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Robert L. Taylor

Oldham's Azalea, Rhododendron Oldhami

[See page 237]

Banks—Gray and Green

MARY JUDSON AVERETT

Sooner or later a hillside garden acquires banks or retaining walls or both, for without some level spots where a seat may stand and where the eye, following the movement of the slope, may come to rest, there will be no repose; and the creation of level areas on a slope leads to terracing in one form or another, which in turn produces the aforesaid banks and walls. Walls require more professional skill in construction but less in maintenance; banks, which any day-laborer can produce, exact considerable ingenuity and care from the owner and yield a wide variety of experience, both painful and pleasurable. Banks, in fact, offer a happy playground for the gardener endowed with abundance of curiosity and patience in addition to a love of putting. Though a small place, my garden boasts—or perhaps deplores—a fair assortment, two of which seem to have settled down to a degree of permanence, one in the sun, one in the shade.

The sunny bank.—This bank, on the up-hill side of a small terrace, rises back of a narrow border of hybrid tea roses. Facing the southeast it stretches about thirty-five feet in the full sun and then runs into shade where it is decorously clad with a well-behaved small-leaved ivy. A planting of *Hemerocallis* and Christmas fern marks the transition from sun to shade. The top of the steepish slope is upheld by a miniature palisades of oblong, angular blocks of the local trap rock, stood on end and embedded in the stiff rusty clay of the bank. Other such stones are sunk in its surface at intervals according to the needs of the plants and without pattern. The first planting here consisted of Intermediate irises which, I thought,

would give me a fine display when other people had tulips. In this particular the irises performed satisfactorily but their ripening foliage made a dismal setting for the summer roses. Then, too, the effort to keep them free from borer, though great, never succeeded perfectly. So all the irises came out except one clump of Crimson King at the east where it blooms with splendor against deep golden *Hemerocallis* each May.

The planting now consists of a variety of gray-leaved things which are quiet in tone even in full bloom and make a fine foil for the roses. Along the top of the bank behind the stones is a row of *Salvia azurea* var. *grandiflora*, set three feet apart with a clump of Giant Leedsii daffodils in the center of each space, a little back from the edge which is softened by *Nepeta musini* and *Dianthus plumarius*. Bailey says this salvia is native from South Carolina to Florida. In spite of its southern habitat it thrives so here that I would consider it practically indestructible except for the fact that I have lost every plant I have ever divided in the fall and none so handled in the spring. Its growth is so rampant that I shear it when it reaches five or six inches in height, a process which seems not to delay its blooming season nor to have much effect upon its length of stem. In the border it is an awkward creature, having so little backbone that only the most careful staking will keep it upright, but here at the top of the bank it arches out above the more lowly plant at its feet, bending towards the sun its silky gray wands set with small two-lipped blossoms of azure blue. These flowers occur in

widely spaced whorls, about six to a whorl, with rather heavy calices of purer gray than the leaves. As only one or two in each whorl open at a time the blooming period is very long, from early August into late September, though there is never any great mass of color. Instead the blue seems sprinkled on the air making a choice companion for the salmon and pink and red roses in front of it.

For the daffodils I use Her Grace, five bulbs to a clump. Planted eight inches deep they will go from four to six years without division, perhaps longer but I like to lift them before the quantity of bloom begins to go off. As daffodils fill the level above them, this row ties them in with the bank planting. The carriage of Her Grace, a flower of distinction, is particularly lovely seen from below.

Of the *Nepeta mussini* Mrs. Wilder writes that there are two forms adding "If you are charmed with it, you have the true form, if you hate it you have the false." She continues "It makes a mist of gray, tumbling branches and lavender spikes from the time the tulips bloom pretty well until frost if given an occasional clipping." I value it also for the shape of its leaves for their scalloped roundness makes a nice contrast with the narrow ones of the salvia and the polished steel scimiters of the dianthus.

The *Dianthus plumarius* are just plain ordinary clove pinks, beautiful, fragrant, endearing as every one knows. One time I bought a box of them in bloom at a roadside stand, one little two-quart box, and from it has come all this progeny. Mostly they have pale pink fringed flowers with deeper markings. Some of the increase results from branches which have taken root about the main stem, some from clippings which I stick in the earth where I need new plants, and some are volunteer

seedlings which I can usually find here and there when occasion demands. Perhaps they are the most cooperative tenants of my small demesne. Lately I have seen a new beauty which they present: on very cold days the mass of foliage seems to hug the earth and the ends of the stems stand up until I see them as metallic stars set upon a gray cushion.

