Chaudron and with *Verbena canadensis*. Another pleasing combination is *C. auriculata* with *Salvia farinacea* and *Eupatorium coelestinum*. When considering an all yellow effect a grouping of *C. grandiflora*, *Oenothera Youngii*, *Papaver arcticum* and *Coreopsis auriculata* would make a spectacular mass here at one time. It could be followed by the yellow heleniums, Zinnia Golden Queen, Marigold, Guinea Gold and chrysanthemums R. Marion Hatton and Yellow Gem. This would give a complete yellow section in a border until frost.

In the rock garden *C. auriculata* can be planted in conjunction with *Lavendula vera* Munstead, *Hypericum Moserianum* but perhaps it would be better in the smaller rock garden with *Hypericum repens* and *Ceratostigma plumbaginoides*. *Chieranthus Allioni* in its later flowering would also give an effect that would not go unnoticed. To this grouping might also be added *Asclepias tuberosa*.

To make this article complete I suppose some mention should be made of the soil preferences of this plant. They are very simple. Any good garden soil with good drainage and not too much undecomposed organic matter will do provided the situation is one giving full sun or light shade. Full shade is not satisfactory.

I. N. ANDERSON.

Ballston, Va.

Rhododendron × *Conecago*

Under the above caption a hybrid of *R. carolinianum* and *R. mucronulatum* originating here in 1930 has been recorded in the 1935 Yearbook of the British Rhododendron Association, and again in Dr. Bower's excellent new work, "Rhododendrons and



E. L. Crandall

[See page 138]

Oriental Cherry, Ojochin

One-half natural size

Azaleas" (Macmillan 1936).

This cross seems to possess some characters worthy of note although in most respects it is intermediate. It is not an "azaleodendron" in spite of the fact that *R. mucronulatum* is often listed as an azalea which it definitely is not. Its botanical affinity is undoubtedly with the lepidote rhododendrons, possessing the typical scales of this group, together with aromatic bark and foliage which, common among the lepidotes, is certainly not characteristic of the azalea series of the Genus *Rhododendron*. Therefore, it seems that *Rhododendron* × *Conewago* is a hybrid of two lepidote rhododendrons of fairly close relationship and the noticeably increased vigor of the F₁ seedlings over either parent tends to support this view.

Also all hybrids of *R. mucronulatum* with azaleas of the obtusum group that have flowered here are quite sterile producing neither pollen nor seeds whereas the subject of these notes produces both pollen and seeds in abundance. The leaves are larger than those of either parent and some are retained through the winter although its evergreen qualities are not so good as *R. carolinianum*, but that portion of the foliage that falls in autumn first assumes brilliant hues of yellow, orange, scarlet and crimson. The flowers are more nearly the color of the seed parent *R. carolinianum* but are larger and have ruffled margins. The fact that the flower buds are borne in the axils of the terminal cluster of leaves in groups generally numbering three to eight, which on opening have the appearance of a single large truss helps to make this hybrid an attractive bit of color in early spring when flowering somewhat later than *R. mucronulatum* it seems to be consistently able to evade

late frosts and to blossom at a time when it has the whole show to itself as far as rhododendrons are concerned.

A temperature of 22 degrees below zero (Fahrenheit) during the winter of 1933-34 injured neither the plants or the buds when much injury was noticeable to the buds of *R. carolinianum*. These traits lead one to hope that *R. Conewago* will prove a reliable and regular performer under our most adverse conditions.

The pink form of *R. carolinianum* was used in making this cross and for some reason was more successful than a hybrid from the white form (*R. carolinianum* var. *album*) produced at the same time which lacked vigor and died without opening a single flower. However, I feel that a hybrid of *R. mucronulatum* with *R. carolinianum* var. *album* should succeed and that my failure in this instance was not due to any inherent specific incompatibility, but to some other cause—cultural perhaps.

Very little variation is evident among the first generation seedlings of *R. Conewago* but future generations should produce variants that may be worthwhile.

