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The American Horticultural Society

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W. C. Wilson

Phyllodoce coerulea in flower and leaves of *Salix anglorum*.

Collecting Alpines in the Shickshocks*

WARREN C. WILSON

A COLLECTOR'S PARADISE

The very name "Shickshocks" arouses interest. To a plant collector it is much more than an unusual name. Personally, it brings to mind thoughts of many pleasant days spent in the field in search of alpines.

Several summers ago while returning from a collecting trip to Mt. Katahdin, Maine, I heard of these unusual mountains. During a brief chat with Mr. J. E. Mitchell, plant collector and nurseryman of Barre, Vermont, he related some of his plant-hunting experiences on the Gaspé Peninsula. This eastern tip of the Province of Quebec in Canada is famous for its magnificent scenery and interesting people. This, coupled with Mr. Mitchell's description of the extraordinary plants found on the sea cliffs along much of the Gaspé coast and on the rugged Shickshock Mountains of its interior, aroused a keen desire to visit the region.

Early the following summer (1935), much sooner than I had dared hope, it was possible to take a three weeks' trip to the Gaspé. So much of interest was found in the limited time available that it served only to whet my appetite. Within two years I was back again, the intervening summer having been spent alpine-collecting in the West.¹ And still much was left undone in the Gaspé.

*The word "alpine" as applied to plants is, unfortunately, very loosely used by various horticultural writers. Personally, I feel that it should mean those plants which, in a given region, are found only in the Alpine Zone (that is, above tree-line) and those kinds which reach their greatest abundance there. This brief definition takes into account most of those stragglers which go down into the Sub-alpine Zone or lower. It also covers those which range upward into the alpine regions from the lower zones.

¹For an account of this trip see NATIONAL HORTICULTURAL MAGAZINE, pp. 89-116, Vol. 17, No. 2, April, 1938, and *Nature Magazine*, pp. 370-372 and 377, Vol. 31, No. 6, June-July, 1938.

Last summer (1938) the third "expedition" set out to really finish the work. Members of the writer's family accompanied him on his first two trips and L. R. Clark and R. C. Siedler, both students at Cornell University, on the most recent trip.

Articles and books have been published in recent years describing the Gaspé coastal region—its people, scenery, and some of its more unusual plants. Botanists, geologists, foresters, and other scientists have investigated parts of the interior, but even at the present time there are large unmapped and unstudied areas. Since the Peninsula is some one hundred and fifty miles long and eighty miles wide, it would be a considerable task to cover the whole region. Some mining and prospecting are carried on and some of the more accessible parts are being lumbered. Sportsmen penetrate deep into the forests for salmon fishing and moose hunting. A few of the natives trap there during the winter; few, if any, permanent settlers are to be found in the mountainous and heavily forested central portion of this peninsula.

Perhaps an account of the more abundant and showy plants of Mt. Albert in the Shickshocks, and some of the experiences undergone while collecting them will be of interest because the interior of the Gaspé is so little known and visited.

INTO THE INTERIOR

Ours was the usual starting point for a trip to the Shickshocks—the small, south-shore town of New Richmond on the Baie des Chaleurs. Here or in nearby towns guides and supplies are secured before starting into the

"bush." On the first two trips I visited Mt. Albert with only a guide, on the last trip R. C. Siedler also accompanied me. Ernie Lawlis, my guide for the past two summers, is a fine fellow who knows the country well and how to make "roughing-it" a pleasure.

After leaving the coastal, and only through road on the Gaspé, we started inland along the Grand Cascapedia River. The relatively wide, gravel road is kept in good condition for several miles as it passes through pleasant, rolling farm country. Soon after leaving the last farms, the road becomes narrower, bumpier, and more crooked. Before entering the Gaspesian Forest Reserve (which has recently been made a National Park to protect all forms of wildlife²), we had to secure our *Permis de Circulation en Forêt*. A short stop at the roadside ranger's office took care of this legal detail. Except for the infrequent lodges of wealthy sportsmen on the river bank, all we saw were the apparently endless forests. The trees, both evergreen and deciduous, walled in the roadway. Over short stretches we drove at the very edge of the Cascapedia; usually the trees restricted our view. As one penetrates deeper and deeper into the interior, the steep sides of the valley close in and the mountains rise tier on tier as far as one can see. The road is remarkable for its extreme narrowness and serpentine windings. More than once upon rounding a sharp bend we suddenly came face to face with another car or lumber truck. It is perhaps fortunate that the condition of the road makes it impossible to go more than fifteen miles an hour without risking life and limb, to say nothing of jarring the poor car apart. At times we had to back several hundred yards to find a place wide enough for the two

cars to pass. When one meets a truck, there is little question of who does the backing!

The Federal Lead and Zinc Mine is a haven after some forty-five miles of bumps, lurches and jars. The mine is not operated at present. Its caretaker cordially welcomes his infrequent "outside" visitors. Few people venture beyond this point, although the weedy, overgrown road continues another five miles. I cannot recommend this last five miles to the timid as most of the way the road literally hangs on the extremely steep sides of the mountain. It was an exciting and interesting drive with a several hundred foot drop to the valley bottom on one side, rocks and fallen trees in the road, and a constant bombardment through the open windshield of grass heads clipped off by the bumper. The forest, an almost impenetrable stand of spruce, has a spongy undercovering of mosses and lichens. The removal of trees along the right of way for the road has let in enough light to support luxuriant stands of *Cornus canadensis*, *Oxalis montana*, *Chiogenes hispidula*, dwarf blueberries, oak ferns, shield ferns, and the like.

We packed our camping supplies and other essentials in knapsacks, and started the trek for Mt. Albert. A trail (optimistically called a "road") partially cleared and graded several years ago by surveyors, follows Brandy Brook for about seven miles. Except for the heat and intermittent showers and the ever-present, viciously-attacking swarms of mosquitos and black flies, the hike along this road was rather enjoyable. We were supposed to follow a blazed trail after leaving the surveyors' road, but I often wondered if the guide knew just where it was. Windfalls by the score provided ideal stumbling blocks; the wet rocks and mud did their part too. As with all things, good or bad, it eventually ended.

²Because of the scientific nature of the work the Park officials kindly granted permission for us to collect plants on Mt. Albert.



W. C. Wilson

The 1938 "expedition" after the ten miles back to the car. R. C. Siedler, Ernie Lawlis, guide; the writer. The caribou antler was found on the mountain.

Our camping spot was near the Isabelle River—in reality an ice-cold, mountain stream. Thirty-seven hundred foot Mt. Albert was but a mile away, mostly hidden from our view by the trees and frequent covering of low-hanging clouds. On the first trip we packed in with us what we thought was a tent. It proved about as useful as a sieve in keeping out the rain. At least the holes gave us plenty of ventilation! Last summer and the year before we had the use of a small, moss-chinked, log cabin. It boasted a pot-bellied stove and double-decked sleeping platforms covered by fir boughs. The nearby stream served as our refrigerator, chilling the butter and canned fruit. A warning to those who think camping in the Shickshock country a lark—our daily menu was about as follows: breakfast, bread and bacon; lunch, bread and beans; supper, bread and jelly or

tinned fruit. An occasional meal with canned meat and potatoes helped to add a little variety.

ON MT. ALBERT

The weather on the 1935 and 1937 trips was normal, that is, it rained half the time. Last summer it was sparklingly clear two days out of three—a miracle—! Fortunately, it was clear for my first ascent. An overgrown trail leads to the scrub-forest line (tree-line) on the mountain. From that point on one has to pick his own way. On Mt. Albert true alpine conditions begin a few hundred feet above the Isabelle River. In the West, however, I have noticed that the alplands often begin several thousand feet above the surrounding forested country.

At first the guide was amazed to see me stop and exclaim over some tiny, innocuous-looking plant. He soon be-



W. C. Wilson

The flatness of Mt. Albert's summit is sharply contrasted with the steep walls on the south side of Devil's Gulch.

came accustomed to my frequent halts to collect plants. The first characteristic and outstanding plant I discovered was a variety of our common maidenhair fern, *Adiantum pedatum* var. *aleuticum*. It formed clumps a foot or more across and grew in large numbers along the brook we were following through the scrub-forest thickets. To one familiar with our Maidenhair it would certainly look "different." The pinnae and pinnules tend to stand up, giving the plants a rigid, wiry appearance. It lacks the delicacy and gracefulness of the typical form; nevertheless, it would make an interesting addition to the woodland garden.

In the Alpine Zone I found many old and made many new acquaintances. On the steep slope up which we were slowly making our way, I collected a little sandwort, *Arenaria marcescens*. This

is a typical mat-forming alpine with needle-like leaves and relatively large, white flowers. Here and there growing with it were other arenarias, *A. verna* var. *pubescens* and *A. humifusa*, with less showy flowers. *A. marcescens* is a bad actor under cultivation. Although easily grown, it produces few flowers and these are of small size.

A plant growing in the moist, hummocky stretches so common on the mountain (but not restricted to them) is *Statice labradorica*. This alpine species of sea-pink (thrift) has rosettes of narrow, rather fleshy leaves and leafless, foot high stems with round heads of pink flowers. Old plants develop a long tap root which makes transplanting difficult. Seed seems to be the most satisfactory way of securing a supply of the *Statice*.

Another plant which is abundant on



W. C. Wilson

South of the Mountain the lower stratum of clouds looks as if their bases had been sheared off.



W. C. Wilson

Cloud shadows on Tabletop Mt. and the Ste. Anne River valley from the headwalls of Devil's Gulch.

the "barrens" of Mt. Albert (barren of trees, that is, not flowers) is the arctic campion, *Lychnis alpina*. It looks much like the statice from a distance but, on closer examination, shows many differences. The stems of the lychnis are stouter and have leaves, the dark pink flower heads are more showy, and the leaves of the basal rosette are broader. The arctic campion has a circum-boreal range, inhabiting the Arctic and some alpine summits farther south.

A word about the physical features of Mt. Albert, which are typical of many of the higher summits of the Shickshocks, will give an idea of conditions one encounters while collecting in the interior of the Gaspé. The sides of the mountain are very steep, in some places nearly vertical cliffs. The summit is a relatively flat plateau with broad dips and rises. Once upon the summit one finds the going easy with only numerous rocky outcrops and scattered, loose blocks dotting the surface. The native rock is serpentine weathered a dark brown. The flat character of the summit is so marked that it is usually called the tableland of Mt. Albert. A nearby mountain has received the name "Tabletop," because of its expansive undulating summit.

Mt. Albert is well known to botanists for its peculiar flora. Here in an area of only a few square miles are concentrated many rare plants, some found elsewhere not nearer than several hundred miles. There is a long-standing controversy as to the origin of this flora. One group, with Dr. Fernald of Harvard at its head, maintains that it is the remnant of an ancient flora which has persisted from before the last glaciation. This group says that certain areas (including most of the Gaspé) were not covered by the Wisconsin ice sheet and, although local glaciation occurred, plants were able to live on in

the places not under the ice. An opposing group has criticized this explanation on several grounds. It claims that even the highest mountains were scoured by the last ice sheet and no plants could possibly exist in the glaciated region. Apparently the question is far from settled and only time and diligent research along many lines will solve this complicated problem.

Regardless of their origin, there is a wealth of interesting alpiners on Mt. Albert. In places these plants form a springy turf covering the ground among the many rocks. Over much of the mountain a black organic soil has accumulated from the decomposition of plant remains. There are many places where the rocky, gravelly soil derived from the disintegration of the bedrock has been exposed by wind and frost action. As in all the alpine regions I have visited, the soil is constantly moist, with water frequently trickling over or just under the surface of the ground. Everywhere there were plants in bloom, not the massed displays found in our Western mountains, but rather, individual plants or small patches.

The moss campion (*Silene acaulis* var. *exscapa*), known the world over, formed dense, evergreen pincushions sprinkled with apparently stemless, pink flowers. The plants seemed equally at home in rock crevices or the alpine turf. It appears well-nigh impossible to make this imp produce many flowers in the garden no matter how it is treated.

An Indian paintbrush, *Castilleja palida* var. *septentrionalis*, with creamy-white flowers on two foot stems grew in the more protected, moist areas. This plant also occurs at lower elevations in the Gaspé and other places, so it is not a true alpine. Frankly, I have had absolutely no success in establishing this castilleja in my garden. There were numerous other kinds of herba-



W. C. Wilson

The large snow-patch overlooking Devil's Gulch



W. C. Wilson

Devil's Gulch from the head of one of its branches.

ceous plants growing amongst the abundant lichens, mosses, grasses, and sedges, but most were not showy enough to be of much horticultural interest.

The dwarf shrubs form a dominant part of the alpine flora of Mt. Albert. The willows are particularly interesting and abundant. One of my primary reasons for visiting the Shickshocks was to photograph and collect these plants so rarely found in our rock gardens. To my mind, the outstanding member of the group is *Salix brachycarpa*. The plants do not grow taller than twelve inches on the mountain. Perhaps they will exceed this height when given the less severe conditions of cultivation. The leaves are covered by dense, silky hairs which give the plants a silvery-gray cast. When the tiny seeds with their long, thistle-down hairs burst from the capsule, tufts of cotton seem to have miraculously appeared on the plants. If this beautiful willow retains its many desirable features when placed in the garden, it should have a bright future.

The bearberry willow, *Salix Uva-ursi*, is common on many of our Eastern mountains which rise above tree-line. I did not happen to see it on Mt. Albert, although Dr. Fernald lists it as occurring there. *Salix anglorum*, which grows by the thousands all over the mountaintop, is similar but has broader, more rounded leaves. In their native habitat both often form large, bright green mats only an inch or two in height. The flower and seed heads stand well above the leaves, they give the plants a touch of individuality which more than compensates for the lack of showy flowers.

Salix chlorolepis, an endemic and the third species of willow found, was sufficiently different for me to distinguish it readily from the others, while in the field. The two varieties collected, I must admit, looked almost the same to

me. Its most prominent characteristics are the upright growth (to eight inches) and shiny brown of the young twigs. The green foliage and silky seeds are pleasing, not unusual. Remember, all of these Lilliputian willows are mature "trees" twenty-five years, or likely more, in age. They seem to take well to cultivated conditions and should in time be recognized by rock gardeners for their attractive foliage, tiny "pussies," conspicuous seed capsules, and silky seeds.

Two outstanding alpine members of the genus *Vaccinium* grow on Mt. Albert. The bog bilberry, *V. uliginosum*, (the alpine form sometimes called var. *alpinum*), is extremely abundant. Usually it is a prostrate, much-branched shrublet on the exposed ridges and rocks; sometimes in more favorable situations it is a taller, less compact plant. Many of the plants on the south-facing slope where we made our ascent were covered (and I mean precisely that) with large, delicious berries, both sweet and juicy. We all welcomed this addition to our tiresome diet!

The dwarf bilberry, *V. caespitosum*, apparently needs the conditions offered by the boggy spots; it was not nearly so widespread as its relative. The plants were taller too, up to six or eight inches, and had very few berries. It was difficult to dig, for the underground stems in the large patches all seemed to be joined. The flowers, pink and urn-shaped, open early in the season. Both the bilberries grow in an acid soil containing a great deal of organic matter and are not confined to the Alpine Zone.

We found one large snowbank on the southeastern part of the "barrens." It lies in a hollow under the lee of a ridge. The snow blows from the ridge and accumulates to a depth of many feet. According to the guides, it is the only large patch of snow which persists for



W. C. Wilson

Upper. Woolly, gray-leaved *Salix brachycarpa* often inhabits rock crevices.
Lower. White-leaved *Salix brachycarpa* in seed with a prostrate form of
Juniperus communis and *Vaccinium uliginosum* (right foreground).



W. C. Wilson

Left. The moss-like *Cassiope hypnoides* in bloom (top) with staminate flowers of *Salix anglorum* (bottom). Right. *Castilleja pallida* var. *septentrionalis* with *Betula glandulosa*.

the greater part of every summer. The condition of the vegetation about this snow-bank is striking, the plants blooming very late. We were able to photograph several alpiners in full bloom (they were in seed over the rest of the mountain) by going varying distances from the edge of the slowly melting snow. As the snow recedes the plants begin growth. Thus, those five feet away may be in bud and those fifteen feet distant in flower. This phenomenon of a species in all stages of growth from buds to seeds all within a relatively few feet is something a collector frequently meets above treeline in the proximity of snow.

Overlooking the snowbank was a rugged, serpentine outcrop. Lovely

clumps of the adiantum, the delicate, recently uncoiled fronds with a brownish tinge, grew at its base and in the larger crevices. A previous, Western acquaintance inhabited many of the narrow cracks—the alpin sorrel, *Oxyria digyna*. Its greenish-yellow flowers tinted red, so typical of many of the *Polygonaceae*, are more odd than beautiful.

Tiny *Cassiope hypnoides*, an ericaceous plant, was the commonest ground cover, with *Salix anglorum*, in the area immediately surrounding the snow. The relatively large white bells are borne at the tips of slender stems covered thickly by needle-like leaves. A minute, evergreen shrub, if there ever was one! The flowers were the only



W. C. Wilson

Left. *Silene acaulis* var. *exscapa* in seed, with a small tuft of flowering material added. Right. *Lychnis alpina* with *Betula glandulosa* and the ever-present lichens.

thing that saved me from nonchalantly walking on this amazing plant as if it were the moss that it so closely resembles. I found this American heather in the few places where snow lasts well into the summer. Another, but much larger member of the *Ericaceae*, is *Phyllodoce coerulea*. It looks rather like a coarse-leaved heath and has the typical united corolla of its family. The three to four inch plants of *Phyllodoce* have a more or less indifferent requirement, being plentiful over most of the summit of the mountain. I cannot recommend the color of the flowers wholeheartedly, as it is too near that magenta found in certain "off-color" azaleas. Although not the easiest of alpines to grow, both of these shrublets will re-

spond to moist, acid, humus soil and part shade in the rock garden. Unfortunately, they bloom infrequently when away from their native habitat.

This by no means exhausts the list of horticulturally desirable ericaceous plants found on Mt. Albert. One which has taken well to garden conditions, for me at least, is *Kalmia polifolia*. The pale laurel forms miniature thickets in many moist, peaty areas on our Eastern alpine summits and also occurs at lower elevations in cold bogs, particularly in the more northerly areas. Its shiny, linear, dark green leaves provide a fine setting for the open-faced, rose-purple flowers. In the garden it needs a yearly trimming after blooming to keep the foot high bushes

from becoming straggly. Beware when pruning, buds are set one year and open the following season!

Although the flowers of the Bog Rosemary, *Andromeda glaucophylla*, are perhaps not so showy as the other ericaceous plants mentioned, the drooping clusters of delicate, light pink bells are very charming. The leaves are noticeably blue-green in color with a white powdery lower surface. Andromeda can hardly be called an alpine as it is a common inhabitant of our sphagnum (peat) bogs. On Mt. Albert this shrub is only a foot (or less) in height, but at lower altitudes it is often twice as tall. *Ledum groenlandicum*, Labrador tea, is generally a companion plant. Above treeline it usually is shorter than six inches, but in bogs I have seen it over two feet tall. The white flowers are clustered in heads, the leaves are notable for their revolute margins, extremely dense covering of rusty "wool" on the lower side, and their fragrance when bruised.