Below the top row of stones and crowded against them spreads a fairly large planting of lavender (*Lavandula vera*). This stiff, shrubby growth gives character to the slope which in the main wears a very soft coat. Speaking of a dwarf form Reginald Farrer describes its flowering as "a lovely unanimous outbreak of 9-inch spikes in summer, emitting much larger flowers than the type." The description applies equally to the type except that its spikes are longer and its flowers smaller. *Arabia alpina*, both double and single forms, two small clumps of *Phlox subulata* var. *G. F. Wilson*, a bit of *Veronica incana*, *Stachys lanata* in process of elimination, some *Sedum Sieboldii*, and repeats of the nepeta and the pinks complete the planting. The arabis, of course, is very white and very early, the double much later than the single and much handsomer with its three or four inch steeples of very double flowers. It sets no seed but is most easily increased by layering; it does not seem to be quite so luxuriant here in the full sun as it is in dappled shade. The phlox has not gray leaves but it looks at home among these other things and it has nice lavender flowers. Unless ruthlessly curbed it would take the place.

The veronica, handsomely clad in silky light gray, produces fine large tapered spikes of rich purple flowers, but it is not happy here and may have to go elsewhere. The *Stachys* grows so easily and multiplies so rapidly that in

spite of its plush texture I have used it as ground cover while better things were getting established. By next fall I hope to have it entirely replaced here where it is too light in color. Farrer calls it "coarse and dowdy . . . with woolly fat foliage and whorled spikes of dull dead-nettle flowers on gawky fat stems." In spite of this damning description which is entirely accurate, I like this plant in some places but not back of my roses.

Sedum Sieboldii is to me a jewel. Though it is by no means rare, few visitors to the garden know it. It puts forth multiple stems which grow vertically an inch or two and then become horizontal, each smooth stem set down its length with whorls of rounded leaves all bluish-greenish-gray in the changing light, each leaf margined with pink. These pretty leaves encircle the stem in whorls of three leaves each and often in their axils produce little incipient plants, globular in form, which drop to the ground when they attain the size of a clove. Pressed into the soft earth, they will root and become thrifty new plants. Strange that plants so unlike as this sedum and the tiger lily should both do this cute trick. The bloom comes in October, in a "much-branched umbellate cyme" at the end of each stem, the flowers pink spotted with green and the long filaments fringing the whole cluster. From the time growth starts in early spring, through the long summer of its slow maturing and late flowering it is an attractive plant, with a clean-cut definiteness in all its parts and a well-groomed look just as the waxwing and the chewink have among birds.

If they could be persuaded to do so, crocuses, the very early *Sieberi* and *Tommasinianus*, rising from a bed of woolly thyme would draw a cheerful scarf of amethyst along this bank in late February and early March, but this

thyme simply melts away, resenting the clay perhaps and languishing for sand, and the crocuses either are heaved out by frost or devoured by mice. So that dream has vanished. In late March or early April a scattering of *Chionodoxa sardensis* appears, a deep vivid blue, as spectacular at this season as the scarlet of *Tulipa Greigii* is among pale yellow and white daffodils a little later. Mice do not seem to bother these small bulbs and they bury themselves to such depths that frost does not throw them out. Forget-me-nots, Johnny-jump-ups, and grape hyacinths are "in my soil," to use Miss McIlvaine's nice phrase, and so come up everywhere. They are left in the bare spots on the bank which will later be covered by the catnip and the pinks. Early daffodils could be managed here but their heavy foliage would be lax and unsightly just when the first burst of bloom comes on the roses.

There must be other low-growing things which would add interest to this bank. *Artemisia frigida*, for instance, which I have tried many times in vain. That hidden quest in the back of my mind sharpens my perception when I visit nurseries and other people's gardens. An ever present problem whets the appetite like a tonic.

The shady bank.—This bank is very small indeed; it lies along the road, tapering from almost nothing at the uphill end to about two feet in height at the lower part. It faces slightly north of east, its base a cobblestone road, its top a narrow border bounding a small paved area under an apple tree, a very beautiful apple tree which was old when the house was built. The narrow border comprises a row of shrubs to frame the paving and block off the road; at the upper end a specimen of *Rhododendron catawbiense*, at the lower a group of *Kalmia latifolia* which gives way on reaching a sunny stretch to *Deutzia*

gracilis. Between the rhododendron and the kalmia are *Pieris floribunda*, *Leucothoe catesbaei*, and mixed with these broadleaved evergreens a few plants of the delicate pink *Azalea Vaseyi* which is deciduous. These shrubs are familiar plants in any good nursery, lovers of acid soil and light shade, but they should not be planted under an apple tree unless, as in my case, there is no place else to put them. So far as I can tell, the apple tree has not objected to the acidifying diet of the shrubs but the spraying necessary for the fruit comes at the very time the shrubs are at the height of their beauty. I neglect the spray and sacrifice the fruit. The defective fruit which results from this procedure then drops at intervals all summer and fall, often breaking the shrubs and always increasing the labor of keeping this little out-door sitting room neat and orderly.