While my success has not been phenomenal, summer cuttings seem to be the most effective method of clonal propagation. A fair percentage generally root. The plant habit is rather too upright for prolific layering and the ponticum stocks so universally used for grafting would be quite incompatible on account of the rather distant relationship. Even among closely related rhododendrons I feel that grafting is a practice to be avoided whenever possible, and that plants grown on their own roots are much to be preferred.

Primary interspecific crosses of any



Lilian A. Guernsey

Hybrid Rhododendron, Conewago

[See page 140]

importance whatever in any genus should by all means be recorded, for if in time the mating proves to be of merit and is used in further breeding among species or garden hybrids, or if selection and crossing *inter se* is practiced the plant breeders' work will not only be more simplified but no doubt can be more systematically planned when accurate records of ancestry are available.

Hence these notes on *R. Conewago*, which has been very sparingly disseminated at this time, and which needs a more thorough garden trial to prove its final worth.

JOSEPH B. GABLE.

Stewartstown, Pa.

Veronica repens DC (See page 145)

There may be places where this Corsican plant, strangely hardy to our cold, does all that it should do, but this far south it has many off seasons. With the best of luck, newly bought or newly divided plants set out in late summer spread into flat mats of slender prostrate stems, symmetrically lined with characteristic leaves that make an excellent pattern. These are not much damaged by the winter but if at all, the whole is quickly green again in spring to form a green background for the myriads of gray-white, blue-veined flowers, that tumble off with the slightest wind—to be replaced by others almost as swiftly.

Here, if the plants are left alone, the centers of the masses die away, leaving irregular patches of growth.

The usual comment in texts is that this plant prefers a moist soil and will endure considerable shade. In this part of the mid-South, this is poor advice, for if one combines moisture and shade, the plants are first feeble in growth and then decay, and if one

tries moisture and full sun he usually has mechanical difficulties.

Undoubtedly farther North the prescribed conditions would be best, but here, a well-drained soil, plenty of sun, even moisture and most important of all, an annual replanting seem to be required. The plant is worth it for it is one of the flattest of creeping plants and does not contribute to the general humpiness that makes so many rock gardens a chaotic mass.

Clethra alnifolia L. (See page 146)

The delightful fragrance of the sweet pepper bush fills the air in late summer in the same fashion that wild grape, black locust and Japanese honeysuckle perfume it earlier in the year, with moving waves of scent. So delicious is the fragrance that one is a little surprised at the flowers from which it is exhaled.

The plant makes a fair sized shrub of very erect growth that spreads by underground stems until a thicket is formed. Complaints are sometimes heard on this score, but in the garden here, there is no wish that its confines be smaller.

The foliage is rather handsome and turns yellowish in the autumn with some rusty tinting.

The whole glory of the plant, however, is in its flowering. The stiff flower racemes grow on almost every twig and branch, the individual flowers a rather dull white that shows a faint greenish tone in the inflorescence as a whole. But, the flowers might be wholly green and still be cherished for the perfume and their late flowering.

Silene pennsylvanica Michx.

This is a handsome Eastern native that is perhaps too often taken for



Michael Carron

Veronica repens

[See page 144]



Lilian A. Guernsey

Clethra alnifolia

[See page 144]



Michael Carron

Salvia pratensis

[See page 148]

granted. In the Potomac Valley it is common enough, so that one can bring in roots for the garden without misgiving. As they occur naturally in a moist, woodland soil of an enviable blackness and depth, they were planted on the edges of a scree in a deep soil made of the native earth to which had been added as generous amount of leaf compost as could be spared with enough coarse sand to insure drainage.

Now yearly the increasing crowns send up larger rosettes of their typical narrow leaves, that are hidden in season by the six inch flowering stalks. Nearly all the forms hereabouts are pale flesh pinks, although none are so pale as *Silene Wherryi*, and the deeper pink forms seem missing altogether. They add therefore a color note, as useful as white, in the general motley of spring bloom.

Salvia pratensis L. (See page 147)

After the more delicate flowers of spring many of the summer blooming perennials seem even more robust and splendid than they are, so that one looks for supplementary species and varieties, showy in themselves, but not so obvious, that will make the proper undertone of interest in the mixed herbaceous border. Among such plants one might well include this July-blooming sage—in one or more of its color form.