So far, I have not been fortunate enough to see in bloom *Rhododendron lapponicum*, the Lapland rosebay. It comes into flower very early, soon after the snow melts, so by August its seed capsules are nearly mature. If the mats of twiggy stems are a true indicator, the plants live for many years. The leaves and young stems are partly covered by brown scales, giving the plants a rusty appearance. Checking in "Gray's Manual" I find that the flowers are described "—corolla open bell-shaped, dotted, violet-purple." This ground-hugging rhododendron is one of the dominant alpiners on Mt. Albert, as on other of our Eastern mountains which have an Alpine Zone. It has a circumboreal distribution and is one of the characteristic plants of the "reindeer-moss" country.

A plant that attracted my attention on my first trip above treeline in the

East was the tiny Alpine azalea, *Loiseleuria procumbens*. It has been in the horticultural trade for some time, but its use in rock gardens is restricted by its cultural requirements. Apparently it does best in an acid soil which has a rather high percentage of organic matter. If given moisture and light shade, it usually will grow quite well. I have not seen the Alpine azalea over two inches high in its natural habitat. It is a mat-forming evergreen with very small, dark green leaves and often reddish stems. The flowers, rose-colored, barely rise above the overlapping leaves. Like its fellow-member in the *Ericaceae*, the Lapland rosebay, the flowers appear early and one does not usually find it in bloom later than mid-July.

Empetrum nigrum, the crowberry or curlewberry, is a common plant of our highest Eastern mountains. It cannot be classified as an alpine, because it is found at all elevations, even sea level, where conditions are suitable. It is an interesting fact, and one hardly to be missed by a plant-conscious person, that the crowberry (as well as *Vaccinium Vitis-idaea* and *Potentilla tridentata*) is common on Mt. Washington and Mt. Katahdin in New England but much less abundant on Mt. Albert. However, all are common ground-covers along much of the Gaspé coast.

Empetrum looks much like an ericaceous plant; actually it belongs to the family *Empetraceae*. In exposed places the curlewberry grows in dense mats which stay close to the ground; under less rigorous conditions its trailing stems may barely hide the soil. The slender, woody stems carry evergreen, heath-like leaves, each with a white stripe on its lower side. The crowberry bears inconspicuous flowers in the axils of its leaves. The berries which succeed them are large, juicy, and edible, if one enjoys their peculiar



W. C. Wilson

Upper. *Artemisia borealis*, a dwarf, gray-leaved member of the Compositae.
Lower. *Pellea densa*, all fruiting fronds, below a rock in a scrub-forest thicket.

flavor. This plant has great possibilities as a groundcover for small areas. It will grow well in all but hot, dry places and dense shade, needing only an occasional trimming to produce a thick carpet.

Have you ever played the very unwilling but likely receptor of a lightning bolt? In 1937 the guide and I had this unwelcomed privilege. We were slowly walking across one of the barrenest parts of the "barrens," collecting along the way, when the clouds began to come rolling over the mountain. At first we did not mind the light mist around us and the gentle rain that accompanied it. Soon a black thunderhead appeared over the edge of the mountain to the west and we decided that the nearly flat summit of Mt. Albert was "no place for us." The nearly invisible flashes of lightning were followed immediately by the sharp crashes of thunder. No doubt we were perfectly safe, but both of us felt greatly relieved to reach the side of the mountain and start down towards our camp!

One of the shrublets which first caught my eye on my initial trip to Mt. Albert was a prostrate birch. I could not decide at the time whether it was a birch or an alder; it has since been identified as *Betula glandulosa*. Its long, trailing stems are not uncommonly intertwined with other shrubs in the alpine turf. One frequently sees it "climbing" against the almost vertical surfaces of a massive block of serpentine, much in the manner of some of our rock garden cotoneasters. Rarely does this *Betula* form solid mats by itself. The lustrous, light green leaves with a hint of gray in them and their odd, almost round shape make the plants attractive no matter where they grow. The plants collected have grown well but very slowly. It is too soon to make any predictions about the garden value of this alpine form of *Betula*

glandulosa. The species does grow in other places and not always above tree-line, hence, it may get larger than we would wish. If it does, an occasional, careful pruning should remedy this.

Two other plants, both *Compositae*, complete the list of conspicuous alpine I found on Mt. Albert. A dwarf and showy goldenrod, *Solidago multiradiata*, dotted the stony areas of the tableland. It was only a half foot tall but the bright orange-yellow flowers and irregular, dark green leaf rosettes were striking on their bed of brown chips. An equally lovely plant was a small artemisia. I have tentatively identified it as *A. borealis*. The gray tufts send up six to eight inch flowering stems which bear small, disappointing, brownish-yellow flowers. Under cultivation this plant actually retains its dwarf stature (more than one can say for most artemisias). I have been careful to plant it where it does not get the best of growing conditions for fear of its becoming weedy.

The solidago and artemisia seem to be cosmopolitan individualists, they grow all over the mountain, but not in mats. We found them below the scrub-forest line along a stream where they had become established in the gravel. It is worth noting, in addition, that the *Silene*, *Arenaria*, *Adiantum*, *Lychmis*, *Castilleja*, and certain of the other plants characteristic of the Alpine Zone also grow in this nearly dry stream bed.

On my first trip to the Shickshocks I had an unusual stroke of luck. One of the botanically prized plants of Mt. Albert is a beautiful fern, *Polystichum mohrioides* var. *scopulinum*. I secretly hoped to locate this fern but realized that my chances were almost nil. The guide and I spent considerable time and much energy struggling down, then up, the slippery, precipitous sides of Devil's Gulch (or, if one prefers the French,



W. C. Wilson

*The tangled shrub-forest thickets make the climb up the lower slopes of Mt. Albert difficult. The rare fern *Pellea densa* grows among the rocks on this part of the mountain.*

Ravin du Diable). This tremendous gash in the side of the mountain is a spectacular sight indeed, and the home of many rare plants. We had almost given up the search when I happened on a small colony. It was my introduction to this fern "in the flesh" and I was agreeably surprised. The compact tufts are the typical *Polystichum* kind—a large raised crown with embryo "fiddle-heads" in the center of a symmetrical ring of fronds, both old and new. The living fronds usually stand about eight inches high, are rigidly upright, and the pinnae are very dark green, closely set and densely covered on the lower side with rusty scales (as are the rachis and young, coiled fronds).

Knowing the rarity and localized

habitats of this *Polystichum*, I felt obligated not to take many. Five were carefully put in the collecting can and brought home. Now comes an admission of partial defeat—I have only three remaining and these are growing very poorly. So far, I have not been able to discover the reason for their temperamental reaction under cultivation.

Another fern, *Pellaea densa* (one of the Cliff Brakes), nearly escaped notice on the first trip for two reasons—its small size and my ignorance. All day I searched for it diligently but unavailingly as I collected far above the forests. On the way back to camp while pushing through the tangled growth of the scrub-forest, I tripped and slid down a rocky bank. It was a surprise



W. C. Wilson

Arenaria marescens, an alpine sandwort on its bed of rock chips.



Upper. *Viola adunca* growing in the mats of *Salix anglorum* and *Vaccinium uliginosum* beside a pool. Photograph by R. C. Siedler.

Lower. The alpine sorrel growing below a large patch of the rare variety of the common Maidenhair fern. Photograph by W. C. Wilson.



W. C. Wilson

A flowering mat of Salix anglorum in the slanting rays of the late afternoon sun.

to find numerous plants of the *Pellaea* practically under my hand. This was an unorthodox way of finding the fern, but, then, one cannot be particular as to method! The collected plants have responded well to the care given them in their new home. They have reached their normal four inch height and produced numerous sterile fronds. As yet, none of the markedly different fruiting fronds have appeared. This Cliff Brake is found not only on Mt. Albert, but also in Megantic County, Quebec, and elsewhere.

IN CONCLUSION

As my collection of Eastern alpine grows, I cannot help but feel that here is a group which has been slighted by rock and alpine plant gardeners. The excellent results that many of these plants give in the garden have con-

vinced me that they deserve a place in the rock gardening world. Of course, some are known to the specialists and a few are offered by nurseries. One nursery lists most of them, but still gardeners have been slow to grow them.

For some reason Eastern alpine as a whole have received the stigma of "difficult." This is unfortunate because it is a misconception. A plant such as *Diapensia lapponica* (an interesting alpine of New England and elsewhere) is "difficult"; ones like *Salix anglorum* or *S. Uva-ursi* are correspondingly "easy." Why let the perverse habits of a few spoil the reputation of many valuable kinds? I am sure that as soon as Eastern alpine are given a fair test, they will be recognized as a useful group. When they are more widely grown, many of the details of their cul-

ture, particularly of the "difficult" species, will be worked out.

There is a duplicate set of my Eastern alpine at the Department of Floriculture and Ornamental Horticulture of Cornell University. We are undertaking experiments in their propagation and culture in the hope that our contributions will add to the knowledge of this group and make its use more widespread.

LIST OF PLANTS MENTIONED IN THE ARTICLE

This list of twenty-five plants includes only kinds which, I feel, have horticultural possibilities. They are arranged according to their general cultural requirements. This does not mean that they will not grow under other conditions of soil, exposure, moisture, and the like. These recommendations are based on observations of plants growing in the writer's garden (near New York City) and in their native habitat.

I—(a) Full sun for most of day, well-drained soil, average moisture. (Recommended soil mixture— $\frac{1}{4}$ peat moss, $\frac{1}{4}$ fine gravel or coarse sand, $\frac{1}{2}$ loam; mixture should be neutral or slightly acid.)

Arenaria marcescens
Artemisia borealis
Castilleja pallida var. *septentrionalis*
 (? , more organic matter and moisture)
Lychnis alpina
Oxyria digyna
Pellaea densa
Polystichum mohrioides var. *scopulinum* (culture?)
Silene acaulis var. *exscapa*
Statice labradorica
Solidago multiradiata

I—(b) The following will also grow under the above conditions if care is taken to keep them from drying out.

Andromeda glaucophylla
Betula glandulosa
Empetrum nigrum
Ledum groenlandicum
Kalmia polifolia
Salix anglorum, *S. brachycarpa*, *S. chlorolepis*

II—Light shade, well-drained soil, slightly more than average moisture. (Recommended soil mixture— $\frac{1}{3}$ peat moss, $\frac{1}{3}$ fine gravel or coarse sand, $\frac{1}{3}$ loam and/or thoroughly decomposed leaf mold—the proportions may vary; the mixture should be moderately acid.)

Adiantum pedatum var. *aleuticum*
Andromeda glaucophylla
Betula glandulosa
Cassiope hypnoides (must NEVER be allowed to become dry)
Empetrum nigrum
Kalmia polifolia
Ledum groenlandicum
Loiseleuria procumbens
Phyllodoce coerulea
Rhododendron lapponicum
Salix anglorum, *S. brachycarpa*, *S. chlorolepis*.
Vaccinium caespitosum and *V. uliginosum*

NOTE:—

As is true of most rock and alpine plants, the above kinds benefit from a winter mulch of some light material which prevents heaving of the plants and burning of the leaves and twigs.

I wish to acknowledge the kind assistance of Dr. R. T. Clausen of the Bailey Hortorium, Cornell University, in identifying many of the plants collected on these trips.

Young Royal Palms

O. F. COOK

UNDER the so-called "law of recapitulation" the early stages in the development of an animal or a plant were supposed to show the more primitive characters, with the more specialized characters appearing in the adult stages, but exceptions have been recognized, of earlier stages of development becoming more specialized and adult stages remaining primitive, as in some of the orders of insects. The royal palms are another example of more striking differences being shown in the early stages, while the adult characters appear less divergent.

Juvenile characters of four species of royal palms were described in *Science* of June 14, 1936, but without illustrations to show the nature and extent of the differences. The native royal palm, *Roystonea floridana*, is a scenic feature in southern Florida, and three West Indian species have been introduced, the Cuban royal palm, *Roystonea regia*, the Puerto Rican royal palm, *R. borinquena*, and the Barbadian royal, *R. oleracea*. Other species are found in the West Indies, and the royal palm of Haiti has juvenile foliage even more strikingly diverse.

The leaves of the young royals in Haiti have the pinnae much broader than those of the related species, in remarkable contrast with the narrow, close-set, erect pinnae of the Cuban species, as in Figure 1, where the two types of foliage are directly compared. Other differences shown by the Haitian palm are wider spacing of the pinnae along the rachis, the nearly horizontal position of the pinnae, and their deeper green color. The species native in Florida and in Puerto Rico also have juve-

nile leaves with spreading pinnae, as shown in Figure 2, but the pinnae are much narrower and closer than those of the Haitian palm. These differences of the pinnae are most apparent when the young palms reach the stage of producing leaves from three to six feet long, but other juvenile specializations develop later, at the stage of forming the lower sections of the trunk.

The diversity of the juvenile characters seems more remarkable in view of the difficulty of fixing upon any definite differences of general appearance or proportion between the adult stages of the several species. The general similarity no doubt arises from the fact that the adult characters of the royal palms are notably specialized to form a simple pattern. The smooth, columnar trunk is faintly ringed with regular leaf scars and surmounted by a green, cylindrical bundle of very long, closely wrapped leaf-sheaths. The petioles are so short as to figure very little in the general appearance of the palm, except as they are responsible for the crown of foliage being very compact, an advantage no doubt in often offering less resistance to the wind. Also the texture of the petioles is specialized in being rigid and brittle, so that the entire leaf blade breaks off in a severe wind, and the palms are able thus to "shorten sail" under hurricane conditions.

The species of royals are subject, like other palms, to perceptible variations of stature and proportions determined by conditions of soil and moisture, and especially by access of sunlight. Such variations are parallel in the several species and of little use as differential characters. Even in the same group,



Figure 1. Young Cuban royal, with leaf of Haitian royal.



Figure 2. Terminal pinnae of young Haitian royal (left) and Cuban royal (right), the lower surface natural size.

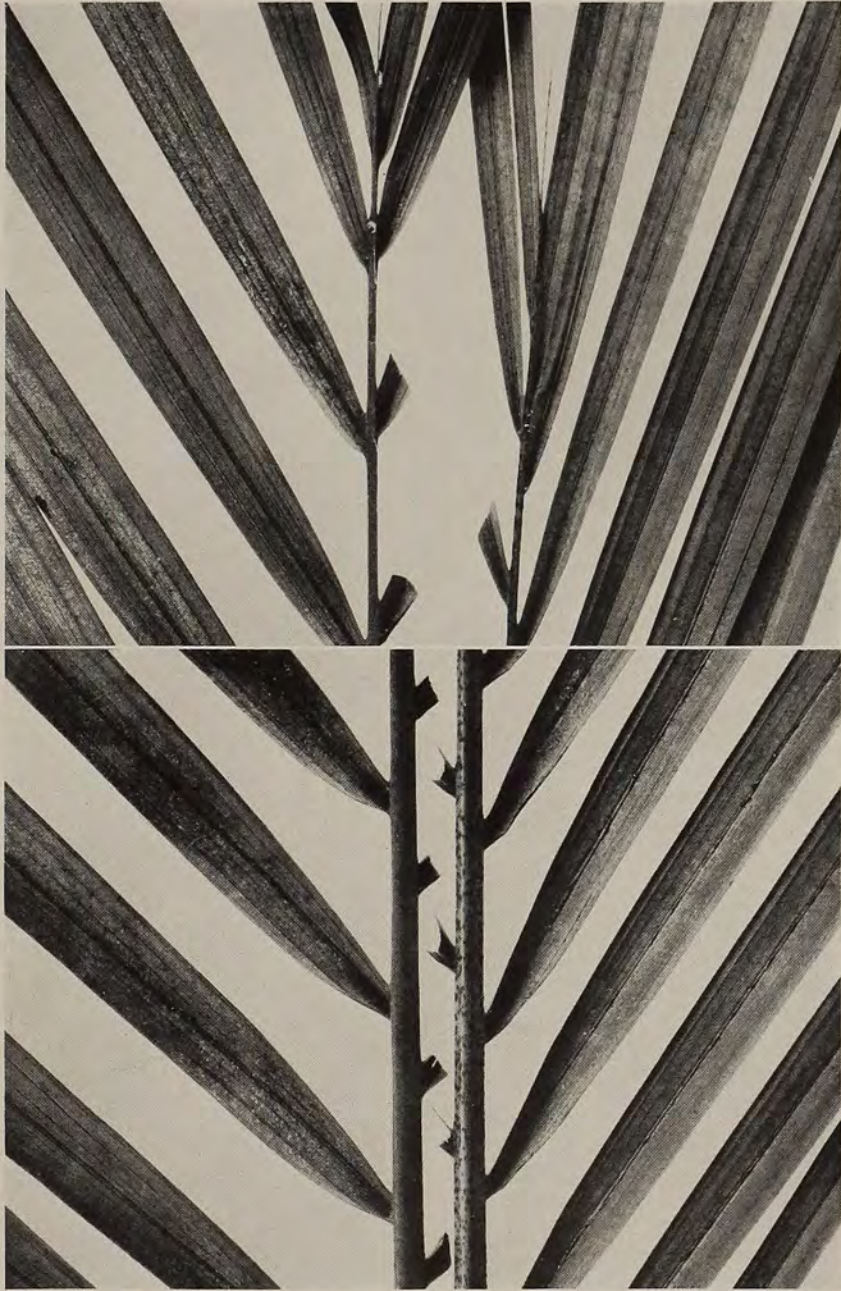


Figure 3. Terminal and middle pinnae of Florida royal (left) and Puerto Rican royal (right), lower surface, natural size.

some of the palms show more slender trunks and relatively longer joints than adjacent individuals, as in the grove of Haitian palms shown in Figure 8. The foliage also may show notable differences between neighboring palms of the same species.

Differences that appear very slight in length, width, texture or spacing of the pinnae may have a striking cumulative effect on the general appearance of a palm, standing with others of the same species. Even on the same leaf the pinnae are set in different positions, some erect and others drooping. Erect pinnae may be restricted to the lower part of the leaf or may continue to near the end, or other differences of texture or form may determine the extent of drooping.

Botanists are accustomed to depend chiefly upon floral characters for distinguishing species and genera, and in many orders of plants the flowers are more specialized and distinctive than the other parts, as notably in the groups where the floral structures are specialized to facilitate pollination by insects, but most of the palms are wind-pollinated. Some have fragrant, nectar-bearing flowers, but not large or showy, while the fruits, inflorescences and leaves often show adaptive modifications more definite than those of the floral organs. Since flowering and fruiting usually do not begin among the royal palms till the trunks are 20 to 30 feet high, characters that distinguish the species in the juvenile stages are of greater interest, and have practical relations to cultural problems.

An extensive utilization of royal palms in southern Florida may be foreseen, with their economic possibilities becoming better appreciated and their remarkable ability to resist hurricanes. Groves and shelter belts of royal palms would be useful and ornamental, and a function of soil improvement is sug-

gested by formation of tubercles on the smaller surface roots, first reported of the Puerto Rico species in 1901, and shown in natural size in Figure 5. The Florida species has similar tubercles that should be investigated in relation to soil improvement possibilities, since symbiotic fungi have been found in the tubercles, as in those on the roots of *Podocarpus*, and probably having the same function of supplying nitrogen.