The idea for this slope grew out of a lecture heard years ago in Washington, at one of the early annual meetings of the American Horticultural Society, I think. The editor of this magazine talked on Japanese gardens, showing slides. There were pictures of azaleas sheared so as to produce a low ground cover; here, too, I think I first saw a picture of *Azalea macrantha* and first heard of the adaptability of some of this genus, heard that sometimes a plant thought to be tender may lose its top in the winter and given time may produce another one which will be hardy. The small dark green leaves of the evergreen azaleas make a covering of fine texture, especially pleasant in the summer when their glistening surfaces always look cool. So there are three bushes of *Azalea macrantha* on this little slope. It is a much-branched shrub, low and wide, producing in June large single rose colored flowers. It conforms beautifully to the slope, not needing the shearing I planned to give it

but only to be relieved of the few branches which show vertical aspirations. Sometimes the leaves drop in late winter before the new growth starts and always the whole plant takes on a bronzy tone with the coming of cold weather. Tucked in among them is an azalea which came in an Easter basket, guaranteed "perfectly tender and unsuited for outdoor planting." It has leaves of a fresh salad green and light salmon-pink blossoms of the hose-in-hose type, really a delicately lovely thing. It has been there now more than ten years, loses some wood every year but never more than it makes, and every spring holds up a small bouquet for the admiring eye. This year it still holds its bright green leaves on this the eighteenth day of February. Every time it catches my eye something inside me perks up, smiles and says "Ah ha! So there you are!" and I congratulate myself on having a garden.

Here, too, grows one plant of *Ilex helleri* which came to me from the New York Botanical Garden when it was little more than a rooted cutting. It has slowly attained a spread of ten by fourteen inches and a height of five inches. It develops short twiggy branches so interlaced that the plant is rigid under your hand. Its leaves are small, really small,—a quarter of an inch wide by five inches long, dark smoky green, leathery in texture with very smooth surface but they do not shine as do those of the azaleas. An interesting plant, one to give stamina in a difficult place. A small ivy, *Hedera helix* var. *minima*, fills a few square feet of space near the azaleas, looking very un-ivy-like for every end of its prostrate stems turns up like a little tree and adjacent to the bend even branches, suggesting that in its old age it might possibly assume the tree form. Its leaves, barely an inch each way, are dark green, conspicuously veined with lighter green,

are crowded along the stem with very short internodes, and are so markedly two-ranked as to appear to the casual eye in pairs. A drawing of a sprig of it is shown in the NATIONAL HORTICULTURAL MAGAZINE, Vol. 11, p. 72, that is in the number for January 1932.

Galax aphylla and *Gaultheria procumbens* finish the planting as it is now but I am hoping to add *Mitchella repens* and *Linnaea borealis* in the spring. Both of these have in the past done well here until undermined by moles. I am thinking if I should plant some

stones among the roots below the surface the roots would not be harmed and the moles might be discouraged. *Shortia galacifolia* belongs in this group but instead I use it on the other side of the shrubs where its early bloom may be enjoyed from the house. The stiff round leaves of the galax, green in summer, bronze in winter, and the familiar oblong ones of the wintergreen, set here and there with its red berries, give variety to this little slope, and variety is the spice of life in the garden as everywhere else.

Ione Manzanita

A Wilding Finally Yields To Culture

GEORGE A. FURNISS

This dwarf ericaceous shrub grows in the low foothills of the Sierra Nevada near the historic old mining town of Ione in the eastern part of Central California. It is confined to a small area, growing mostly on low exposed ridges and forming nearly pure stands, with the growth openly spaced as though thinned out by the hand of man. Why this particular species, so different from its kin, should grow so abundantly within this small spot, and no where else in the known world, is one of those mysteries found in plant distribution.

In California there are 38 native species out of about 50, many tree-like, distributed in North and Central America, principally on the Pacific Coast (McMinn). This Ione Manzanita, botanically, is *Arctostaphylos myrtifolia*, an *Ericaceae*, with a generic meaning from the Greek, a bear and grape, in reference to bears feeding upon its berry-like fruits. The early Spaniards, however, called all the species "Man-

zanita" (Man-za-NEE-ta) or "little apple" and this better describes the fruit.