From its more or less fleshy roots the plant produces first a basal rosette of rather coarse but handsome leaves, often quite decorative enough to merit use, above which develop the branching flowering stalks with their smaller leaves and tier after tier of whorled flowers. The individual flowers are large and of a shape clearly shown in the illustration. The color forms here have always been a majority of deep

blue purple and a minority of reddish violet that would be much more treasured if the bluer forms had not been seen.

Like many other sages it seeds freely and one need not undertake special arrangements for its propagation. Like other sages, also, it resents too much moisture about the crown in late autumn and winter, a condition likely to end its garden life that is not indefinitely perennial at best.

Pentstemon hirsutus Willd. (See page 149)

To those fortunate gardeners who can grow with ease and abandon the pentstemons native to the Rocky Mountain Plateau or the Pacific Coast states, no Eastern pentstemon can look like very much of a garden plant. For the Easterner, however, who has seen the more precious species languish, and who wants a plant to fill the gap in the border after some earlier perennials and before the summer masses of phlox, this species and *P. laevigatus* are not to be despised.

This species makes dense tufts of luxuriant basal leaves that are tinged with dull red and purplish crimson during the cold months of the year. From these ascend the flowering stalks as the illustration shows. On the dry bank where these were growing the flower stalks were about eighteen inches tall, but in a garden border they were a little taller.

The flowers are of fair size and appear almost tubular as the reflexing calyx lobes are not so large as in some other species. In color they are a rather dull white with a tinting of purplish pink toward the base of the corolla tube.

Perhaps the time will come when some enterprising gardener will ex-



Michael Carron

Pentstemon hirsutus

[See page 148]

amine field after field in nature and find a few individuals perhaps whiter in color or with larger lobes, than can be perpetuated for garden use.

As for other pentstemons one should not provide too rich a soil or too much moisture if he wants even relatively long life. Seed and division are both easy.

Sparaxis tricolor Ker. (See page 151)

Now that South African plants are so well discussed, the Gardener's Pocketbook must include a species or two to be in the mode, even if one remembers that South African plants have several times before in the history of gardening had a place in the sun.

Californians, whose climate permits, will and should feel differently since often their best bulbous effects must come from other bulbs and corms than are familiar elsewhere. Were the present reporter living in that State, he would consider *sparaxis* only as a variant to *ixia* which he likes even better.

In the East it is a pot plant for the cool greenhouse. The corms can be packed into a generous pot just as one might plant freesias. A similar treatment should follow. When brought into flowering, the masses of grassy leaves will be accompanied by slightly taller stalks with brilliant flowers. Although the color range is reported as wide, the usual colors have been orange, stopped by a pattern in warm blackish brown, above a clear and brilliant yellow throat. As can be seen from the illustration the amount and shape of the dark pattern varies in different plants.

Since this is a spring-flowering plant it is somewhat difficult to keep the corms in safe storage for spring planting and in regions of cold winters

difficult to provide proper protection for winter since top growth is usually started with autumn rains.

Two Native Spiderworts

Tradescantia subaspera Ker-Gawl.
(See page 152)

T. canaliculata Raf. (See page 153)

It is with some misgiving that these notes are included since there is always the chance that the material grown, having been collected in the wild, does not represent exactly the species in its purest sense. As garden plants these are most worthwhile and it seems likely that all our species are worth more attention than they get.

Of course, acquaintance usually begins with the common and familiar *T. virginiana* now undergoing many changes in the hands of foreign nurserymen. In spite of many aspersions cast by visiting gardeners, these remain valued garden plants for shady spots where their fugitive flowers last far longer.

A list of collected native plants from Texas brought to my attention *T. reflexa* now more properly called *T. canaliculata*. It has persisted in the garden long enough and through enough bad winters that there can be no question of its hardiness. It has not, however, abandoned itself to the riotous living that other species enjoy. It is a question, therefore, whether the plant is hardy or is merely misplaced in its present location.

The picture indicates its habit and size. The color in this plant is a fine clear blue lavender.