Royal palms are valued as pasture trees in Cuba and Puerto Rico on account of the oily fruits being eaten by cattle, pigs and poultry and the tough leaf sheaths serve as roofing material and for many farm uses. The behavior of the different kinds of royals will be of increasing interest to residents and visitors in Florida, as well as to travelers in tropical countries.

Two of the royal palms, the Cuban and the Barbadian, are planted as ornamentals in many tropical cities and in the Panama Canal Zone, while the Florida species and others from the West Indies are only locally known, and are usually supposed to represent the Cuban species, *Roystonea regia*. Two species are recognized in Jamaica by Professor L. H. Bailey, in his *Gentes Herbarum*, Vol. III, Fasc. VII.

For conditions in Florida the native royal may prove better adapted, although the West Indian species apparently will thrive, at least in the southern districts. The Florida royal palm is distinctly more hardy than the coconut, and is being planted as far north as Tampa. Wild royals existed in the eighteenth century as far north as De Land, at Lake Dexter, about 20 miles from the east coast. The young palms grow rapidly under favorable conditions, attaining a height of 20 feet in 6 or 7 years, but the later growth is much slower, after the fruiting stage is reached. The oldest planted palms around Coconut Grove and Fort Myers

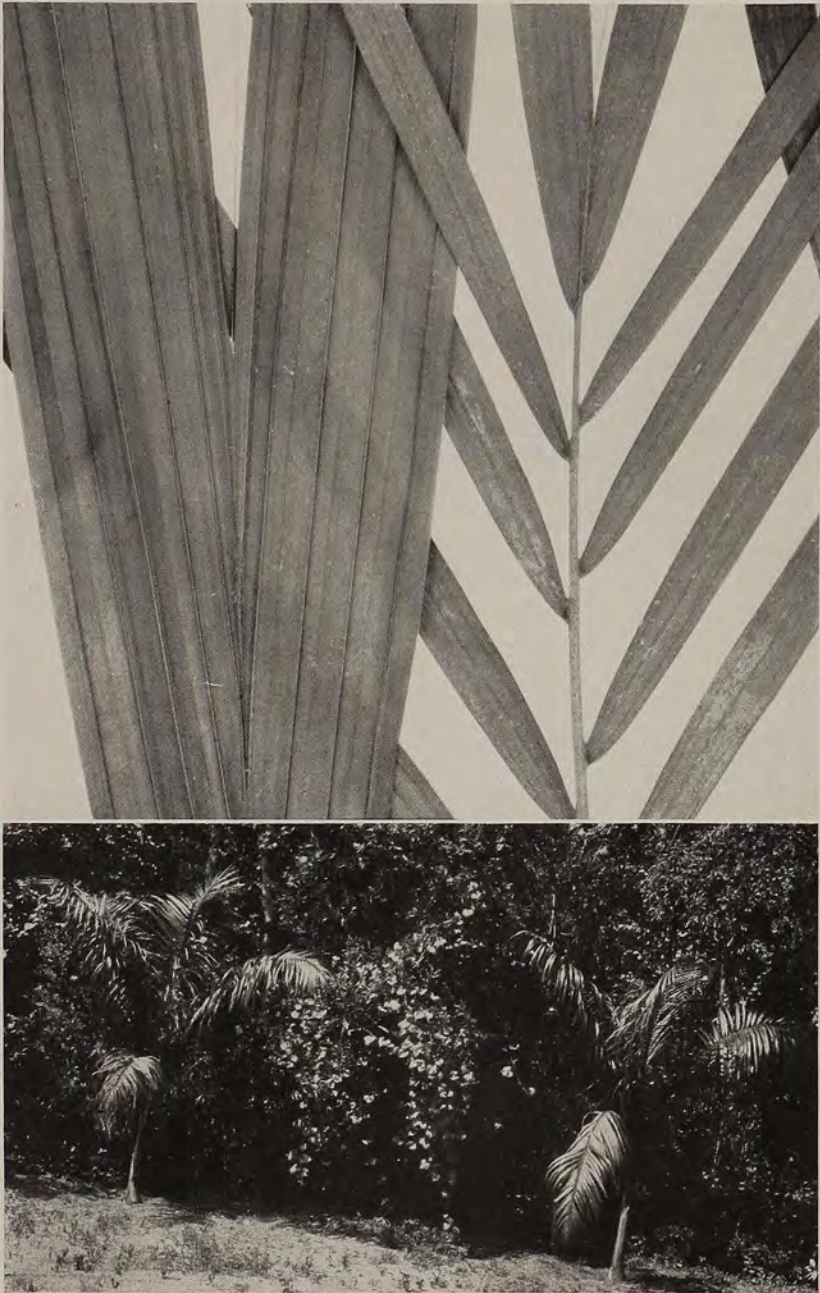


Figure 4. Florida royal palm, sections of seedling leaves and two young palms at Royal Palm State Park.

have not reached their full stature, though many are massive, magnificent trees.

A NEW SPECIES IN HAITI

The royal palm of Haiti appears to be distinct, and may bear the name of *Roystonea aitia*. Not only the juvenile leaves are diagnostic, with broad, spreading, widely spaced pinnae, as shown in Figures 1 and 2, but the trunk is notably smaller and more slender than in the Cuban species, the basal trunk-sections less unequal, and the pinnae more regularly spreading and drooping. The male flowers have white, robust, cylindrical filaments, short, oblong anthers, and a much smaller pistillode. The anthers of the Cuban species are distinctly sagittate, deeply cleft and divaricate at the base, and the slender, tapering filaments are deeply tinged with purple.

The slender, cylindrical form of the trunk is shown in Figure 8, in a grove of palms near Port-au-Prince, but even in open places there is little tendency to such pronounced bulging of the trunk as frequently occurs in the Cuban and Puerto Rican species. A marked elongation of the lower sections of the trunk is seen in Haiti, though seldom to the extent of the Cuban palm or of the Florida species, shown in Figure 7.

Hundreds of the native royal palms can be seen along the southern shore of the harbor of Port-au-Prince, around the naval station at Bizoton, and on the road westward to Leogane. Though less abundant in other localities, the palms are scattered through most of the inhabited districts, especially near the coast, but also in the interior, notably in the region of Mirebalais and Las Cahobas. Palms that spring up in yards and gardens often are allowed to grow for the sake of the oily fruits, which serve as fodder for cattle, hogs and poultry. Also the palms are climbed to obtain the fruit clusters,

which are tied with ropes and lowered carefully, to avoid breakage and scattering.

A natural habitat of the Haitian palm is difficult to assign, since all of the lowland districts probably have been inhabited for many centuries, even before the time of Columbus, who described the island as very well populated. Several kinds of native palms have been almost completely exterminated, and one that was used by the buccaneers seems to be extinct. The survival of the royal palm may be ascribed to its ability to grow spontaneously in rather swampy places, too wet for most of the cultivated crops, and to the fact that in Haiti few cattle are kept, since browsing would destroy all the young palms in open places.

The Haitian royal palm appears on coins, stamps and insignia of the Republic of Haiti. Charles Mackenzie's "Notes on Haiti" published in 1830, has mention of "a mountain cabbage tree, *Palma nobilis*, the tree of liberty in Haiti," growing at Port-au-Prince near a wooden platform called "L'Autel de la Patrie," where the President "harangues the troops and citizens." Some might infer from this reference that the name *nobilis* should be adopted for the Haitian palm, but an earlier *Palma nobilis* is cited by Martius from Ray's *Historia Plantarum*, 1688, in relation to palms in Jamaica and Barbados.

TWINNING OF STAMENS

Twinning of stamens is one of the specialized features of the adult royal palms. It occurs in the Haitian species, in those from the neighboring islands, and in the Florida palm, but not in the species from Barbados. Most of the related genera have only six stamens, in two whorls, the outer whorl alternating with the petals, the inner whorl opposite. The number is increased, not



Figure 5. Puerto Rican royal palm, sections of simple leaves and roots with tubercles.

by adding another whorl, but by some or all of the inner stamens being twinned, the outer whorl remaining simple.

The number of stamens varies in *Roystonea aitia* from 7 to 9, with 8 as the modal number. A count of the stamens at Ennery, Haiti, in 1925, showed nearly half of the flowers with 8 stamens, most of the others with 7 or 9. The numbers as noted were: 13 flowers with 6 stamens; 23 with 7 stamens; 45 with 8; and 25 with 9; also a single flower with 10 stamens. More numerous stamens are indicated in *Roystonea floridana*, a count at Miami in October 1934 showing no flowers with 6 stamens; 3 with 7; 18 with 8; 31 with 9; and 2 with 10, from triplets replacing twins. Twinning may be less frequent in *Roystonea regia*, but flowers with 7 or 8 stamens are not uncommon. Abnormal male flowers with 5 to 8 petals and 7 to 9 stamens were found under a palm of this species in the Canal Zone, in 1926.

SIMPLE SEEDLING LEAVES

In studying the development of the different species through the seedling and juvenile periods, several forms of leaves may be distinguished as marking the stages of growth. As in most of the palms, the first two leaves of the seedlings are reduced to short, cylindrical sheaths, the third leaf being the first to show an expanded green blade, and this only simple and narrow, about half an inch wide and 6 or 7 inches long, resembling a blade of grass. The next two leaves are of the same form, the blade increasing to a foot or more in length and two to three inches in width.

An abrupt change in the leaf-form then occurs, by the splitting of the blade to below the middle, still a simple blade, but deeply V-shaped. The lower part of such a leaf is shown in the upper section of Figure 4, and correspond-

ing sections of a juvenile leaf of *Roystonea borinquena* in Figure 5, with the base of the young plant and roots bearing tubercles.

The close resemblance of the early leaves of palms to grasses or sedges no doubt is responsible for great numbers of seedlings being destroyed every year. The seeds of royal palms are scattered widely by the birds, but the seedlings usually are not recognized and are weeded out, thus seriously limiting the palm population. Royals transplanted from nurseries often are badly checked and become diseased, or if they survive may have only slender trunks, with the lower sections short and irregular.

EARLY COMPOUND LEAVES

The third type of leaf-blade results from a further development of the midrib or rachis, to the extent of separating the folded segments of the simple leaf so that they stand wide apart, thus forming a pinnate leaf, as shown in Figure 1, also in Figures 2 and 3, where natural-size sections of such leaves, representing four species, are compared. In the Puerto Rican species the surface of the young leaf is sprinkled with brownish scales, scarcely perceptible in the Florida species.

The early pinnate leaves of the Florida royal palm, at the stage of development represented by the two young palms shown in Figure 4, have the pinnae wide and spreading, as in the Haitian species, but much closer together, longer, and more inclined to droop, thus widely different from the narrow, erect pinnae of the Cuban royal shown in Figure 1.

The first of the compound leaves have regular pinnae, standing in two rows along the rachis, but as the palms reach a height of 6 or 7 feet the insertion of the pinnae becomes more or less irregular, at different angles to the rachis and drooping to a different ex-



Figure 6. Young royal palms in Panama Canal Zone, Cuban royal left, Barbadian royal right.

tent or in different directions, giving the foliage of the young palms at this stage a rather disheveled appearance.

The leaves produced on the longer basal trunk sections of the Cuban royal and the closely related species from Florida, Haiti and Puerto Rico are correspondingly larger than the leaves produced on later sections of the trunk, and of a different form, with longer, thicker leaf-sheaths, and the rachis or mid-rib of the leaf erect or ascending instead of spreading or drooping like the leaves of the adult palms. In a vigorous young palm a tall bundle of the closely wrapped leaf-sheaths is formed, 6 to 8 feet high, clearly analogous to the "trunk" of a banana plant.

Palms that are checked by unfavorable conditions during the early stages of growth may form only short sections or sections of irregular length in the lower part of the trunk. The sections above may become more normal, or checking may result in permanent stunting of the palms, so that only a slender trunk is formed.

The larger basal sections, with their taller and more erect leaves, have an obvious advantage in reaching more sunlight, and hence may be viewed as an adaptive specialization for living under forest conditions or competing with other vegetation during the early stages of growth. A greater extent of elongation of the lower trunk sections may be found in the native palm of Florida and in the Cuban royal, as shown in Figure 7, than in the Haitian or the Puerto Rican species, while the lack of long sections in the Barbadian royal presents a complete contrast. Greater tolerance of shade and better adaptation to forest conditions would be indicated for palms with the longer basal sections and the larger and more erect leaves in the early stages. The ability to grow with other vegetation obviously would con-

tribute to the survival of the young palms by giving them greater protection in periods of low temperature, and thus might explain the survival of the Florida species outside the tropical zone.

GRADUAL THICKENING OF TRUNK SECTIONS

Palms and other endogenous plants are not supposed to show thickening of the trunk sections by secondary growth, after the leaves are formed. Each of the trunk sections supports a leaf, and with most of the palms the section reaches its full diameter during the life of the attendant leaf, but the leaves of royal palms may complete their development before the trunk sections have thickened and hardened to the full extent. Indeed, the shedding of the leaves often is occasioned by the continued swelling of the trunk sections, in royal palms that are growing rapidly, while palms that are checked in their growth may retain their leaves too long, till the leaf-sheaths decay and disease organisms gain access to the trunk sections by way of the fibro-vascular system.

The first consequences of normal secondary swelling of the trunk section is the rupture of the epidermis, soon after the leaf falls off, the surface of the section being marked by fine longitudinal fissures, white at first, soon becoming light buff or gray and gradually increasing in number till the whole surface is covered. The growth of a thin layer of corky tissue with fine embedded fibers keeps the surface nearly smooth, instead of the fissures becoming deeper. In many of the palms that do not have this secondary thickening, the green epidermis of the trunk sections may remain fresh and functional for long periods, or for the entire life of the tree. The relative proportions of the leaf-sheath bundles compared in thickness with the trunk, in Figure 7,

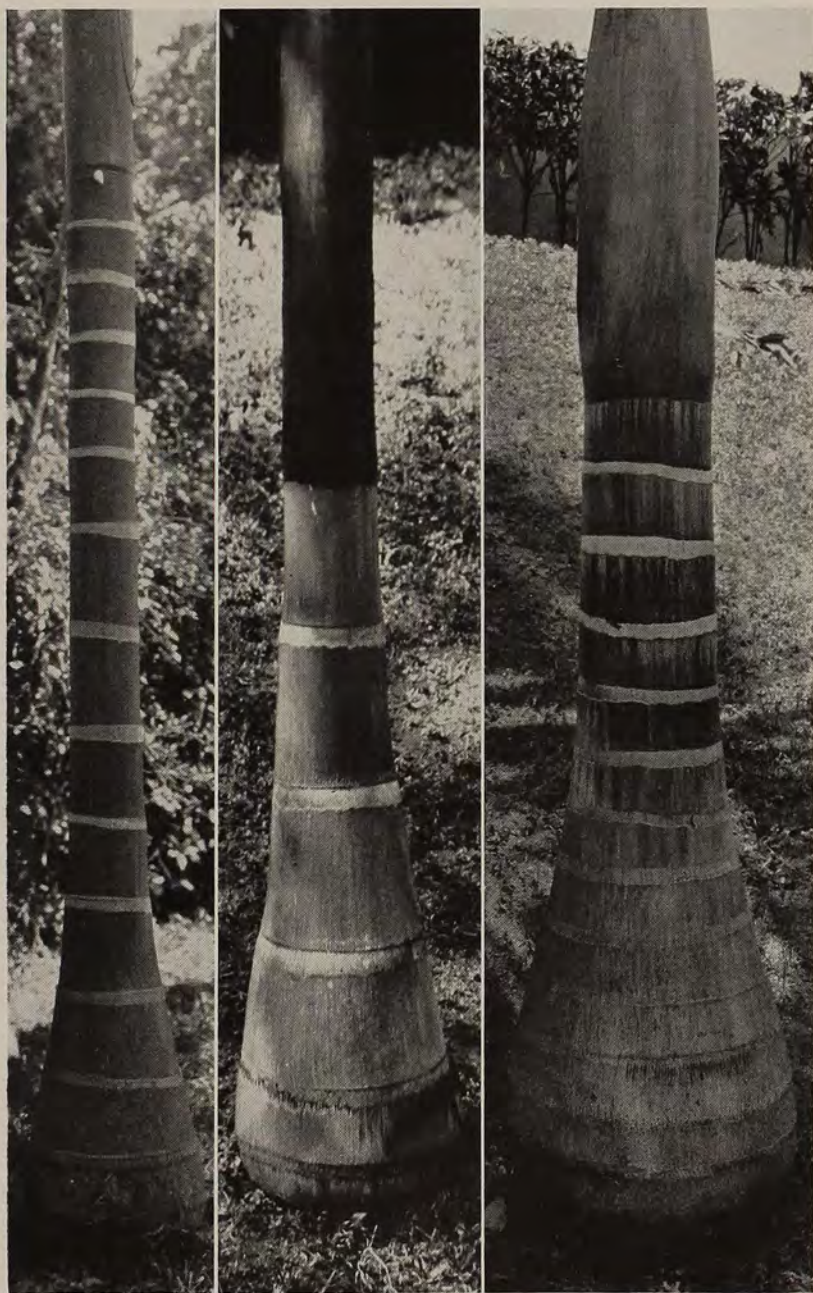


Figure 7. Trunks of young royals, Florida royal right, Cuban middle, Barbadian right.

shows that secondary thickening is carried further in the young Barbadian royal.

BASAL TRUNK SECTIONS A GENERIC DIFFERENCE

The specialized nature of the enlarged basal leaves and the supporting sections of the trunk is better appreciated by taking account of the absence of these features in the Barbadian royal, an even larger and more imposing palm than the Cuban species or those of the neighboring islands. The uniform length of the trunk sections shows that the Barbadian palm is not adapted in the same manner for competing with other vegetation during the juvenile period, in other words, that its habits of growth were different under its natural conditions of development, either by way of requiring a more open habitat or by being more tolerant of shade in the early stages of growth.

Instead of assuming that such a series of adaptive characters is shared by some species of a genus but not by others, less confusion may result from taking account of other indications of generic divergence. Since the Barbadian palm has several notably specialized floral characters that the other species do not share, there is no occasion to refuse a generic separation. An outstanding difference is that the corolla has lost its function of protecting the stamens, the petals being reduced to half the length of the filaments, with the anthers projecting before the spathe opens. Neither the petals nor the long, robust stamens spread apart at anthesis. The stamens are not twinned, the number not exceeding 6. The calyx of the male flower has broad, overlapping sepals like those of the female flowers, and the pistillode is much smaller than in *Roystonea regia*. The endosperm is not excavate, nor the testa thickened.

Ample opportunities for comparing

the Barbadian palm with the Cuban species, *Roystonea regia*, are afforded in the Panama Canal Zone, visited every year by thousands of travelers. The introductions are credited to Count de Lesseps, both kinds being represented by hundreds of thriving palms, often planted or allowed to grow indiscriminately, so that all ages and stages of development may be seen, under varied conditions. The adult Barbadian palms appear very distinct in attaining a larger size with more massive trunks and more rigid horizontal leaf-blades, while the young palms are even more definitely distinguished by the equal sections at the base of the trunk, the sheaths of the lower leaves not elongated and the leaf-blades not held in erect or ascending positions, but spread horizontally like those of the mature palms. The pinnae of the young Barbadian palms are much broader and closer together, regularly inserted and evenly spreading or drooping, in contrast with the narrow, straight pinnae of the Cuban palm, standing at different angles or drooping irregularly. The greater extent of secondary thickening in the Barbadian royal is another difference that is definitely shown in the younger palms but hardly to be recognized at the stage of maturity. Young palms of the two types are shown in Figure 6, and the trunk sections are compared at closer range in Figure 7.