In natural development, this little shrub is already what the Japanese try to do in their art of stunting growth. It is a sturdy midget-like tree with a graceful, spreading, open-crown, of tiny evergreen foliage and with contrasting bare limbs of dark mahogany red. There are few woods that are more crooked than that of many of the manzanitas. This one is very slow growing and retains its form from seedling to maturity. The plant illustrated is eleven inches tall and eighteen inches across, and is about fourteen years old. Judging from plants in the wild to reach its ultimate height of 24-30 inches, indicates a long life.

January-February is the normal blooming season and then it becomes a mass of pinkish-white little bells later to be followed by tiny red to green berries. It grows at low altitude in full hot summer sun and heavy winter

frosts while other species inhabit regions of snow and summer heat.

What's in a name. A botanical name through analysis often reveals the outstanding or unusual characteristics which may be helpful in recognizing or remembering the plant, or in recalling its name, or its culture—perhaps, at least, a background of enlightenment.

This meaning, of course, is readily obtained from a botany text book and knowing the meaning, often not only adds to plant enjoyment, but somehow contributes to an inexpressible intimacy of pride and fondness. It seems to vitalize what otherwise might just be an inert label, in a chaos of names. Having quoted the meaning of *Arctostaphylos*, now let us follow through, for an example, to see what is in a name and how well it fits the plant.

The fruit, of itself, is no more a bear diet than a diet for other animals, such as the deer and fox; even birds. Then too, the flowers are a bee's food and interestingly so. We may see bees buzz about collecting honey in the warm sunshine, of the new year, when the bee's incidental touch, like magic, pops open the pollen sack and showers the bee with golden dust—a dust as valuable to the hive as gold dust was to the early miners.

Why prestige is given to the bear in naming the species, is not lacking. The bear has been the symbol for the Great West—wild, rugged, resistant, and defying the incursion of man. The manzanitas were often the component of the chaparral, or brush thickets, which was the habitat of the bear, and we might add that the chaparral in protecting the bear also opposed the incursion of man.

In history, when it came to organizing California into a Republic (1846) with the adoption of a flag, the emblem was no other than a bear and one star. Then, when California came into the Union, the Great Seal of State (1850)

shows hooded Minerva seated with spear and shield and Ursus is there by her side guarding the shield. Thus the monarch of the forest, as guardian, represents aggression, strength, and defense. *Arctostaphylos* may be an awkward word and not easily remembered, but it seems well chosen for characterizing the plant and for expansion of associated thought. Some names have little amplification, of course.

A narrative about bears is incomplete without Indians, who by coincidence also fed on the berries. The berries also served to make a cider beverage. Then a medicinal tea was brewed for stomach trouble, diarrhea, sore throat, colds. We often think that if we should live more in the open and ate natural foods, we would be rid of such ailments as these. The harvest season closed with a "heap big feed," then a ceremonial dance and "whoopla." The fruit, frankly, is rather insipid, dry, and not tempting, certainly not refreshing, to the average wayfarer.

Culture of Ione Manzanita. A Superintendent of Parks, in an adjacent city, specialized in California natives in one of his parks, particularly in the large family of manzanitas, but this little dwarf stumped him and his staff, try after try, over a series of years, plants and cuttings alike.

The Superintendent invited the writer on a collecting trip. The location was rolling hills, low both in height and altitude. It was virgin country and impressively wild and still. Far, far beyond in the blue haze of the horizon was the lofty, majestic Sierra. We walked up a slope and as we reached the crest, we paused in the serenity of the invigorating mountain air and the impressive surroundings. And there down before us, strewn over the crest, were the Ione Manzanitas! A Lilliputian-like forest, a fairyland.



George A. Furniss

The Ione Manzanita

The temptation is to collect a quantity of plants but the net result is far better by spending the time in carefully digging and handling a few. The soil was gritty red clay, some orange-red, and crumbly. Small plants are better prospects for transplants but even these were deep rooted and required care. Scattered about on the ground were lichen covered rocks in beautiful pattern, and as though premeditated, the gray-color designs matched the shade in the plant foliage. Precaution was taken upon reaching home to send plants to well known propagators to try their hand. Past experiences began to repeat. The foliage would turn black and the plant gradually die. All concerned encountered the same trouble in their

different handling.