The other species, once called *pilosa* but now *subaspera*, shows no reluctances. Its seedlings appear in every corner and its tall stalks if bent will root at every node. The flowers of this plant are much smaller than those



Lilian A. Guernsey

Sparaxis tricolor

[See page 150]



Lilian A. Guernsey

Tradescantia subaspera

[See page 150]



Lilian A. Guernsey

Tradescantia canaliculata

[See page 150]



Lilian A. Guernsey

Syringa reflexa

[See page 156]



Lilian A. Guernsey

Syringa

[See page 156]

of the Virginia spiderwort, but there are many more of them and they are borne in all the upper axils of the leaves, making a fine showing up and down the stalks. It flowers later in the season and continues well past mid-summer. Here, it has spread on dry slopes under light shade so that no extra moisture seems necessary.

Two Lilac Species

Syringa amurensis japonica (Maxim) Franch. et Sav. (See page 155)

Syringa reflexa Schn. (See page 154)

As gardeners are beginning to discover there are lilacs and lilacs, and in addition most of the lilacs differ radically from the familiar common lilac of the dooryard with claims of their own on our attention and affection.

The Japanese tree lilac flowers much later than the common lilac or the more commonly cultivated species. Its dimensions and habit are much more tree-like than even the oldest, most arborescent common lilac. Its leaves

are thinner and a slightly more yellow green. Its flowers are much more privet-like and not particularly sweet scented.

Its chief value, perhaps is not as a species to extend the lilac procession as much as an individual small flowering tree than can be used as a specimen among deciduous trees that have flowered earlier in the season and are now without particular interest.

Our other species is quite as different in its way and it is regretted that we do not have an even better picture to show. The chief objection to our illustration is the carriage of the flowers which were taken from the upper shoots of a rather young plant and do not show the characteristic drooping habit of the inflorescence that calls to mind the buddleia.

In color the buds are purplish rose but the flowers open to a much paler, pinker hue. The fragrance is faint and quite unlike that of the common lilac. Like many other species lilacs, this looks its best after the plant is fairly mature and well furnished with flowering shoots to insure an abundant flowering.

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All directors of institutions and secretaries of societies will receive a copy of our questionnaire at the beginning of December of each year. Replies should reach the Editor-in-Chief, Dr. F. Verdoorn, Leiden, Holland, not later than January 30th, as it will generally be impossible to make use of information received after that date. Directors

or Secretaries, who do not receive our Autumn Bulletin, which will reach them annually before Oct. 15th, are kindly requested to acquaint us of the fact at their earliest convenience, which will enable us to include them in our mailing list, and will ensure their receiving a copy of the questionnaire in December.

Prospectus, sample pages and further information may be had from the EDITORIAL AND PUBLISHING OFFICE, P. O. Box 8, Leiden, Holland.

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For its members the society publishes *THE NATIONAL HORTICULTURAL MAGAZINE*, at the present time a quarterly of increasing importance among the horticultural publications of the day and destined to fill an even larger role as the society grows. It is published during the months of January, April, July and October and is written by and for members. Under the present organization of the society with special committees appointed for the furthering of special plant projects the members will receive advance material on narcissus, tulips, lilies, rock garden plants, conifers, nuts, and rhododendrons. Membership in the society, therefore, brings one the advantages of membership in many societies. In addition to these special projects, the usual garden subjects are covered and particular attention is paid to new or little known plants that are not commonly described elsewhere.

The American Horticultural Society invites not only personal memberships but affiliations with horticultural societies and clubs. To such it offers some special inducements in memberships. Memberships are by the calendar year.

The Annual Meeting of the Society is held in Washington, D. C., and members are invited to attend the special lectures that are given at that time. These are announced to the membership at the time of balloting.

The Annual Meeting luncheon will feature a lecture by Mrs. F. Stuart Foote, "The Lure of the Daffodil." The Narcissus Show of the Garden Club of Virginia, April 15-16, and of the Daffodil Club of Maryland, April 16-17, make this a most important week for garden lovers.

The annual dues are three dollars the year, payable in advance; life membership is one hundred dollars; inquiry as to affiliation should be addressed to the Secretary, Mr. C. C. Thomas, 821 Washington Loan and Trust Building, Washington, D. C.