Gorgasia A NEW GENUS

For a palm that features prominently in the Canal Zone the name *Gorgasia* would seem appropriate, to commemorate the achievement of Dr. William Crawford Gorgas in establishing the system of sanitation against yellow fever and malaria. This effective application of biological science not only made possible the construction and operation of the Canal but also opened



Figure 8. The Haitian royal palm, a grove near Port-au-Prince, showing variations of the trunk.

a new era of human welfare throughout the tropics. Since the palm is likely to be planted in all of the tropical regions that are reclaimed and civilized, it may symbolize the progress of sanitation.

The massive columnar trunk, with the basal sections unspecialized and equal, the imbricate sepals of the male flowers, rudimentary petals, simple erect stamens, uniform testa, and oblong unsculptured endosperm, are the diagnostic characters of *Gorgasia*. The embryo is relatively small, and the central cavity of the seed much larger than in *Roystonea*.

The specific name *oleracea*, proposed by Jacquin in 1763 for a palm from the Carib Islands, has been used for the Barbadian royal palm, but it probably belongs, as Professor Bailey suggests, to a related species that holds its leaf-blades in ascending positions, forming a funnel-shaped leaf-crown, in contrast with the flat umbrella top of the Barbadian palm. The leaf-blades of the Carib palm are narrower because the pinnae are shorter, and the trunk apparently tapers more. Photographs of royal palms in St. Kitts agree very well with the drawing by Jacquin. An excellent photograph of royal palms in Barbados appears as the frontispiece of a popular travel book on the West Indies, "The Cradle of the Deep," by Sir Frederick Treves, 1908.

Which of the Carib Islands was the original habitat of Jacquin's *Areca oleracea* may be difficult to determine, but his "Historia" contains no plants from Barbados or from other British colonies, except a few from Jamaica. Collections were made at Havana and around Cartagena, on the coast of South America, otherwise only in French and Dutch islands, many of the plants coming from Martinique. Barbados is rather remote from the other islands, about 80 miles east of St. Vin-

cent, and is reported not to have been inhabited when first discovered and colonized, though remains of earlier people have been found.

In the absence of a later distinctive name for the Barbadian royal palm, recourse may be had to a suggestion by Griffith Hughes, in his "Natural History of Barbados," published in 1750. Hughes gave Latin names for many plants, some of them in binomial form, and was greatly impressed by "The Cabbage Tree," which he proposed to call "*Palma maxima*," believing it to be the largest of all palms.

"This Tree is by some Authors called The Palmeto Royal. And well may it be called Royal from its great Height, majestic Appearance, and Beauty of its waving Foliage: Neither the tall Cedars of *Lebanon*, nor any of the Trees of the Forest, are equal to it in Height, Beauty or Proportion. . . . It is generally as straight as an Arrow; and scarce can a Pillar of the nicest Order in Architecture be more regular, especially when it is of about Thirty Years Growth; And as there is a natural involuntary Pleasure arising from the Harmony of just geometrical Proportions, striking the Eye of the most unskilful and ignorant Beholder it is not strange that these Trees are universally admired. . . . I have always thought it the Height of Extravagancy and Luxury to fell so stately a Tree, which would be an Ornament to the most magnificent Palace in Europe, to gratify the Taste of any Epicure, especially as there is but a very small Part of it eatable."

On this reckoning *Gorgasia maxima* (Hughes), the Barbadian royal palm, abundantly represented in the Panama Canal Zone, would be the type species of the genus, with the Carib royal, *Gorgasia oleracea* (Jacquin), as a second species, distinguished by the leaf-blades not spreading horizontally, but borne aloft, above the leaf-sheath bun-

dle, thus giving a very different form of leaf-crown. Hughes describes and figures the leaf-blades of the *Palma maxima* as "spreading horizontally with great regularity," and states that a fiber of unusual strength was obtained from the pinnae, for spinning into cordage and fishnets.

The Barbadian royal and the Cuban royal have been introduced during the

last century in many countries, and share distinction with the coconut palm as the chief ornaments of the tropical world. Their beauty may be exceeded by some of the other palms of the tropical forest, but most of the forest palms have foliage of more delicate texture, poorly adapted to open conditions of sun and wind where the royals and coconuts thrive.

Some Bryophyllums and a Kitchingia

CLAUDE HOPE

IN THE last number of this magazine, a key was given for the separation of the three genera of the Kalanchoideae and some kalanchoes were described and illustrated. In this article the common species of *Bryophyllum* and one *Kitchingia* will be described. As before, they will be discussed in alphabetical sequence.

As a group, the bryophyllums are more satisfactory horticulturally than the kalanchoes. Of the ones described below, only *B. Aliciae* and *B. scandens* have failed to flower regularly in the greenhouse near Washington. All have attractive ornamental features to recommend them, either in the color or the character of foliage, and of the flowers, or the character of the inflorescence. In addition, most of them give rise to new plantlets on the margins of the leaves, a feature that is sure to appeal to most people. Like kalanchoes, they make satisfactory house plants if given plenty of light. With one or two exceptions, they do not differ in cultural requirements from kalanchoes.

With the viviparous species, propagation, of course, is no problem. On the contrary, some of them are inclined to be weedy if given the opportunity. All of them may be rooted from stem cuttings, or as always seed may be used. Cuttings present no problems whatever; in most cases they may be taken with aerial roots already formed. The best season for starting cuttings, if one wants good plants for flower, is June and July. Any exceptions to this will be noted below.

Bryophyllum Aliciae (Hamet) Berger is illustrated in color in Addisonia

19:(1936) pl. 633. The plant, a native of Madagascar, is a true perennial that attains a height of more than a meter. The round, glandular hairy stems are erect, rather stout and persistent to the base of the flower peduncles of the previous season. The plants are rather sparsely branched, but, in spite of that, they present a rather pleasing appearance.

The leaves, like all other parts of the plant, are covered with long white glandular hairs. The basal leaves are sessile, and the upper ones are distinctly petiolate; the transition between the two is accomplished gradually. The blades of the lower leaves are obtuse, wide-ovate to orbicular, and measure about 10 to 12 cm in length and 8 to 10 cm wide. The intermediate and upper leaves sometimes are 2 to 4 cm long and 2 to 4 cm wide. The broad petioles are enlarged at the base so that they extend half way around the stem, each meeting its counterpart in the opposite leaf midway. The leaf margins are provided with close-set, blunt serrations on all except the basal portion. Plantlets have never been observed on the margins.

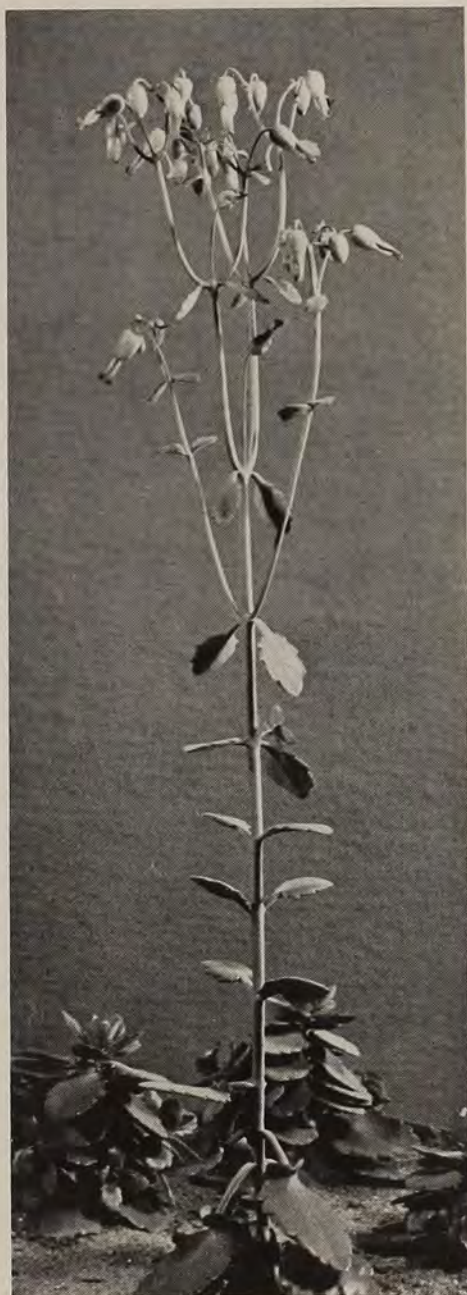
The inflorescence is a loose, dichotomous cyme of 20 to 30 flowers. The pendent flowers on slender pedicels with their velvety covering of hairs and orange-scarlet color need no apologies. The corolla tube is about 25 mm long, and is terminated by 4 broad-ovate, somewhat spreading lobes, about 1 cm long, each strongly notched at the tip. The tube is less inflated than in most bryophyllums. It has two slight constrictions, one opposite the tip of the calyx, and one at the base of the lobes.

The inner surface of the corolla tube, including the lobes, is beautifully marked with a network of scarlet lines over an orange-yellow ground. The calyx, slightly inflated, has a tube about 5 mm long and 4 acute, deltoid lobes about 3 mm long. After flowering, the inflorescence sometimes produces a mass of young plantlets, which, after a developmental period of 6 to 10 weeks, drop to the ground, where they root and form new plants.

B. Aliciae grows rather slowly and is not dependable in its flowering habit. It seems likely that the plants must be allowed to grow two or three seasons without pinching the terminal if flowers are wanted. However, with its dark green, white-hairy leaves, rather closely spaced, it is reasonably attractive in its vegetative stages.

Bryophyllum crenatum Baker (*Kalanchoe laxiflora* Baker) (See page 117) is a native of Central Madagascar, where it is very common. It is a small, glabrous, herbaceous perennial whose stems die back to near the base after flowering. A little later, new shoots, thickly set with leaves, make their appearance; these grow very slowly until about June, but from that time rapidly until flowering time in late September or October. Their mature height is from 20 to 40 cm.

From the time the flower buds are formed until the first flowers open, the terminal part of the stem bends over as if wilting. The flowers are pendent in a corymbiform cyme of 2 to 4 pairs of branches. The symmetrical pattern formed by the cymes contributes greatly to the charm of the plant in flower. The soft, opalescent colors of the peduncles, pedicels, and calyces are very appealing. The calyx is strongly inflated, with a tube about 8 to 10 mm long, and 4 to 6 mm in diameter. Its appressed lobes are deltoid, acute, and about 3 to 4 mm in each dimension. The corolla, in-



Claude Hope

Bryophyllum crenatum.

cluding the somewhat spreading segments, is about 22 to 25 mm long. The tube is conspicuously constricted about

the top of the ovaries, from which point it is enlarged at a uniform rate to the base of the lobes. The lobes are wedge-shaped, broadest at the truncate apex. The corolla color is one common to several species of *Bryophyllum*; it is difficult to describe but might be called brownish orange or yellowish brown. After the flower withers, the pedicel begins to straighten, and by the time the fruit is mature, it stands quite erect, holding the carpels upright.

The abruptly petiolate leaves of *B. crenatum* are gray green, glaucous, ovate-elliptical, obtuse with broad rounded crenations on the margin. They are 1 to 2.5 cm wide and 2 to 5 cm long. Plantlets are frequently produced in the sinuses of the margin. The leaves are distinguished from all others of the genus by the presence of a conspicuous pair of auricles at the base of the blade. The petiole is slender and terete throughout its length of about 15 mm.

This is a species that flowers every season without fail if given approximately satisfactory light. Since much of its beauty is in the color and pattern of the inflorescence, it is very satisfactory as a cut flower. Its propagation is simple, either by plantlets from the leaf margin, cuttings, or by seeds.

Bryophyllum Daigremontianum (Hamet et Perrier de la Bathie) Berger (See page 119) is probably the strongest grower of the whole group of bryophyllums. Furthermore, it has been called the easiest of all plants to propagate. This feature is responsible for its low cost and, no doubt, its great popularity in the five and ten cent stores. Despite the fact that it is of fairly recent introduction from Madagascar, it seems to enjoy a very wide distribution.

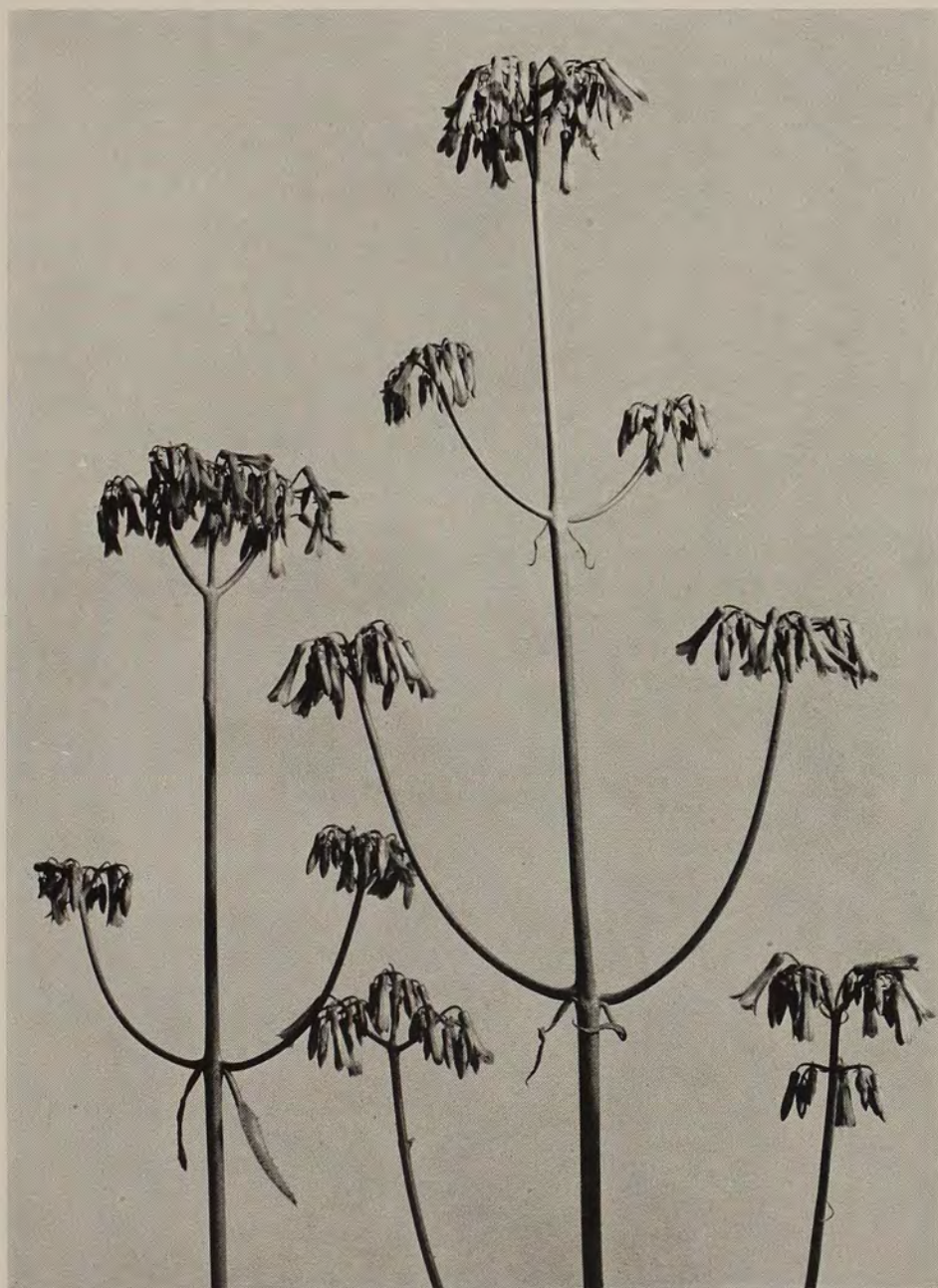
The plant is very handsome in the vegetative stage. Its large triangular-lanceolate leaves, rich, glossy green,

marbled and blotched with dark brown, are undoubtedly familiar to all who are interested in succulents. When the plants are sturdy, as they usually are, and when the leaves carry a full complement of plantlets along the margins, as they usually do, they form attractive and unique specimens; as such, they are well worth growing, even if they seldom flower.

There is evidence, however, that they will flower in the house if they get the benefit of good southern exposure. A good plant in flower should please the most exacting modernist in interior decoration. Few other house plants are so adaptable to the modern style. Indeed, most of the charm of the flowering plant lies in its pattern of branching. The flower color of dull mauve and the stem color of neutral blue gray are not colors to attract the eye. The flowering season is very long; our plants first came into flower about December 1 and continued until early March. Possibly for the best results during the winter, new plants should be started in May.

The individual flowers deserve some attention. They are pendent on slender pedicels. The calyx is tubular, but smaller than in most bryophyllums. The tube is about 4 mm long and its deltoid lobes are about as long. The corolla has a moderately narrow tube about 16 to 17 mm long, distinctly constricted just below the middle. The lobes are practically erect, spread only a little from the mouth of the tube, and are about 7 to 8 mm long and 3 to 4 mm wide. The filaments are attached in the base of the corolla tube in conformance to one of the essential characters of the genus.

Kalanchoe Fedtschenkoi Hamet et Perrier de la Bathie (See page 121) is a species that belongs in *Bryophyllum* if one follows the Berger concept. However, it was not included in Berger's treatment of the group and has never



Lilian A. Guernsey

Bryophyllum Diagremonianum.

been transferred. Hence it must be called *K. Fedtschenkoii* until that transfer has been accomplished.

It is a luxuriantly leafy species as compared with most others. The internodes are very short and, under good conditions, very few of the lower leaves are shed before the flowering season is ended. In nature, it is said that the flowering shoots are often leafless, due, no doubt, to a shortage of water at flowering time. Good plants that have had their growing tips pinched 2 or 3 times in early season will have from 4 to 8 shoots arising from near the base, each with a full complement of purplish-blue leaves, faintly margined with red. The leaves have the pleasant and distinctive habit of facing toward the outside of the plant, thereby contributing much to the apparent leafiness of the plant. The stems reach a height of about 40 to 50 cm. A number of aerial roots are produced, particularly from the lower portions of the stem.

The leaves are rather fleshy, flat, abruptly petiolate, obovate-orbicular, very obtuse. The slender terete petiole is very short. The margins of the lower leaves are provided, in the basal half, with rather crowded, long teeth, separated by angular sinuses. Above the middle of the leaves, there are widely spaced, acutish dentations.

The inflorescence, a lax terminal cyme, is well illustrated in the photograph. The presence of the bracts should be emphasized, however, because they aid in distinguishing *K. Fedtschenkoii* from *K. Waldheimii*, described below. The flowers are coral or amber rose, a color common to several species of the genus. The corolla tube is 16 to 18 mm long and the lobes are 6 to 7 mm long. The tube has two constrictions, one at the base giving the flower a stipitate appearance, and one just below the mouth of the tube. As may be seen in the illustration, the calyces are

somewhat inflated. Their color is light glaucous green.