In the meantime Mr. Louis L. Edmunds, a retired mechanical engineer, had been specializing in natives at nearby Danville. He had spread a layer of small rock, half-inch mesh, over the soil beneath the foliage. That was the answer. Neither soil, temperature, water, etc., were the culprits as variously implicated. Mr. Edmunds concluded that soil fungus, perhaps, was spattered up on the foliage by watering or by rain. However, plants in containers of native soil and cuttings in greenhouse sand beds had acted in the same way.

Anyway, all credit and thanks to Mr. Edmunds.

Oakland, California.

Some Studies in Azalea Nutrition

NEIL W. STUART¹

What causes the leaves on azaleas to become chlorotic (yellow) and the plant to have an unhealthy appearance? What can I do to correct it? These questions are often asked by amateur and professional growers. Studies on the nutrient requirements of this plant have been in progress for several years at the Plant Industry Station, Beltsville, Maryland. The purpose of the present note is to describe certain of the nutrient deficiency symptoms of Kurume azaleas under greenhouse conditions and to tell how they are brought about.

The most frequent nutritional disorders of azaleas are caused by lack of nitrogen or by unavailability of iron. Poor growth resulting from insufficient nitrogen in the soil is easily corrected, but the basic, underlying causes of chlorosis in azaleas resulting from lack of available iron seem to have received little attention.

In the course of these tests rooted cuttings have been grown in quartz sand and in glazed crocks and supplied with various combinations of nutrient solutions, some of which lacked one or more of the essential mineral elements. It has been possible to obtain as good or better growth of azaleas in pure sand containing no organic matter but supplied with a complete nutrient solution as could be obtained in so-called azalea soils. At the same time it has been possible to greatly modify the growth and produce deficiency symptoms at will with various nutrient solution combinations. Certain of these deficiencies are shown in figure 1 for the Coralbells or Madame Pericat varieties.

Lack of nitrogen in the nutrient solution of azaleas results in the production of stunted plants with small, pale green leaves. Eventually the lower leaves become yellow or red in color and are shed. Plants growing in soil low in available nitrogen soon exhibit these symptoms. If no additional nitrogen is supplied terminal growth is restricted to only a few shoots and the plants soon exhibit a ragged, uneven appearance. Azalea plants seldom die as a result of nitrogen deficiency but their growth and flowering are seriously restricted.

The form or carrier of nitrogen that is applied is of great importance. In figure 2 the plant on the left was supplied with a complete nutrient solution containing ferrous sulfate, calcium phosphate, potassium sulfate, magnesium sulfate, boric acid, manganese sulfate, zinc sulfate, and copper sulfate. All of the nitrogen was derived from calcium nitrate. Even though iron was applied regularly and the acidity of the nutrient solution was suitable for good growth of the azaleas the youngest leaves soon became chlorotic, a typical symptom of iron deficiency. The leaves first became somewhat pale, the veins remaining green. Later the leaves became almost devoid of chlorophyll and appeared cream colored, bronzed, or even white. Soon after this they turned brown. As shown in figure 2, the lower leaves remained green, indicating that the iron was fixed in them and not readily translocated to the younger leaves. If these chlorotic leaves are sprayed with a solution of ferrous sulfate at the rate of 1 ounce to 1½ or 2 gallons of water, the yellowed leaves will become green in a few days' time, indicating that the deficiency was actually caused by lack of available iron. If the sand

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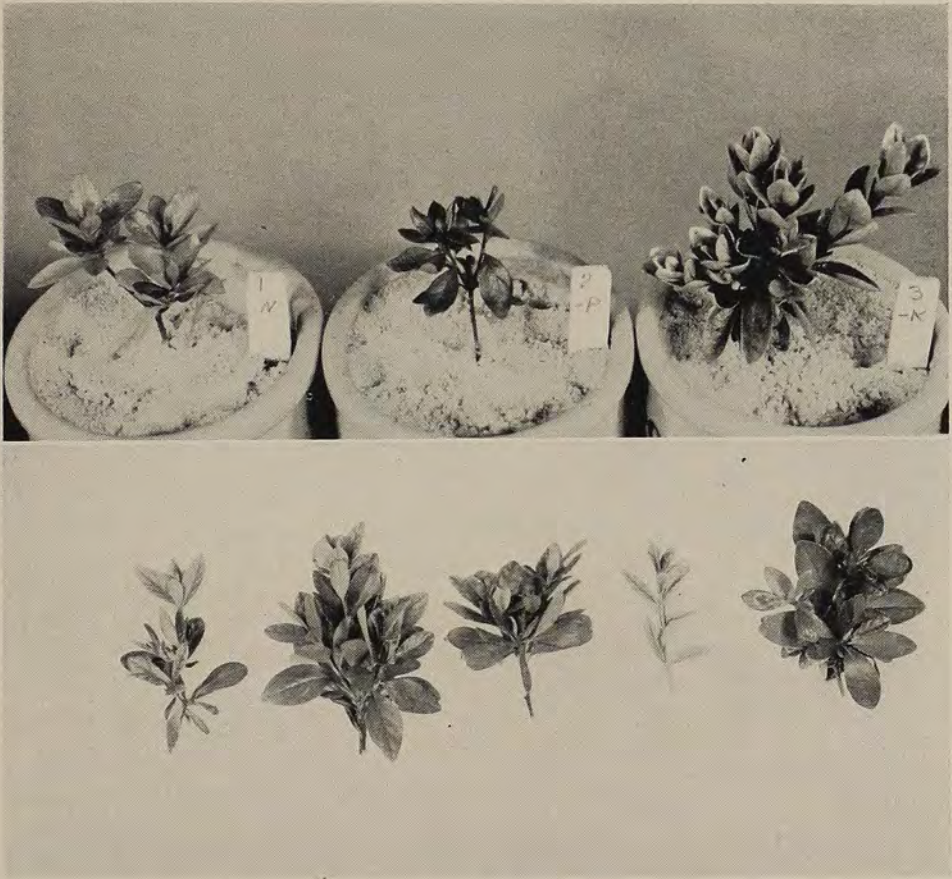