This species may be propagated from seeds, leaf cuttings, or stem cuttings. Leaves seldom produce plantlets in the margins spontaneously, while attached to the plant, but when detached for propagation they respond readily. As a window plant, this species has not grown as well as many of the others, neither has it produced good color in the leaves.

Kalanchoe Gastonis-Bonnierei Hamet et Perrier de la Bathie (See page 123) like *K. Fedtschenkoii*, was not included in Berger's treatment and has not been transferred to *Bryophyllum*. It is a stout, large-leaved, glabrous perennial, possibly monocarpic in its native habitat. In the vegetative state, the plant body is virtually a rosette of 6 to 8 pairs of leaves, separated by very short internodes. Just before flowering, the stem elongates rapidly, forming internodes increasing in length from 5 mm or less at the base to as much as 12 or 15 cm at the top of the plant. At its best, the stem is more than 1 cm in diameter.

The leaves, very large for the genus, are largest at the base of the plant and gradually become smaller upwards until finally they are reduced to small linear bracts. They frequently attain a length of as much as 40 cm and a width of as much as 15 cm. The blades are ovate-lanceolate, triangular at the base and acute or sub-acute at the apex. They are light green, glaucous, or sometimes mealy, marked with numerous small, light brown patches. The margins are regularly, closely, and obtusely crenate. In the sinuses of the crenations young plantlets are produced, both after flowering and during the summer. The two strongest plantlets are at the tip of the leaf, which characteristically bends down to touch the ground. Under good conditions, they become rooted



Claude Hope

Bryophyllum sp. (*Kalanchoe Fedtschenkoi*).

and a circle of new plants is formed around the old one.

The petiole is distinct from the blade only because it is entire. It varies in length from about 8 to 12 cm on the largest leaves and is 2 to 2.5 cm wide. There are two marginal wings that half way encircle the stem and are connate with those of the opposite leaf.

Little needs to be said about the flowers and the inflorescence, which are well shown in the photograph, except to indicate that the calyx tube is about 20 mm long, the lobes about 10 mm long, the corolla tube about 35 mm long, and its lobes about 5 mm long. The calyx is pale green except for a clear rose blush which forms on the upper side when exposed to full sun and except for the reddish-brown streaks at the sinuses of the lobes. The corolla is paler green than the calyx, with brownish-red margined lobes.

This species is a native of Madagascar, where it grows as a rock plant in regions of moderate rainfall.

Bryophyllum minutum (page 125) (Hils. et Boj.) Berger is a native of Madagascar, where it is apparently rather widely distributed. It is a species that has caused some trouble among the taxonomists. Baker could not decide whether to call it a kalanchoe or a kitchingia, but if he had adhered to the characters that he set up for the genus *Kitchingia*, he should have had no trouble. Several forms have been separated by botanists, only to be suppressed by other botanists. Probably the true situation is explained by Perrier de la Bathie when he says that there are a number of isolated populations of the species in Madagascar, each of which is rather homogeneous, yet fairly distinct from the other populations in some small way. Intermediate forms, however, have been found that connect the various populations.

As the plant grows in the greenhouse, it is rather ungainly and unattractive in habit. As it grows out of doors in California, to judge by a specimen sent by Mrs. Neff Bakkers of San Diego, it is truly handsome. In the greenhouse, the internodes are long and the leaves are few in number. The stems are slender and barely self supporting. Only a few flowers are open at any one time. Out of doors, the habit is so much changed that the entire effect of the plant is different. The number of leaves is approximately doubled, the length of the internodes is almost halved, the stem is stout instead of slender and, finally, the number of flowers is increased many times. In both situations, much of the charm is in the pattern of the inflorescence, but this is much improved out of doors. The reader must bear in mind, in appraising the merits of this plant, that the photograph is from a greenhouse plant and the observations and experience here given are based on greenhouse plants.

During the summer the plants are compact enough. In late fall the flowering stems begin to elongate and, by the time the first flowers open, the stems are about 3 feet in length. The flower details, other than size and color, need not be given. The strongly inflated, 4-angled corolla tube is from 20 to 25 mm long. The color is a charming, luminous pink, shading to pale yellow at the base of the tube. It is reminiscent of the color of pink roses. The flower color was much deeper in those of the plant grown outside.

The leaf is triangular with obtusish apex and coarsely crenate margins. The base sometimes turns upward to give an auriculate effect and sometimes is flat and extended behind the point of attachment of the petiole, giving a peltate leaf. The petiole is rather broad and flat and at the stem end is abruptly



Lilian A. Guernsey

Bryophyllum sp. (*Kalanchoe Gastonis-Bonniei*).

enlarged to a semi-circular plate which half encircles the stem, meeting that of the opposite leaf. The leaves are held stiffly at right angles to the stem. The leaf color is medium dull green, decorated with red-brown blotches in the sinuses of the crenations. Plantlets on the margins have never been observed.

After the rather extended flowering season in midwinter, the inflorescence proliferates into a mass of young plantlets which may be used for propagation. Seeds are not readily produced, at least in the greenhouse.

Unfortunately, no observations have been made on the behavior of the plant in the window garden. An abundance of light is indicated for best success and lack of it may prove to be a limiting factor.

Bryophyllum pinnatum (L.f.) Kurz (See page 126) (*R. calycinum* Salisbury), like *K. laciniata*, is a species of world wide distribution in the tropics. Some have thought that it is indigenous only to Madagascar where it has been disseminated both naturally and by the agency of the aborigines who admired it as an ornamental and who use it as a medicinal plant. The leaf is used as a dressing for sores, and a tea is brewed from it.

One may see from the photograph that this is a strikingly handsome plant. The colors that the picture does not show greatly enhance its beauty. In the vegetative condition the leaves are rich glossy green, with reddish-brown margins, decorated with brown blotches at the sinuses of the crenations. As the flowers develop, the leaves begin to dry slowly. This process is accompanied by a gradual change to yellow-red-brown, proceeding from the margins to the midrib. It is a pleasing color, suggestive of but not as brilliant as that of the red oaks in the fall. In drying, the leaves do not wither appreciably; rather they lose their succulence and be-

come leathery. A feature which adds interest is the change from simple leaves in the lower part of the plant to pinnate leaves in the upper part.

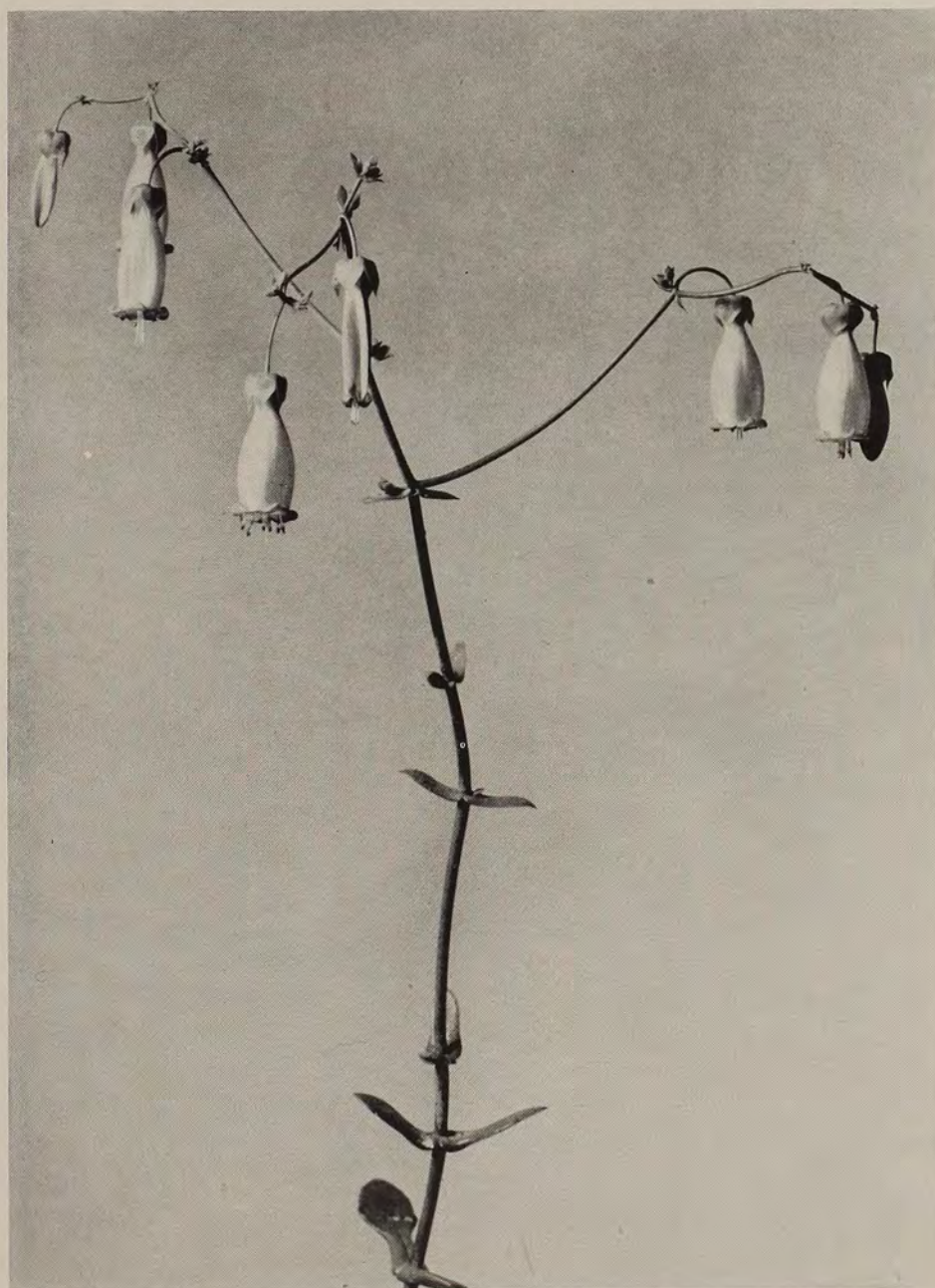
The flowers possess real charm, both in the pattern of the inflorescence and in the form and color of the individual flower. By far the most conspicuous is the pale, inflated calyx, touched with red at the base and green at the tip. The corolla, which is exerted for only a third of its length, is a warm red brown, very similar to the color of the leaves.

This species is not as prolific in the formation of plantlets in the leaf margins as many of the others, yet the fact that they form on detached leaves has given the plant its common name, the air plant. Certain strains of the species produce quantities of small plants in the inflorescence after the flowers wither, just as in *B. miniatum*.

As a house plant, *B. pinnatum* has a good reputation, but on that subject the writer can not speak with experience. How well it flowers under such conditions is not known. Regardless of its flowers, it is well worth growing just for its leaves. Those who can give it plenty of light will surely be rewarded with flowers.

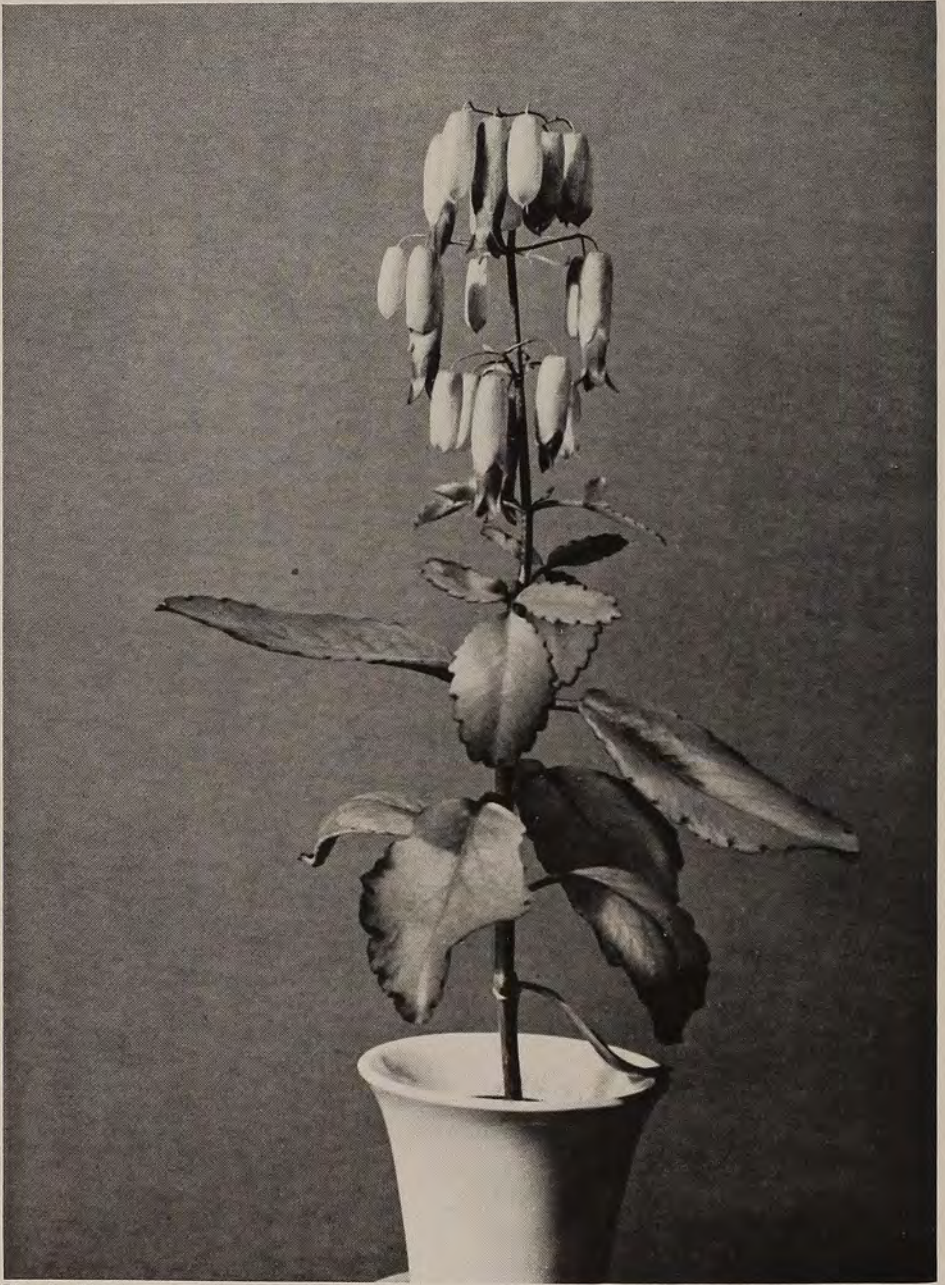
This species was the first of the group to be introduced to Europe and is the one upon which the genus is based. The first mention of it in literature was by Clusius in 1605 as *Sedum madagascariicum*. It is quite possible that it was the first of the Kalanchoideae to be brought to Europe.

Bryophyllum scandens (Perrier de la Bathie) Berger (See page 127) is a slender vine from Madagascar that should be interesting in any collection of house plants, if only as a novelty. Visitors to the writer's office, where it has grown happily for several months, have almost invariably singled it out for comment. Many have compared it



Lilian A. Guernsey

Bryophyllum miniatum



Claude Hope

Bryophyllum pinnatum.



Lilian A. Guernsey

Bryophyllum scandens.

to a chain and the "chain plant" is very likely to be its common name if it becomes well distributed. The reflexed leaves supply its chief means of support as a vine, aside from the occasional aerial roots; there are no tendrils nor does the stem twine.

The photograph shows the vegetative characters of a young plant quite well. It was taken in October and since that time the plant has been kept in the office. There are now (April) some 6 or 8 stems about 40 inches high as ample proof of the plant's adaptability to indoor conditions.

There seems to be no need for a detailed description of the leaves. Their shape and habit, as well as the ever present plantlets at their tips, are well shown in the illustration, which is a little less than one-third natural size. As a further key to the size, the length of the mature leaves is about 5 to 6 cm. Occasionally one sees leaves with marginal crenations or irregularly spaced teeth. The first pair of leaflets formed on the baby plants after they drop from the plant is broad-ovate with crenate margins. Hence the evolutionary relationship between the two types of leaves is indicated. When grown in strong light, the leaves are distinctly purplish; in weaker light, they are light blue green, becoming darker with age, but never purple.

To judge by the experience in Washington, one may not often see flowers of *B. scandens*. It doesn't matter particularly because the flowers are not attractive. The corolla is dull gray violet, and the calyx is glaucous blue. They are broad-tubular or campanulate in shape, not greatly different from the shape of the flowers of *Campanula carpatica*. The calyx and corolla are very similar both in size and in shape.

Bryophyllum tubiflorum Harvey (*B. verticillatum* (Scott-Elliott) Berger (see page 129) shares with *B. Daigre-*

montianum the distinction of being the most common plant of the genus, and it, too, is usually available in the five and ten cent stores. While *B. tubiflorum* is not as prolific in the production of plantlets as *B. Daigremontianum*, it is just as easily propagated.

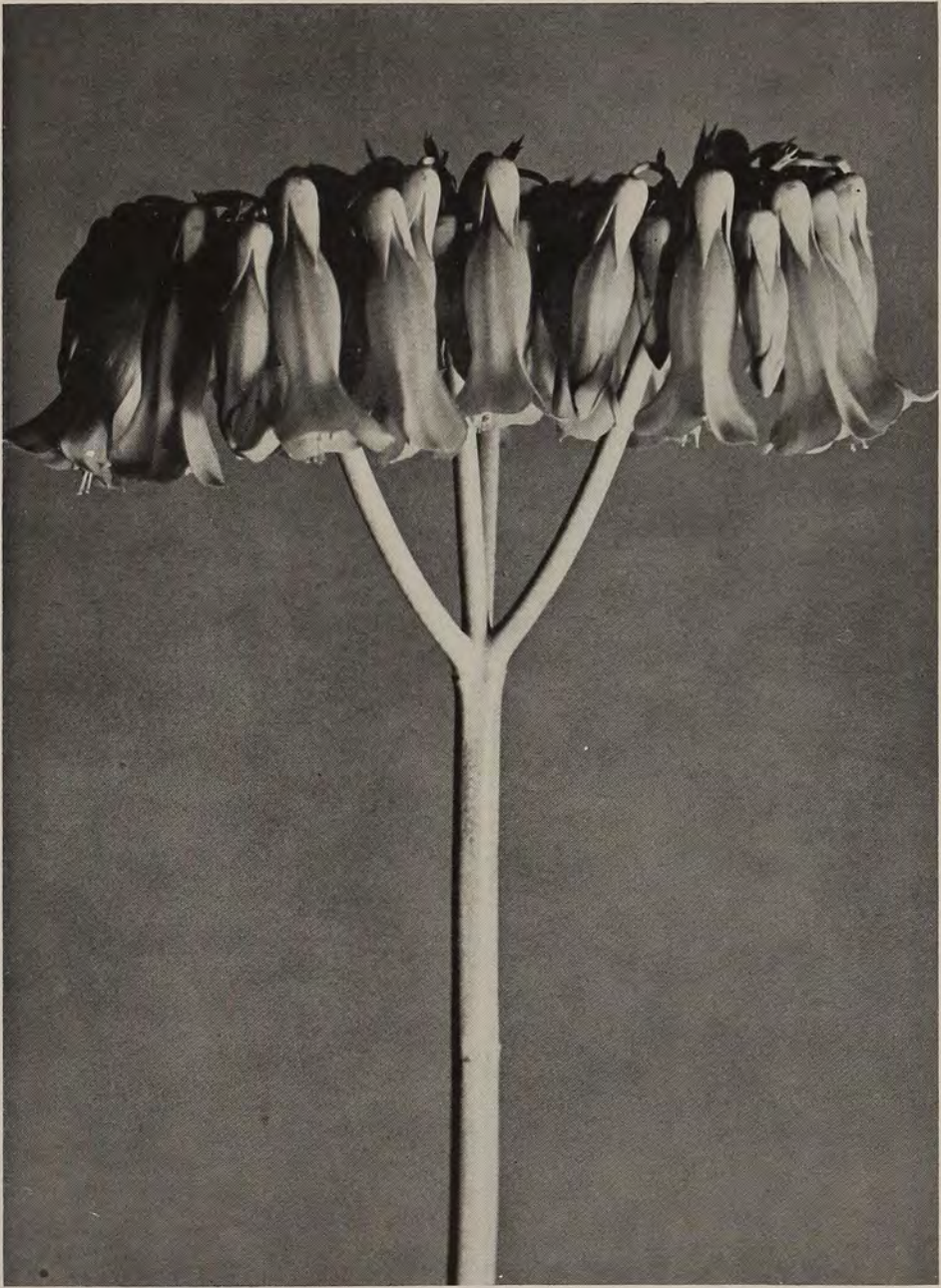
A detailed description of this species seems unnecessary, for an illustration and description were published in the NATIONAL HORTICULTURAL MAGAZINE, Vol. 11, pp. 60 and 65, 1932. It is only necessary to add that its behavior this season further confirms the earlier impression of its value as a cut flower. Of its high rank among showy flowering plants, there has never been any doubt.

As a house plant, it may not be more than a novel foliage plant. More experience is necessary before definite statements can be made as to its flowering behavior indoors.

A hybrid between *B. tubiflorum* and *B. Daigremontianum* is grown in California. The one specimen seen by the writer seems to be inferior to both parents. It has the poor flower color of *B. Daigremontianum* and pretty much the habit of *B. tubiflorum*. In other respects it seems to be intermediate.

Alphabetical sequence places *Bryophyllum uniflorum* (Stapf) Berger (see page 130) near the end of this group, but for showiness and colorful effect it should be first. This species introduces the trailing habit of growth, a habit not previously mentioned in the Kalanchoideae in these pages. In its native home in the somewhat moist woods of Madagascar, it is frequently epiphytic on tree trunks. The trailing habit and the production of an abundance of aerial roots are well adapted to such a habitat.

An excellent illustration in color of a sparsely flowered plant under the name of *Kitchingia uniflora* Stapf is that of t. 8286, *Curtis's Botanical Mag-*



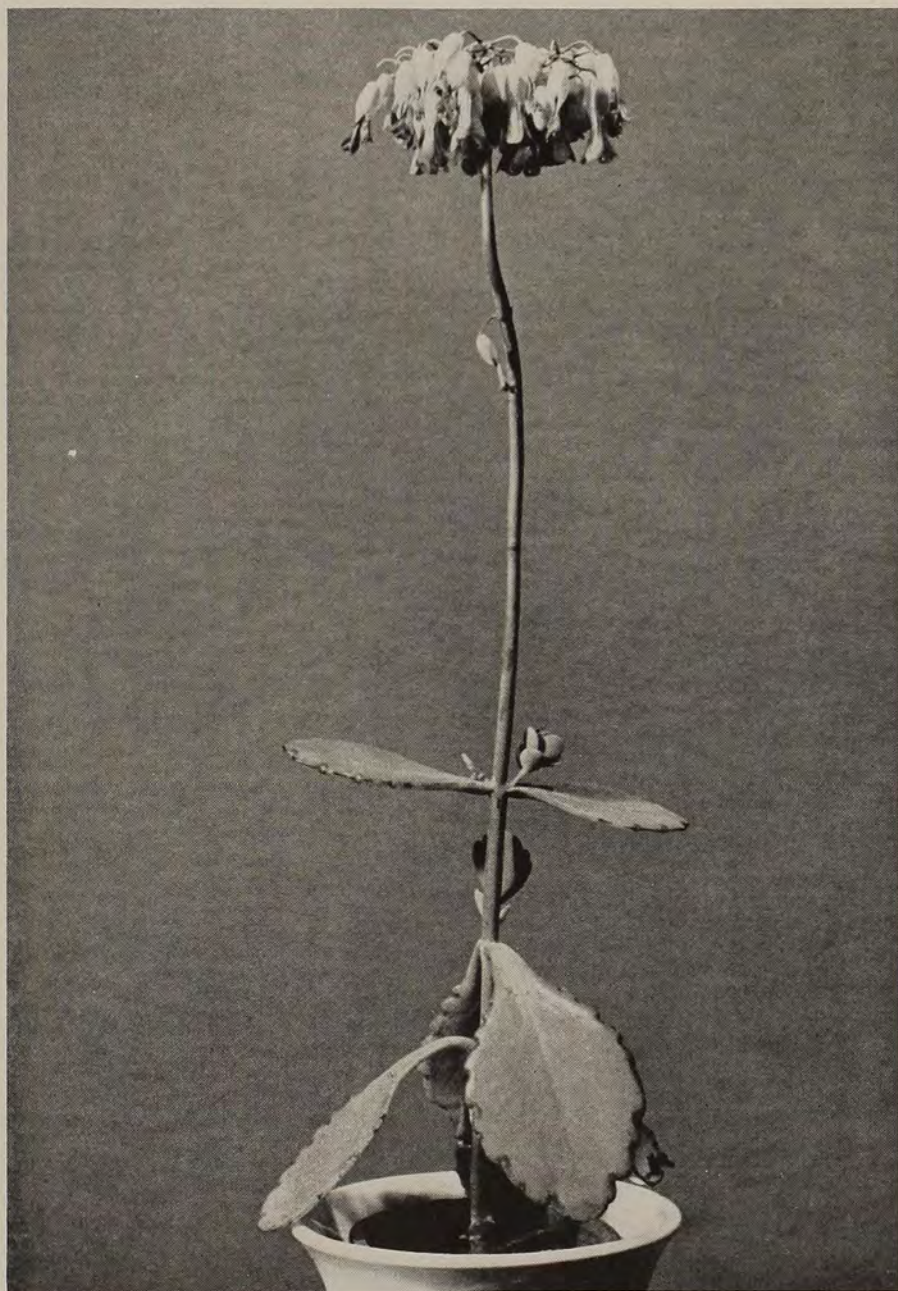
Claude Hope

Bryophyllum tubiflorum.



Claude Hope

Bryophyllum uniflorum.



Claude Hope

Bryophyllum sp. (*Kalanchoe waldheimii*).

azine (1909). This plant was placed in *Kitchingia* because of an error which did not involve any taxonomic characters of the plant. However, it should be said that it seems to be a link between that genus and *Bryophyllum* and approaches rather closely *Kitchingia gracilipes* Baker, another epiphyte of Madagascar.

It may be seen from our photograph that the specific name is quite inappropriate if the plant is well grown; but in ordinary specimens there can be little argument over the name, even though three flowers are more common than one. In the past the various cultural practices have resulted in only mediocre performance. In California it is said that the plant is difficult to grow. At one time it was believed that the plant preferred shade. The right combination seems to have been found this year in a hanging pot. Some old plants have been carried for several years in clay pans plunged in the soil in a sunny greenhouse. This year one was lifted and hung in another equally light greenhouse without any other disturbance. Its flowering was greatly improved. A companion hanging pan was made up with young propagations in new soil. The photograph shows the amazing results that followed. Almost every inflorescence has borne between 30 and 40 flowers, nearly all of which have been open at the same time for a period of several weeks.

Throughout February and March it presented an indescribably lovely sight with its hundreds of nicely proportioned classical urns hanging inverted from slender pedicels. One notable feature is the individuality of the flowers; though there are hundreds of them, they do not leave the impression of a mass. Each flower measures about 30 mm (the illustration is approximately one-half natural size).

The small leaves are not over 20 mm in length and are distinctly succulent in character. They are remarkably uniform in their close spacing on the stem. The color is a medium rich, glossy green, only slightly lighter underneath, with a faint marginal line of red brown. Plantlets are never produced on the margins, but detached leaves root readily and produce new shoots at the point of attachment to the stem.

Kalanchoe Waldheimi Hamet et Perrier de la Bathie (see page 131), like *K. Fedtschenkoi* and *K. Gastonis-Bonnieri*, was not included by Berger and has not been transferred to *Bryophyllum*. In certain stages and conditions of growth, this species is very similar to *K. Fedtschenkoi*, though the stages illustrated here are distinct enough.

The photograph of *K. Waldheimi* is complete enough so that it needs little elaboration besides color notes. The rather close, flat-topped inflorescence contrasts with the looser one of *K. Fedtschenkoi*, but the colors are very similar; in fact, identical in the corolla. The calyx of *K. Waldheimi* is paler, almost translucent, and a little more inflated. The fat, flat leaves of the present species are silky gray green with distinct red-brown margins accentuated at the broad sinuses of the crenations with blotches of the same color. The large size and small number of leaves contrast with the condition in *K. Fedtschenkoi*. Like those of the latter species, they give rise to plantlets only occasionally.

K. Waldheimi is slower in growth and later in blooming than *K. Fedtschenkoi*. It also remains in flower for a much longer time, usually from February through early May. At its best it will be sure to satisfy the most exacting. Its behavior in the weaker light of the window is not known, but there are indications that it will do very well.



Claude Hope

Kitchingia peltata.

Because of its slow growth, better plants will be obtained if they are started in May.

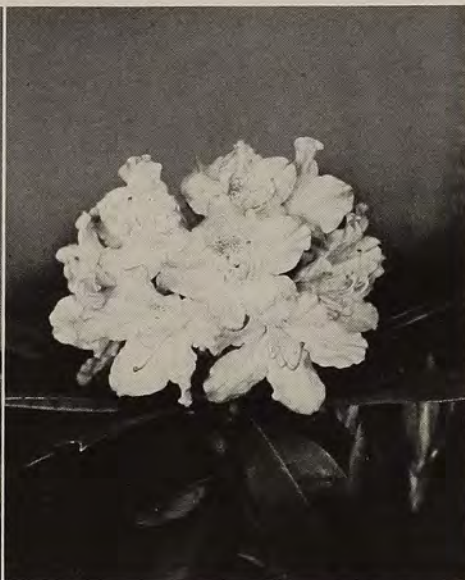
Kitchingia peltata Baker (see page 133) is the first representative of its group to flower in Washington, so far as is known. The essential distinguishing characters of the genus *Kitchingia* may be obtained by reference to the January number of this magazine. Suffice it to say that the divergent carpels (suggested in outline in the two wilted flowers in the illustration) constitute the most striking distinction from the other groups of the Kalanchoideae. The whole genus of six or seven species is native to Madagascar.

K. peltata is a vigorous, glabrous perennial that apparently flowers only occasionally in cultivation. The stems attain a height of at least a meter, perhaps more at times. On that account, it seems to be a plant more suitable for outdoor succulent collections than for window gardens. Unquestionably, several stems would be formed in age, but by nature it seems to be a sparsely branched plant. However, after flowering, a great number of laterals were produced on our plants.

As may be observed in the photograph (about one-third natural size), the leaves are elliptical and peltate, on slender terete petioles. They are clear bright green, while the stems are purplish, finely marked with paler dots.

The inflorescence is marked by an almost complete absence of bracts except for one small pair subtending the first pair of branches. The branches of the inflorescence ascend at first and then are arched gracefully downward by the weight of the flowers. The corolla is cylindrical at first, but it is soon stretched into a four-angled tube by the development of the carpels and rather rigid, slender styles within. The tube is soft, pale green, while the spreading ovate lobes are light pink. By the end of the flowering season of about two months (January and February), the number of flowers had greatly increased over that shown in the illustration.

Propagation may be accomplished only by seeds and stem cuttings in this instance. Leaf cuttings fail to respond. The fact that aerial roots are formed on the lower part of the stems is evidence of the prompt response that may be expected from stem cuttings, however.



Left. *Boule de Neige* × *R. Fortunei*.

Right. *R. Smirnovi* × *R. Fortunei*. This clone has been named *Katherine Dalton*.

Rhododendron Notes

CLEMENT GRAY BOWERS, *Chairman*

WE now have a few further notes to add to those previously appearing in this column (Vol. 16, pp. 193, 258) concerning the red azalea reported by Dr. Camp on a mountain in Kentucky.

Plants taken from this station on a mountain top at an altitude of 4,000 feet were transported to my home in central New York and also to Cornell University in June 1937 while in full bloom. Under cultivation in both places they appear to be perfectly hardy and I can report that my three plants have endured low temperatures to a minimum of twenty degrees below zero Fahrenheit without injury and with apparent success. I have an accurate color record, made on the mountain at the time the plants were collected,

showing the most brilliant color form, in order to check results under cultivation. It is a bit too soon to make comments concerning the eventual success or desirability of these plants, but they seem to be entirely satisfactory from the standpoint of hardiness. They bloomed sparsely last year and no good photographs are available to show the characteristic flower truss, although color photographs were taken to record their colors.

While the plants seem to behave all right in cultivation, their color is a different matter, and in this we have to report a disappointment. The brilliant, scintillating coloration of the mountain plants seems lacking in some degree in these specimens when grown here.

Their color is a good red, to be sure, but not a great deal better than existing varieties, such as one or two of the darker red Ghent hybrids. Indeed, these Kentucky azaleas seem much the same color as the best reds already in cultivation when you first see them opening their buds, but they do become somewhat darker after the flowers have been open for a few hours, and, in such a stage, are still the darkest azaleas I have seen. But in 1938 mine failed to develop the iridescent, flaming scarlet color that struck me so forcefully when I encountered them in the wild. The red color, under my conditions, was considerably duller and less interesting.

This change of color may be due to transient conditions which can be rectified—some peculiarity of the season, some inhibition caused by the transplanting process or to the fact that I am growing them in a site where they are not getting full sunlight. It may be that, if grown in complete sun (as was the case with a few of the wild plants), the brightness will reappear. I am hoping that such is the case. But, on the other hand, the combination of cool air and very high light intensity prevalent on the mountain top may be a prerequisite for the development of that brilliancy of pigmentation which has so charmed those few of us who have had the privilege of visiting the plants at home in the wild. It is not uncommon to find that mountain plants, when grown under lowland conditions, fail to develop brightness of color comparable with what they possess under alpine conditions, as all those know who have ever seen *Aquilegia caerulea* in the Rocky Mountains and later have grown it in the East, where the full bright blue color just refuses to appear.

Nevertheless, this is still a good azalea. It is distinctive in being rather late to bloom. It does not begin to bloom until the flame azalea, *Rhodo-*

dendron calendulaceum, is practically gone. It did not begin blooming here until June 15th. As such, it is one of the late azaleas, although not so late as *R. viscosum*. Then, too, its splendid flower trusses, globular in shape, constitute another good feature and one that seems consistent with this form of azalea. Then, as mentioned before, is its apparent hardness.

Seeds of this form were collected from the wild station in October 1937 and were distributed to certain arbor-etums, botanic gardens and to a few propagators. A few seeds were sent abroad. Some of these are doing well and should some day be in commerce. No propagation by cuttings or graftings has been done. To forestall inquiry, I will say that I am not propagating any for distribution.

In my opinion, further study is needed to determine whether this azalea may correctly be called *Rhododendron calendulaceum* variety *aurantium* Rehder, or whether it should be called by a new varietal name, or whether it might be, as some botanists suspect, the dying gasp of some previously undescribed species now nearly extinct. I understand that similar forms have been found in the Carolinas and even in Georgia, all bearing certain distinctive traits which seem to travel together, which lends credence to the theory that it may belong to a species of its own. Perhaps the whole thing is not worth so much attention as has been given here, but this red azalea has been a fascinating matter from the outset and we all hope that seedlings will appear which may be good enough to be of real value to plant breeders and horticulturists.

The Rhododendron Association (of England) has long published a year-book containing an immense amount of valuable data on rhododendrons and

azaleas. The subject matter is treated from the horticultural point of view, which, in England, means that it is replete with encyclopedic plant descriptions, with notes as to hardiness and certain practical information concerning hybrids and the like, but that matters of plant physiology and genetics are not similarly developed. In other words, it is easy to grow rhododendrons in Britain as compared with the eastern United States, so that the British growers are not forced to concern themselves about the many physiological factors which seem to operate against many species here. Were it possible for us to grow exotic rhododendron species and varieties in this country so easily as it is done in England and with such a wealth of material to use, the British rhododendron yearbooks would be of great usefulness to us. As it is, comparatively little of the information contained in the yearbooks are of direct usefulness to American amateurs except those who live on the Pacific Coast and those who are especially concerned with hybridization. Otherwise, for the majority of us, the material presented, however excellent, is vain, because we just can not grow many of the "new" half-hardy rhododendrons in our ordinary climates—too cold in the North, too warm in the South, too dry in the West, and so on, or approximately so! How American rhododendron fanciers do envy the mild, moist British climate! We must say, however, that those Americans who do live in mild regions, like the residents of the Puget Sound region, will find the Yearbook of the Rhododendron Association (of England) a most excellent and profitable guide.

Now comes the German Rhododendron Society (Deutsche Rhododendron Gesellschaft) with its first yearbook (1938) and another one just about ready for 1939. Since this yearbook is

probably unfamiliar to most Americans, we will explain that it is quite different both in format and in content from the English yearbook. The German book has some commendable features and, like the other, it contains certain features which will be practicable for Americans, along with other features which will not. Its photographic illustrations are noteworthy as showing, not plant specimens alone, but pictures of planting techniques and other useful operations, along with a large percentage of charts and tables which relieve some of the task of translation. In addition to plants of the genus *Rhododendron*, the German yearbook treats of broad-leaved evergreens generally and contains some useful articles on these. Some idea of the contents may be gleaned from the following list of subjects, picked at random from the 1938 yearbook: A catalogue of rhododendron species and varieties grown in the Bremen experimental garden; geographical distribution; the systematic arrangement of the family Ericaceae; Western China and Eastern Tibet as a rhododendron paradise; uses and planting design for rhododendrons; hybridization; Rhododendrons in Sweden; and problems in the breeding of rhododendrons.

C. G. B.

Rhododendron "Boule de Neige" \times *R. Fortunei*

As an early flowering hardy white rhododendron the Catawbiense hybrid "Boule de Neige" has held well nigh undisputed sway in our eastern gardens for half a century. In an effort to create a larger flowered earlier white this old variety was handcrossed in 1931 with pollen of the Chinese species, *R. Fortunei*. These seedlings grew into nice compact plants and began flowering in 1937. As was to be ex-

pected in a combination of which one constituent is already a hybrid of mixed parentage, there is considerable variation in the size of the flowers though all have been white in color. On some plants they are so small as to be mediocre or even worse but there are other seedlings which have produced the desired results.

These flower a week or ten days in advance of "Boule de Neige" in much larger very compact trusses which carry with them just a little of the *R. Fortunei* fragrance and like this species the large corollas are often six or seven lobed. A peculiarity noticed in some flowers is that of divided or forked stamens without anthers.