FIGURE 1

Top—Coralbells azalea plants growing in quartz sand. Left to right, deficient in nitrogen, phosphorus, or potassium, respectively. *Bottom*—Madame Pericat azalea plants. Left to right, deficient in calcium, magnesium, manganese, or iron, and no deficiency, respectively. (Photographs by R. L. Pryor.)

in which the azalea is growing is tested, it will be found that it has become slightly alkaline. This is due to the fact that nitrates were absorbed in relatively greater amounts than the calcium which remained, resulting in the production of an alkaline condition. This in turn caused the soluble iron to become unavailable to the plant and produced the chlorosis. As shown in figure 2, the chlorosis can be eliminated by re-

placing the calcium nitrate in the nutrient solution with ammonium sulfate. When this is done, the sand remains acid due to the sulfate and the iron continues to be available and the leaves stay green. It is recognized, however, that there are other factors than pH in iron availability.

Figure 3 shows that when plants growing with a nutrient solution containing ammonium sulfate as the sole



FIGURE 2

Coralbells azalea plants growing in quartz sand. Left, all nitrogen from calcium nitrate; right, two months after substituting ammonium sulfate for calcium nitrate. (Photograph by R. L. Pryor.)

source of nitrogen are shifted to one in which the nitrogen is supplied by calcium nitrate, the terminal growth soon becomes chlorotic, indicating that iron is no longer available in these leaves. The same effect is produced if the plants are supplied with sodium nitrate. They are more tolerant of potassium nitrate and ammonium nitrate since both potassium and ammonium are absorbed by the plants.

It soon became evident in these studies that iron chlorosis resulted from causes other than unfavorable pH. In general any condition resulting in poor root growth seems to result in chlorotic leaves. These include heavy compact soils, overwatering, poor drainage, low temperature, and over-fertilization. In addition, deficiencies of the nutrient bases calcium, potassium, and magnesium are first manifested as iron chlorosis in the leaves. Later the characteristic deficiency symptom of each appears.

Of the bases potassium appears to be required in the greatest amounts. Azaleas supplied with a nutrient solution lacking potassium show typical iron chlorosis. These initial symptoms of iron deficiency are temporarily remedied by spraying with ferrous sulfate but this treatment cannot, of course, replace the deficient potassium. Later, the leaf blades of the whole plant become bronzed and chlorotic, and sometimes appear scorched along the margins. The leaves curl inward and terminal growth virtually stops (Fig. 1).

Magnesium-deficient azalea plants also initially exhibit symptoms of iron chlorosis. The characteristic deficiency pattern for this element is seen in the appearance of brown dead areas on the tips and margins of the lower leaves, which soon abscise (Fig. 1).

As pointed out by Bowers², though

²C. G. Bowers, *Rhododendrons and Azaleas*. The Macmillan Co., 1936.