An outstanding seedling selection has been named "Beaufort."

R. Smirnowii × *R. Fortunei*

This cross represents another attempt to produce earlier blooming varieties but in pink shades instead of white. As both parents are true species there is very little variation among the seedlings of this mating either in the color or the size of the flowers. These are uniformly much larger than the Catawbiense hybrids in rather loose

trusses of twenty or more corollas with only a faint trace of the *Fortunei* fragrance.

The plant habit is excellent and it will be interesting to note whether this hybrid of which both parents are uninjured by the lace wing fly is also immune. The foliage of *R. Smirnowii* however is especially inviting to other insect pests such as the army worms and various leafeaters while none of these seem to touch the leaves of *R. Fortunei*, so let us hope this latter character is handed down to our hybrid for of all the fine qualities of *R. Fortunei* none is more appreciated by the gardener year in and year out than its absolute freedom from all insect injury to its foliage.

The color of the flowers is bright rose pink to crimson pink, the margins are wavy or "ruffled" and the leaves bear only a trace of the white indumentum of *R. Smirnowii* on their under surface. Both of the parent species being excellent garden plants in themselves with me there would seem to be no good reason why this new hybrid will not hold its own, especially since it is good enough in its own right to cause one to wish it would.

JOSEPH B. GABLE.

A Book or Two

Sagas of the Evergreens. Frank K. Lamb. W. W. Norton & Co., Inc., New York. 1938. 364 pages, illustrated. \$3.50.

"For forty years I have been striving to make friends of some of the outstanding trees of the world." Such is the first sentence of the author's prologue. This sentence is enough to show the temper of the man and to give some idea of the probable contents of the book. There are almost no limits to the various phases of information about trees that are not touched upon, some at much greater length than others. There are almost no corners of the globe, where evergreens exist, that have no share in this text.

Since it is written apparently for the joy of telling of the delights that have been discovered and experienced, it should kindle a more vivid response in the heart of the attentive reader than any other sort of presentation.

What to do with Herbs. Mary Cable Dennis. E. P. Dutton & Co., Inc., New York. 1939. 92 pages, illustrated. \$1.50.

This is a book almost impossible of reviews. One should read it. Then alone can one decide whether it is of any use to him or not. The text is discursive, but not diffuse. It comes from a full experience and is set down apparently with some impatience, as if the writer felt that you, dear reader, surely must have known this already—(the subtlest flattery this!). You'll like it immensely whether you like herbs or not.

The Primulas of Europe. John Macwalt. Offices of Country Life Ltd., London. 1923. 208 pages, illustrated in color.

This comes to the reviewer's desk as

a new book, but presumably is a reprinting of a useful manual that has already and doubtless will again send devotees of the primrose on various happy chases for other members of their beloved group.

Wild Flowers of Attica. Shirley Clifford Atchley. The Clarendon Press, Oxford, England, 1938. 60 pages, with 22 colored plates.

This represents a posthumous publication of plant notes by a particularly keen field botanist edited and supplemented somewhat by Dr. W. B. Turrill who has long studied the flora of the Balkan Peninsula. The text is delightful and as the plants discussed include many plants grown in gardens or known from literature, the book is twice pleasant reading. The illustrations, paintings by W. O. Everett, are equally charming.

For the gardener, it will be provocative chiefly in urging him to find other representatives of familiar families.

The Garden of Larkspurs. L. H. Bailey. The Macmillan Company, New York. 1939. 116 pages, illustrated. \$3.00.

This volume follows the same general format and plan as "The Garden of Gourds" and "The Garden of Pinks." The chapter on Diseases is written by Dr. Leonian, that on Insects and Other Pests by Dr. Blauvelt but neither overshadows the text nor alarms the gardener. One reads whatever Dr. Bailey writes eagerly with pleasure in his personal approach, his dicta, his clarity of presentation. How much or how soon the gardening world will be influenced by this book remains to be seen. Many avenues of departure are presented to those who may care for them.

The Gladiolus. 1939 edition, published for and by the New England Gladiolus Society, Inc., Boston, Mass. 248 pages; with regular membership, one dollar.

Each year the New England Gladiolus Society publishes a better yearbook, with clearer, better organization. The sections this year are—Notes from Other Lands, Research of General Interest, Hybridizing and Hybrids, Notes on New Varieties, Culture, Reports. What more important headings could there be? The reviewer read with keenest interest the articles in the section on research, and dipped with greatest pleasure through notes on New Varieties.

Lilies for American Gardens. George L. Slate. Charles Scribner's Sons, New York. 1939. 258 pages, illustrated. \$3.50.

This is a very good book. In plan and organization it is not unlike some of its predecessors but that plan and organization have so much that is fundamental that they can scarcely be escaped. The style is clear and precise, erring neither on the side of scientific desiccation nor of emotional diffuseness.

One is shown what the lily is, how it grows, how it may be cultivated, how it may be improved, how it may suffer under cultivation. The reasons for its pursuit through its many forms and species are brought out in the enumeration that forms the major part of the work. If anything has been slighted it may be the historical portion or the discussions of lilies in nature. These lacks are not serious since the book is well documented with references that the inquiring reader may easily find if he will.

Gardening in the Shade. H. K. Morse. Charles Scribner's Sons, New York. 1939. 205 pages, illustrated. \$3.00.

Gardening in the shade is one of the more difficult phases of gardening. One opens this volume hopefully, and goes on even more hopefully after reading pages 3-6 in which shade is discussed in very simple and understandable terms. As the book develops, however, one soon begins to wonder about what would go into a book called Gardening without Shade.

There is much good in the book, much sane gardening advice, many well-chosen examples of plant combination, many charming pictures. There are also some strange inclusions among the pictures, some combinations that sound most unlikely, and some bits of advice that are feeble. The book is given no locale but the material is essentially northeastern. One suspects that there were too many note books.

A Book of Wild Flowers. Margaret McKenny and Edith F. Johnston. The Macmillan Company, New York. 1939. 88 pages, illustrated in color. \$2.00.

The jacket of this charming book suggests that it was designed for children. The reviewer admits that by no possible chance could he be considered a child and offers the thought that this book, like some others, will please both child and adult. The simple texts will not be too difficult for those newly arrived at the pleasure of reading and yet they hold all the essential matters for much older persons. The charming plates offer no difficulties to understanding or recognition and yet have also much charming design that only the adult can fully seize upon. One hopes that all children will be as pleased as we are!

Water Gardening. Frances Perry. Country Life, Ltd., London. Charles Scribner's Sons, New York. 1938. 353 pages, illustrated.

This is a very useful book, with detailed chapters on the main topics that need most discussion and briefer treatments of the topics that need mention and no more. There is an elaborate section on the construction of pools, and excellent annotated check lists on both hardy and tender water-lilies. Several chapters relate to minor aquatics and to plants suitable for planting along the borders of streams, ponds and pools. The photographs are numerous and excellent.

Edible Wild Plants. Olive Perry Medsger. The Macmillan Company, New York, 1939. 323 pages, illustrated. \$3.50.

This is a most interesting book based on "data assembled over a span of thirty years" and forming the "first complete handbook of America's wild menu." Surely no one who has roamed the woods or fields has not wondered or experimented at tasting and nibbling various things, sometimes with sure knowledge of what he may safely taste, sometimes hopefully, sometimes doubtfully; with this he might always have eaten surely and safely.

The data are pleasantly presented so

that new tasters should arrive on our scene. The suggestion as to which plants might well be added to cultivation are exceedingly temperate.

The plants are grouped according to uses, fruits, nuts, seeds and seed pods, salad plants and potherbs, roots and tubers, beverages and flavoring plants, sugars and gums, and mushrooms. The chapters are fortified by an excellent series of indices.

Hardy Chrysanthemums. Alex Cumming, Jr. Whittlesey House, New York, 1939. 168 pages, illustrated. \$2.50.

So much that is excellent among chrysanthemums and other plants has come from the hand of Alex Cumming, Jr., that one opens the book with some anticipation. It is just what one would expect in nearly all points, an orderly and careful treatment of all the essentials of chrysanthemum matters, historical, botanical, cultural, pathological and genetic. The book is somewhat compressed and one wishes that there were more to be said in some of the divisions. No lover of chrysanthemums will fail to find it useful and the new gardener will welcome it with open arms.

Rock Garden Notes

ROBERT MONCURE, *Editor*

ROCK GARDENS FOR THE SOUTH

ELIZABETH SEYMOUR RAWLINSON

It is necessary to consider climatic conditions in the construction and choice of plant material for successful rock gardens for the South. Our problem is to bring plants through our hot dry summers and the alternate freezing and thawing of our winters.

The location of the rock garden is important; it should not bake in the full rays of the sun or be entirely under trees. Large trees are too demanding of moisture and food. My own problem of providing a situation for growing a number of varieties of rock garden plants and bulbs was solved by building a sloping retaining wall around a small sunken garden, the wall being planted as built. A large paulownia tree shades the south wall and its shadow extends over most of the wall through the long, hot summer afternoons. All sections of the wall are rather well exposed to the morning sun.

In preparing a soil mixture for rock gardens in the South, we need to take Clarence Elliott's good advice: "It is always safe and wise to add a shovelful of common sense." We should know that in our climate rock plants need food as well as any other type of plant. Rock gardening was developed in England and we have been influenced by English books on the subject. The prevailing moisture, and a soil that has been enriched for generations, makes it necessary for rock plants in the British Isles to be put on a poor diet in order to keep them from growing fat and floppy, thereby losing all their alpine

trimness and charm. With us the situation is quite different; we have a hard clay soil that needs to be broken up to be made retentive of moisture by incorporating humus, well-rotted manure and sand. Well-rotted manure is not usually included in soil mixtures for rock plants, but I know from experience that its addition is beneficial to many plants. A top dressing of well-rotted manure, humus and sand in autumn followed by a liberal dressing of stone chips is the best preparation for winter.

Two or three inches of shale or rock chips, such as used in road construction, spread as a mulch is very important for southern rock gardens. The small stones help to hold moisture and keep the roots cool in summer and prevent heaving by frost in winter. If an attempt is made to dig plants on our mountainsides that are growing in shale in full sun in an apparently barren situation, it will be found that as you follow the long fleshy roots back through layer after layer of rock chips there is moisture and a rich deposit of leaf mold held by the stones.

Again I make sure that the plants are well mulched with rock chips before the heat and drought of summer. Shale from the mountains for the acid-loving plants, limestone rock chips for the lime lovers, such as dianthus, draba and aethionema.

It has been my experience that in long periods of drought, though the rock chips help considerably, it is nec-



R. A. Malby (c)

A well planted rock wall.

essary to give rock plants an occasional good soaking. The new cloth hose allows water to drip through it slowly soaking the ground where it is laid, or an ordinary hose turned on a little way are good methods of watering.

There are various arrangements of stones that may accommodate rock plants satisfactorily: the development of a slope with outcroppings of stone, either natural or carefully constructed, the treatment of the area around an informal pool, the use of stones as edging to raised flower borders where many rock plants of the spreading, matty sorts flourish, or the planted wall. The latter will be found a very satisfactory situation for many rock plants and bulbs. I find my wall a source of never-failing interest at all seasons. In the past six years it has been fun to try out a number of rock plants and bulbs,

with about one hundred varieties of plants and thirty-one varieties of bulbs on the wall at present. It has been interesting to work out a succession of bloom, with some blossoms every month in the year.

The year is only a few days old when *Crocus Sieberi* sends up clusters of lavender bloom with conspicuous orange stigmata. This crocus, given a warm eastern exposure, is the first to flower of a family that lighten the dull months of late autumn and winter. *C. Sieberi* is a prolific bloomer and can stand a great amount of cold. Neither Mrs. Wilder in *Adventures With Hardy Bulbs*, or E. A. Bowles in *A Handbook of Crocus and Colchicum* give this variety as the earliest to flower, but for me it consistently appears the first week in January.

In February *C. Korolkowi* opens yel-



Walter B. Wilder

Crocus Sieberi.

low goblets, feathered brown on the outside, to be followed by *C. susianus* with yellow flowers that push through the green spears of the leaves that break through first. This is an old variety known and loved by gardeners since the days of Parkinson and Gerard. *C. aureus* is aptly described by Gerard: "It hath floures of a most perfect and shining yellow colour, seeming afar off to be a hot glowing cole of fire." *C. stellaris* and *C. chrysanthus* var. *E. Augustus Bowles* are soft yellows, *C. tomasinianus* and *C. t. White-well Purple* have dainty small flowers of violet and deep purple, though *C. imperati* is the richest purple. *C. etruscus* and *C. biflorus argenteus* are lavender, *C. Fleisheri* is white with orange stigmata, and *C. versicolor picturatus* has large vase-shaped blooms of white heavily veined purple. These varieties

carry crocus bloom through January, February, March and April.

Crocus add interest to the wall in September, October, November and into December when the autumn varieties bloom. They have not proven as easy to establish as the spring flowering species, *Crocus pulchellus*, *C. speciosus* and *C. zonatus* seem permanent as they have appeared punctually each autumn for four years. *C. pulchellus* blooms through October, and has blue-lavender crocuses, with a few veinings of dark blue, with bright orange stigmata. *C. speciosus* starts flowering the latter part of September and still has blooms to offer in November. It is a rich blue with darker veinings. Its varieties: *C. s. Artabir*, *C. s. Aitchisonii*, *C. s. globosus* and *C. s. Pollux* bloomed two autumns then failed to reappear. The loss of *C. s. globosus* was especially re-

gretted, as its blooming period was so long, flowering steadily through October, with scattering bloom through November, and a final bloom or two in early December.

C. zonatus has delicate orchid colored goblets, with white stigmata tipped with orange, sending up many flowers to a bulb and blooming in October.

Autumn crocus should be planted in August for bloom in the fall. Autumn and spring flowering varieties dislike heavy clay, wanting a light, nourishing, gritty soil.

Sharing early spring interest with the crocus are the tulip species. *Tulipa Kaufmanniana*, *T. biflora* and *T. turkestanica* flower early in March in Virginia. *T. Kaufmanniana* has been in the regular flower borders ten years or more, having been set out before the wall was built. The creamy blossoms, red outside, open out flat to earn the common name of the Water Lily Tulip. It and *T. clusiana* were planted at the same time and have proven the easiest and most permanent of the species tulips.

T. biflora and *T. turkestanica* are minute tulips growing a few inches in height, *T. turkestanica* is the showier of the two, as its white blossoms come in clusters and have conspicuous black anthers, though the tiny stars of *T. biflora* are most engaging.

T. polychroma, blooming the last of March, has clusters of blooms, white with yellow at the base of the petals, grey and faint lavender on the outside. In April flower *T. australis* with graceful, pointed blooms, dull coppery red outside, bright yellow within, *T. dasystemon*, (one of the best) white star-shaped tulips with color from the yellow centers spreading halfway up the petals, *T. Marjoletti*, a smaller *T. clusiana*, *T. stellata* following the same red and white color scheme, *T. eichleri*, a

brilliant scarlet, *T. Fosteriana*, with huge, fiery red blossoms eight inches across when wide open, *T. praestans* var. *Turbergen's* uniformly vermilion, *T. Wilsoniana* with small cup-shaped blooms of bright red and dull red *T. Hageri*.

The tulip species also resent clayey soil, desiring a warm, well-drained situation with sand and humus. They like being baked in summer heat. The early flowering bulbs need stone chips about them to keep their blossoms from being mud-spattered.

The first rock plant to flower on the wall is *Draba azoides*. It is the only member of the large family of drabas I have tried. Raised from seed sown in 1935, the green spiny rosettes increase slowly. In early March little yellow clusters of bloom hoist themselves several inches above the green rosettes, continuing to bloom until early April. It likes full sun and to be mulched with limestone chips.

Two candytufts bloom in March: the compact form of *Iberis sempervirens* called Little Gem, six inches in height smothered in candytuft heads of bloom from late March to the first week in May, and *Iberis saxatilis*, a nice prostrate bushling with dark green foliage, flat heads of white flowers, individual flowerets rather large, faintly perfumed. It is one of the better rock plants with its neat foliage, perfectly prostrate growth and long blooming period from mid-March to mid-May. It sets buds in the autumn that appear on the point of opening every warm day in winter.

There are many beautiful species of iris suitable for our rock gardens of which none is easier or lovelier than the bulbous *Iris reticulata* with its graceful, airy blossoms of blue, gold and purple in March. The last of March sees the first pumila hybrid, *I. pumila atrovio-lacca*, with its rich purple irises four to six inches in height, flower, followed by

other pumilas through April, ending May 15th with Tid-Bit's pale silvery blue blossoms, flecked with dark blue on the falls. One of the prettist is *I. p. coerulea*, which I had from Mrs. Floyd Harris, and whose lovely azure blossoms are a yearly reminder of a gracious gardener. Other pumilas in my collection are Sambo, Blue Stone, Black Midget, Orange Queen, Glee, The Bride, and graminea. The pumilas are easy and their abundant bloom may be enjoyed by any gardener.

I. cristata is happy on the wall, spreading rapidly, though in a dry situation in full sun. *I. cristata* Pearl White has dainty blossoms of white with faint tracings of blue. Two choice varieties for bloom in early May are *I. arenaria* and *I. gracilipes*. *I. arenaria* bears the most minute and charming yellow irises a few inches in height that look like a flight of delicate yellow butterflies resting on the wall. This variety wants a sandy soil and a hot situation. *I. gracilipes* has dainty blossoms of lavender, falls slightly recurving, white veined violet, edged lavender. It requires partial shade, a rather rich soil and some moisture.

Epimedium niveum is a little plant six to eight inches in height that as its bronzy foliage unfurls in early April an airy flight of tiny, waxy white blossoms hang above it. These dainty flowers are particularly attractive with the azure carpet of *Veronica filiformis* below them. The epimediums like shade and some moisture.

Veronica filiformis has delicate blue flowers scattered lightly over a green mat of foliage. The little flowers are borne on long pedicles that make them dance in the slightest breeze; the effect is so lovely that one wonders how anyone can speak of this as a pest as stated in English rock garden books. It does spread, but how would it be possible to have too much *V. filiformis*? Its two

months of bloom from late March to late May is another point in its favor. In our climate it should have some shade.

The amateur approaches veronicas with trepidation as the tangled nomenclature is very confusing. I have a perfectly prostrate veronica with bright blue spikes of bloom that I used to call *V. repens*, then *V. rupestris* and now *V. teucrium* var. *prostrata*, though with no degree of certainty. It is a good veronica whatever its name may be, as is also its taller sister to eight inches in height that came labeled *V. chamaedrys*. *V. teucrium Trehani* is easily identified as it has golden foliage that contrasts rather well with the bright blue spikes of bloom. *V. incana* is another certainty with its prostrate silver mat and spikes of dark blue. Doubt surrounds the trade name of *V. corymbosa stricta*, though the variety so listed has nice spikes of very dark blue. It blooms through June, making it one of the latest flowering of the rock garden veronicas. Veronicas are easy to grow, the *V. teucrium* tribe have short blooming periods in May, but some of the varieties flower for a long time. The New Zealand shrubby veronicas contain varieties that are most attractive for rock gardens but they are difficult to obtain in this country.

Sweet woodruff, *Asperula odorata*, is an easy, well-known plant that is valuable for its white clusters of sweet-scented bloom in April, its neat foliage and its cheerful willingness to grow in shade. *Asperula cynanchica* was raised from seed and had tufts of dark green foliage smothered in innumerable minute trumpets of pale pink, rather on the order of tunica, only prettier, with a long blooming period from July to November. It was short-lived, perhaps blooming itself out. *A. hexaphylla*, also raised from seed, bore a cloud of tiny white blossoms on a big spreading

plant more suitable for border use than on a wall. In England there are entrancing asperulas of the greatest beauty: *A. arcadiensis*, *A. Gussonii*, *A. hirta* and *A. suberosa*. Apparently they do not set seed as it is never offered. Plants of *A. hirta*, I believe, may be purchased in this country.

Helianthemum, the Rock or Sun Rose, is a very happy wall plant if given full sun and a position where it may spread into a big mat of evergreen foliage that is covered with blossoms from the last of April until the first of June. The hybrid rock roses come in various shades of pink, red, yellow and cream, in single and double. The silver foliaged, pink flowered *H. rhodanthum carneum* is a pretty variety. The helianthemums should be sheared over after flowering.

The aethionemas are attractive bushlings with blue-grey foliage and pink and lavender-pink heads of bloom. The Persian candytufts are slow of growth, but gradually spread into plants a foot or more across that are covered with bloom through May. The plants should be sheared after flowering. They like full sun on top of the wall and some lime. *Aethionema persicum* and *A. warleyense* are the two varieties I have grown.

Lithospermum canescens is one of our native plants that is better known in England than America. Brought to the wall from a stony hillside a mile or two away, the brilliant orange flower heads are reminiscent of Siberian wallflower, and the green slightly wooly foliage is not unattractive. The height is a foot or less and the blooming period from late April into May. It wants full sun and is impervious to heat and drought.

Many silenes have been on the wall at one time and another. The western ones tarried only long enough to show their beautiful blooms. European vari-

eties languished away in time, except some ugly magenta species with glaucous foliage that seeded themselves energetically and had to be routed out. Finally only the two native catchflies remain: *Silene caroliniana* and *S. virginica*. The former with its big clear pink stars, sometimes as many as 50 (by actual count) to a plant, and the latter a rich red that looks very nice with a mass of the white bloom of *Sedum ternatum* beneath it. Full sun and gritty soil suits these silenes.

The dianthus family is approached with the same trepidation as the veronica, either plants or seeds is so apt to turn out to be more *Dianthus deltoides*! The good species on the wall in full sun with a mulch of limestone chips form lovely mats of glaucous or dark green foliage that are attractive at all seasons of the year. *Dianthus arenarius*, the Sand Pink, is one of the best: "A fringed and ragged rascal running between rugged rocks," to quote a tongue-twisting description of Reginald Farrer's. The grey-green spreading mound of foliage is covered by a lacy cascade of dainty white blossoms, only faintly scented. *D. Waldsteinei* resembles the above, except the stems are shorter, blooms more fragrant and with age overlaid with a faint flush of pink. *D. caesius*, the Cheddar Pink, has beautiful blue-grey foliage and very sweet-scented fringed pinks. *D. plumarius* Little Jock Hybrids is a low compact rock garden form of the Scotch pink that is very satisfactory. Easily raised from seed, and fine for large mats of glaucous foliage for the wall.

D. Liboschitzianus, in spite of its terrible name, has lovely glistening white flowers with rounded even petals and dark green foliage. It is deliciously fragrant, a sweet heavy perfume, not spicy like other pinks. Nine to ten inches in height. *D. Knappii*, the yellow pink, has tight clusters of bloom, rather

a pale yellow, with dark green foliage. Looks rather well with the purple spikes of *Prunella grandiflora*. It has a long blooming period from June 20th to August 20th to quote from my notebook of last year.

Geraniums are not always happy in our climate, except the *Geranium sanguineum* forms. The white one and the beautiful pink *lancastricense* are the best, the type is too hot a tone of magenta. *G. s. lancastricense* may be raised from seed, flowering the second year, and bearing very pretty inch-wide salvers of apple blossom pink, veined darker pink, with a touch of salmon at the base of the petals. Blooms from late May to July.

One of the best thrifts for our use is *Armeria lauchiana*. It forms a tuft of dark green from which arise flower stalks to six inches, which bear tight heads of deep rose colored flowers. The blooming period is through May and well into June. This is another variety that wants light, well-drained soil in full sun.

The campanules are many and varied, some easy, many difficult in our climate. Three reliable easy ones are *Campanula garganica*, *C. carpatica* and *C. rotundifolia*. *C. garganica* flowers in late May to well towards the end of June. The heart-shaped leaves are completely hidden by a shower of lavender stars; of prostrate growth, slowly spreading into a mat. *C. carpatica*, the Carpathian Harebell, and its various forms, is one of the most satisfactory plants obtainable for the rock garden. Easily raised from seed, the numerous lavender-blue or white bells are borne in profusion from the end of June well into August. *C. rotundifolia*, the Scotch Harebell, is a familiar plant with its lovely blue-bells that are especially attractive hanging from a wall. It blooms in August and does best in some shade.

Gypsophila fratensis is a choice va-

riety of prostrate growth with silvery-blue foliage lightly sprinkled with clear pink flowers through the month of May. It is the best of the rock garden sorts. The *G. repens* varieties are valuable for their long blooming periods. The Bodgeri hybrid flowers profusely in Spring, with scattering bloom through the Summer and another burst of bloom in Autumn. Bodgeri and Rosy Veil are a faint pink in full sunshine. I am told the color deepens in part shade.

Gentiana przewalskii seems a hardy and indestructible gentian with dark green, shiny foliage and clusters of deep blue flowers, each tube about an inch in length. Not the blue intensity of *G. acaulis*, but a good blue, whose flowers are borne profusely in late June and early July. It has flourished for four years in full sun in a hot dry situation. *G. rochelli*, a very similar variety, blooms a little later.

The flaxes are useful and pretty though not very permanent. Easily raised from seed for the most part. *Linum flavum* bears a profusion of yellow bloom from June to September. The form *L. f. compactum* is a better rock plant. *L. narbonense* has lovely blue flowers and *L. tenuifolium* has delicate lavender bloom with heath-like foliage. The beautiful *L. salsoloides* of English rock gardens refuses to germinate for me.

Oenothera missouriensis seems the best of the evening primroses that I have tried with its large lemon yellow blossoms two inches across, the faded flowers of the day before are a not unattractive shade of apricot. Only five to six inches in height it makes a shape-ly plant that does not spread.

In Mrs. Rowntree's book *Hardy Californians* there is a fascinating chapter on eriogonums. The only eastern species of these buckwheats is *Eriogonum Alleni*, a shale barren endemic of Alleghanies. It makes shrubby growth



Walter B. Wilder

Silene pennsylvanica.

of a foot or more, has leathery foliage and loose umbels of bright yellow flowers from late July to mid-August, making it a good rock plant for mid-summer bloom. Full sun, acid soil and plenty of stone chips are its requirements.

A number of the flowering onions have been tried. The small Spring flowering ones are mostly rather insignificant. The better forms of the native *Allium cernuum* and the white variety are very pretty for late July bloom, though seedlings must be watched. *A. pulchellum*, blooming at the same time, has drooping heads of pink-lavender flowers on long pedicles and buds like lavender beads that make the nodding heads very graceful. *A. Purdomi* has dark green foliage and thick heads of lavender bloom in August. *A. tanguticum*, one of the best of the alliums, has flowers in dense heads of bloom of a beautiful lavender, sweet-scented, and flowering from the end of August to the last of September. A very valuable variety for late bloom. Alliums are for the most part easily raised from seed and contain many interesting species for rock gardens and a few handsome varieties for perennial borders; however there are also a number of worthless weedy, pale lavender onions!

In September *Sternbergia lutea* at the foot of the wall mingles its yellow crocus-like bloom with the blue or *Crocus speciosus*. The scarlet clusters of *Lycoris radiata* stand up stiffly on the wall, where it is really too tall for such a situation, but it shows its preference for sharp drainage and rock garden conditions by blooming happily here, and only sending up plentiful foliage in the flower borders.

Bulbs give bloom in autumn on the wall and vines and prostrate shrubs furnish berries for color and interest. *Cotoneaster horizontalis*, *C. h. perpusilla* and *C. lactea* give red berries, as does the vine *Ampelopsis aconitifolia*, which has left the wall to scramble over a nearby hydrangea bush in company with *A. heterophylla*, with its clusters of berries of turquoise that are highly decorative.

Plant material is not lacking for southern rock gardens. Other species such as phlox, erigeron, clematis (bush types), achillea, scutellaria, dwarf hemerocallis and talinum I know from experience are further possibilities for our trial. All that is needed for perennial interest in southern rock gardens is an inquiring attitude of the owner to search out and try plant material suitable for our climate and his or her particular location.

The Gardener's Pocketbook

From the Midwest Horticultural Society:

Magnolia denudata (See page 153)

One of the earliest and most showy small trees is the Yulan Tree, *Magnolia denudata* formerly known as *M. conspicua*. It is a native of Central China, where it is said to have been in cultivation over 1,000 years, and well it deserves to be. Flowering in the greatest profusion, and at a season when there are few things in bloom, with large flowers 3 to 4 inches in diameter of exquisite fragrance, what more could one ask for?

Of course, the flowers would show to much better advantage against a background of green, so it would be desirable to plant it near evergreens, against whose dark green foliage the blossoms will be pleasingly relieved. It thrives best in a deep, rich, sandy loam and under favorable conditions will reach a height of 15 to 20 feet. The Yulan Tree blooms about the same time as *Magnolia stellata* or shortly after. Its large campanulate blossoms are deliciously fragrant and appear to be nine-petalled since the three sepals can scarcely be distinguished from the petals. In regions where late spring freezes prevail the buds are likely to be injured so a sheltered position is recommended.

Euonymus radicans var. *vegetus*

Probably the best evergreen self-clinging vine for ordinary use is *Euonymus radicans* var. *vegetus*, sometimes called Evergreen Bittersweet, although more correctly Evergreen Winter-creeper. This variety is distinct from the other evergreen euonymous because of the orange-red berries carried during the winter. Although rather slow to

start, as soon as it becomes established it climbs satisfactorily.

It serves to best advantage on low walls of any kind whether stone, brick or concrete, or to spread along stone embankments. It may be trained as a bush if kept from any support and kept sheared. Another use is as a ground cover either in sun or shade where it makes a luxuriant mat with its glossy rich green leaves. The leaves on old plants are about an inch wide and 1½ inches long, being the largest of the euonymous. This plant would make a splendid shrub to use in the foundation planting in front of evergreens. When not trained up a support it will remain dwarfed and bushy and will be an object of admiration both winter and summer.

Potentilla fruticosa var. *parvifolia*

In foundation planting where a combination of shrubs and evergreens is desired it is necessary to choose shrubs with small, finely divided leaves to avoid too great a contrast with the evergreen foliage. Let me recommend the dwarf, bushy *Potentilla fruticosa* var. *parvifolia* as a facer shrub in an evergreen planting of this nature. It is much slower in growth than the common cinquefoil, reaching a height of about 2½ to 3 feet in this locality with finer leaves, usually 7-parted. Beginning in June it flowers all summer long, although not as profusely as when it first comes into bloom. The attractive yellow flowers are similar to strawberry blossoms although larger and more showy. Only a few nurseries list this choice variety. Another desirable variety is *Potentilla fruticosa* var. *Veitchii* with pure white flowers and leaves glaucous beneath. They require a sunny location but are not particular as to soil conditions.



Courtesy Morton Arboretum

Potentilla fruticosa var. *parvifolia*.

Sciadopitys verticillata

An interesting evergreen seldom seen in the middlewest is the Umbrella Pine, *Sciadopitys verticillata*. It has been tested at the Morton Arboretum and found to be hardy if grown in a sheltered position. Its short, slender horizontally spreading branches turn up at the ends forming a narrow pyramidal specimen. The leaves are flat and grooved on each side and are produced in umbrella-like whorls of about 15 to 25. This unusual tree is a native of central Japan and there is only one species. The Umbrella Pine thrives best in a moist loamy soil but under the best of conditions is of rather slow growth. It is not advisable to attempt to grow this plant in a dry soil or in any situation where it will suffer from lack of moisture. Some protection on

the south or east side from the winter sun is necessary to prevent browning of the needles.

R. T. VAN TRESS.

Kalanchoe grandiflora (See page 155)

When the article on kalanchoes was prepared for the last issue of the NATIONAL HORTICULTURAL MAGAZINE, the author omitted a discussion of *Kalanchoe grandiflora* Wight et Arnott because he had not seen one in flower. Since then, however, thanks to the kindness of Mrs. Neff Bakkers of San Diego, he has seen and photographed a handsome specimen. To further augment the descriptions of the available kalanchoes, therefore, is the occasion for this note and the accompanying photograph.



Courtesy The Arnold Arboretum

[See page 151]

Magnolia denudata.

The extreme tolerance of this species to adverse conditions is well illustrated by a description of its condition on arrival. It was shipped in a dry package (the most suitable kind for succulents) and consisted of an unrooted shoot about eight inches long with three pairs of leaves, a pair of bracts, and a cluster of small, young flower buds. Although there seemed little likelihood that the buds would develop into flowers, the shoot, without any trimming, was placed in moist sand in the greenhouse. Needless to say, roots were formed immediately, and the shoot produced a normal inflorescence.

Kalanchoe grandiflora grows abundantly in India and in East Africa and, of course, has been described botanically from both places. The African, *K. Nyikae* Engler, is said to be identical in all respects and, as it is a later name, it becomes a synonym. Our plant is offered in California as *K. glaucescens*, a name which properly applies to a different plant. An excellent illustration of our plant in color is that of the *Curtis's Botanical Magazine*, t. 5460 (1864).

This species has several characters which set it off from other species. Perhaps the unusually large calyx constitutes the most conspicuous character. The lobes exceed the corolla tube in length and instead of standing erect or appressed to the tube in a fashion common in the genus, they are widely spread or even reflexed. The length and habit of the calyx lobes are the more impressive because of the very short calyx tube. Next most distinctive are the stamens, of which the upper whorl is well exerted, sometimes reaching the middle of the corolla lobes, and, peculiarly, are bent so that they lie flat against the corolla lobes. All stamens are attached very near the mouth of the corolla tube. The styles, too, are exerted and, contrary to the usual

situation in the genus, they possess distinct stigmatic surfaces. A brief description of the corolla itself should suffice. Its tube is somewhat bottle-shaped, and is about 12 to 15 mm long. The corolla segments are from 10 to 15 mm long. Contrary to the usual rule, the flowers are fragrant. The other features of the flowers and the inflorescence may be seen readily in the illustration, which is approximately half size.

The leaves, however, are not well shown and deserve a brief description. They are rather thick, sessile, obovate, tapering gradually from the point of attachment to near the broad obtuse apex. They are entire on the lower third and sparsely and obtusely toothed along the rest of the margin. The surface of the blade is flat. In size, they are about 8 to 10 cm long and about 8 cm wide at the widest point. The color is medium green, dulled by the blue-glaucous surface; the margins are touched with dull red. The purplish-red stem is cylindrical.

There is no question but that this is one of the truly handsome species of the genus. The large, rich golden-yellow flowers, in the large, panicle-like, well disposed inflorescence, assure it that rank. The author knows little of its likes and dislikes in culture, but presumably it differs little from the other species in that respect.

CLAUDE HOPE.

THREE TROPICAL VINES

One of the particular garden pleasures of a visit to Florida at any season is the sight of strange or unfamiliar plants native or exotic and the observation of the change in landscape that comes from plants that do not grow in the familiar fashions. Palms are perhaps the most exotic of these sights but the masses of tangled woody vines, often with the most amazing flowers



Claude Hope

Kalanchoe grandiflorum.

[See page 152]

make a close claim upon the palms for this distinction, with their multitudinous and often flamboyant blooms that quite overshadow the fondest dreams of the Northerner.

Aristolochia brasiliensis var. *macrophylla* (See page 158)

Many of the species of *aristolochia* have more or less curious flowers, but none seen by this observer is more curious than this species in which the corolla-like calyx takes on the ridiculous shape shown in the illustration.

Like most of the tropical species, this plant is a strong-growing climber that will reach considerable heights or tangle up on itself into a mass of twisted stems that show clearly enough in the picture. The leaves are beautifully smooth and of a cool slightly grayish green color, fairly light in hue that gives a cool aspect to the whole surface. Their shape and pattern are clearly shown. The flowers are difficult to describe—basically green with nettings and reticulations of chocolate-brown or purplish-brown, rather dull on the outer surfaces but often becoming velvety in the patterns on the inner surfaces and deep within the flower. Unlike many species which have strongly foetid odors this species is not particularly offensive. The flowers are followed by capsules which split apart on ripening, until they look like curious baskets hanging on the vine.

No notes have been discovered that would suggest how patient this vine may be of pruning, but with any plant that appears to be so luxuriant in growth and that tends so to pile up on itself, an occasional pruning seems inevitable and an almost immediate restoration more than likely. It would mean at the worst only a temporary interruption in growth and flowering.

Stropanthus sarmentosus (See page 157)

To some, the name *stropanthus* will recall only a heart remedy, to others one of the poisons used for arrows, to others like myself only pictures seen in tropical plant books, showing flowers distinguished particularly for the appendage-like development of the corolla-lobes, that gave each flowering branch the most curiously bearded appearance.

The present species is a woody climber, more like a shrub, that scrambles up on itself and other plants with handsome, somewhat leathery leaves and in March a fine display of curious flowers creamy-white in color and marked with dull purple in the bowl of the corolla.

For the Florida gardener who finds plants beautiful not only for themselves but for the strange tales that can be told to visiting Northerners, this should be a particularly appealing plant!

Securidaca elliptica (See page 159)

To the person experienced only with gardening in the north temperate climate, visits to our far South are always of special interest and when this can be increased by a visit to growing collections of exotic plants, his wonder and amazement increase many fold. To him a vine is a perfectly understandable affair from the delicate vines of some annual plants, to the strangling honeysuckles, the terribly overmantling grape or kudzu; but in the far South, the sight of a new shoot in February, already thirty feet high with no sign of diminished speed of growth and a basal diameter of over an inch in its woody stem, makes him wonder and almost rejoice that he has only grape and honeysuckle.

From a more or less innocent looking tangled mass of shoots, this plant



H. F. Loomis

Stropanthus sarmentosus.

[See page 156]



H. F. Loomis

Aristolochia brasiliensis var. *macrophylla*.

[See page 156]



H. F. Loomis

Securidaca elliptica.

[See page 156]

was already sending up thirty-foot beginnings that had hooked themselves through nearby trees. Over the lower tangle there were already pushing out in February the shorter lateral branches loaded with deep purplish-crimson flower buds that were to open later into the abundant masses of somewhat light-

er colored pea-shaped flowers that show in the illustration. To the northern gardener, searching for comparisons with familiar things, the flowers seem made like the billowy masses of *Lespedeza Sieboldi*, multiplied a hundred times in number but no less graceful and somewhat better colored.

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INVITES to membership all persons who are interested in the development of a great national society that shall serve as an ever growing center for the dissemination of the common knowledge of the members. There is no requirement for membership other than this and no reward beyond a share in the development of the organization.

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.

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