FIGURE 3

Coralbells azalea plants growing in quartz sand. Left, all nitrogen from ammonium sulfate; right, two months after after substituting calcium nitrate for Coralbells azalea plants growing in quartz sand. Left, all nitrogn from am-

it is seldom recognized, azaleas require some lime. Its absence from the nutrient solution induces iron chlorosis, slow growth, and death of the lower leaves. Aside from the influence of calcium and magnesium in regulating pH, azaleas require moderate amounts of these elements for adequate iron metabolism and good growth. It is well known that many eastern Coastal Plain soils are deficient in these bases and it seems probable that the frequently reported iron chlorosis of azaleas growing in these soils is a consequence. In case of soil deficiency of these elements, lime and magnesium should be applied as dolomitic limestone, or as gypsum and epsom salt. Hydrated lime should be avoided because of its effect on pH.

Deficiency of phosphorus in the nutrient solution is reflected in very restricted growth of rooted cuttings or small plants. The leaves show a dull green color and finally turn dark brown or black and are shed. At no time is

there any evidence of iron chlorosis. When older plants that have been grown with a complete nutrient solution are shifted to one lacking phosphorus, the plants appear to grow normally for several months. Extreme phosphorus deficiency symptoms are difficult to produce in such plants and are usually restricted to leaf drop and slow growth (Fig. 1).

Absence of manganese in the nutrient solution results in leaf appearances somewhat like those arising from lack of iron, figure 1. The chief difference is that the leaf tissue immediately adjacent to the veins remains green and the chlorosis does not become as extreme as when there is lack of iron.

In other tests older azalea plants have been grown in various soil mixtures and nutrient solutions or fertilizers have been applied. The Coralbell azalea plants shown in figure 4 were grown in glazed crocks containing a 1:1 mixture of sand and woods soil containing



FIGURE 4

Coralbells azalea plants growing in woods soil, leafmold and sand fertilized at two-week intervals with, left to right, nitrogen, phosphorus, or potassium. (Photograph by R. L. Pryor.)

oak leafmold. This mixture had a pH of 5.0, contained relatively little nitrate or phosphate but moderate amounts of calcium and potassium. This same relative composition has been observed in other so-called good azalea soils. Nutrient solutions containing seven possible combinations of nitrogen, phosphorus, and potassium were applied to different lots of these plants at two-week intervals throughout a year's growth. All solutions contained calcium, magnesium, and iron. No iron chlorosis developed at any time. The main effect on growth was produced by nitrogen, figure 4. Whenever it was not included, the plants became straggly, with all terminal growth confined to a few shoots, while many made little or no

growth. Whenever nitrogen was added the plants were much more vigorous, with dense growth from many terminals. This type of growth is seldom obtained without the addition of supplemental nitrogen.

It is realized that some of the results described in this brief paper are extreme and would not be encountered in garden plantings of azaleas. Nevertheless, it is felt that they should be considered in azalea fertilizer practice. Further information on the use of fertilizers is contained in a publication from this Station, *Culture of Rhododendrons and Azaleas*, by Guy E. Yerkes. This publication is available from the Division of Information, Plant Industry Station, Beltsville, Maryland.

Climbing and Creeping Palms in Mexico and Guatemala, Related to Household Palms

O. F. COOK

A general biological interest may be claimed for the palms that live under shade conditions in tropical forests. The forest palms do not require open sunlight but are able to develop normally as undergrowth of the forest. The undergrowth palms are different in each of the forest regions of the world, and often are localized in extremely small areas. The relative age of forests may be inferred from the development of the forest palms.

Many highly specialized undergrowth palms are known from forests of tropical America, and may be taken as evidence that forests have existed on this continent through long periods. Striking contrasts in forest adaptation are recognized in relation to tropical Africa, the nearest continent to tropical America. The African forests are remarkable for the paucity of palms, and of other types of vegetation specialized to live as undergrowth, a deficiency that seems to indicate a relatively recent development of forest conditions in tropical Africa. (See, *The Scientific Monthly*, February, 1946.)

The most general and significant feature in the adaptive specialization of the forest palms is the development of tolerance of shade, so that many kinds of American palms live normally as undergrowth in the forests and are able to thrive in conservatories and greenhouses. Another element of horticultural interest is the generally reduced size of the forest palms, many kinds being dwarfed to the extent of being raised in pots like ordinary house plants. Some of them are so

well adapted to ordinary living room conditions that flowers are produced freely, pollination is readily accomplished, fruits are ripened, and seedlings germinated.

With regard to humidity the forest palms are by no means uniform. Some of the species have developed in districts of continuous rainfall, and the foliage shows little tolerance of dry atmosphere. Such forms may not qualify as houseplants, though some of them are highly ornamental in conservatories, or in outdoor cultivation in Florida or California. One of the largest members of the group produces edible male inflorescences, used extensively in eastern Guatemala, as described in the *NATIONAL HORTICULTURAL MAGAZINE* for July 1839. Several of the smaller kinds, some of them well suited for growing as house plants, have been described in the *NATIONAL HORTICULTURAL MAGAZINE* for January 1938, July 1943, October 1943, and January 1947.

Unarmed Climbing Palms

Climbing palms are of different kinds, separated in three divisions of the palm order. Those that belong to the household group, members of the *Chamaedorea* family, are distinguished from all of the others with climbing habits by the smooth surfaces of their leaves, leaf-sheaths and inflorescences, instead of the leaves and other organs being protected by an armature of teeth or spines, which characterize the two other groups of climbing palms. The rattan palms of the Oriental trop-

ics are the principal group, including hundreds of species of *Calamus* and related genera in the East Indies, and a few in tropical Africa. It is remarkable that no true rattans are found in Madagascar or in the Western Hemisphere.

The false rattans of tropical America are members of the coconut family and of the genus *Desmoncus*, a group very remote from the true rattans, yet providing similar materials for native arts of matting and basketry. Thus the three groups of climbing palms are not related to each other, and undoubtedly represent entirely separate developments of remarkably similar characters, the phenomenon of parallel evolution.

The Genus Anothea

The generic name *Anothea* was applied to an unarmed climbing palm in the 1943 NATIONAL HORTICULTURAL MAGAZINE for October. The meaning of the name is "overhead runner," an allusion to the habit of trailing over the roof of the forest. The same palm was supposed to extend into Mexico, and a Mexican species, *Anothea scandens* (Liebmann) was mentioned as the type of the new genus. On account of Liebmann's *Chamaedorea scandens*, 1849, being four years older than Wendland's *Chamaedorea desmoncoides*, botanists have used *scandens* in recent years as a general name for climbing palms in Mexico, even for specimens from widely separated localities, including material from Guatemala, but several local species or subspecies may be recognized when adequate material has been collected. A notable feature of the climbing palm of eastern Guatemala is that the pinnae of the adult leaf form are broad and deeply arched or inflated below the middle, with the upper half of the pinna

rapidly narrowed to a slender tail, so that the name *caudata* is suggested for the palm described from Guatemala in 1943.

The original specimens, collected at Sepacuité, Guatemala, March 24, 1902, Cook and Griggs No. 149, represented by figures 2 and 4, show the widening of the larger pinnae below the middle, and the long tails can be seen at the right of figure 6. More striking differences appear in a herbarium specimen collected at Sepacuité May 13, 1904, Cook and Doyle No. 167. Pinnae that measured 33.5 to 34.5 cm. in length were 4.2 cm. wide at 12 cm. from the base, but only 8 millimeters wide at 24 cm. from the base. The inflation or buckling of the lower part of these pinnae has resulted in the pressed specimen in a transverse fold across the broad section.

The male flowers, shown in natural size in Figure 5, have a general similarity with those of *Docanthe*, NHM October 1943, page 141, in shape obpyriform, with the cuplike calyx broadly three-toothed, and the petals connate at the tips, opening laterally. Other similarities with *Docanthe* are interfoliar inflorescences and the narrow basal joint of the peduncle.

Mature female flowers about five millimeters wide, the receptacle without a distinct raised rim, but the surrounding depression with rather prominent sloping sides, forming a wide annular impression in the base of the sepals, the impressed area with a relatively narrow outer rim leaving the marginal lobes outside the rim scarcely longer than the basal impression, sometimes shorter. Petals broadly quadrate, the distal margin nearly transverse, distinctly angled or mucronate in the middle; two sepals, nearly opposite, much larger than the third, which partially covers the indurated



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FIG. 1—*Anothea Palm as a Houseplant*

somewhat prominent stigmatic area. The larger petals three millimeters wide; the smaller about two millimeters. Inner surface of the petals with a narrow smooth margin, the central area with about eight parallel longitudinal ridges separated by somewhat wider grooves.

Dry fruits 8 to 9 mm. in diameter, coarsely wrinkled, the pulp layer not fibrous except a thin coat of evanescent parallel strands on the outer surface of a very thin crustaceous endocarp, thinner than in *Neanthe*, closely adherent to the testa. Seed 6 mm. in diameter, the endosperm extremely hard. Surface impressions of the raphe rather broad and shallow, simple, evenly curved, nearly in a circle on each side of the seed near the base. Embryo close to the hilum. The cavity one mm. long, rather deep-seated, the outer end closed by a rather thick operculum, not prominent on the surface. Embryo somewhat constricted in the middle, expanded on the inner end. Inner surface of operculum slightly concave, not prominent in the middle as in *Neanthe*.

The Original Scandens

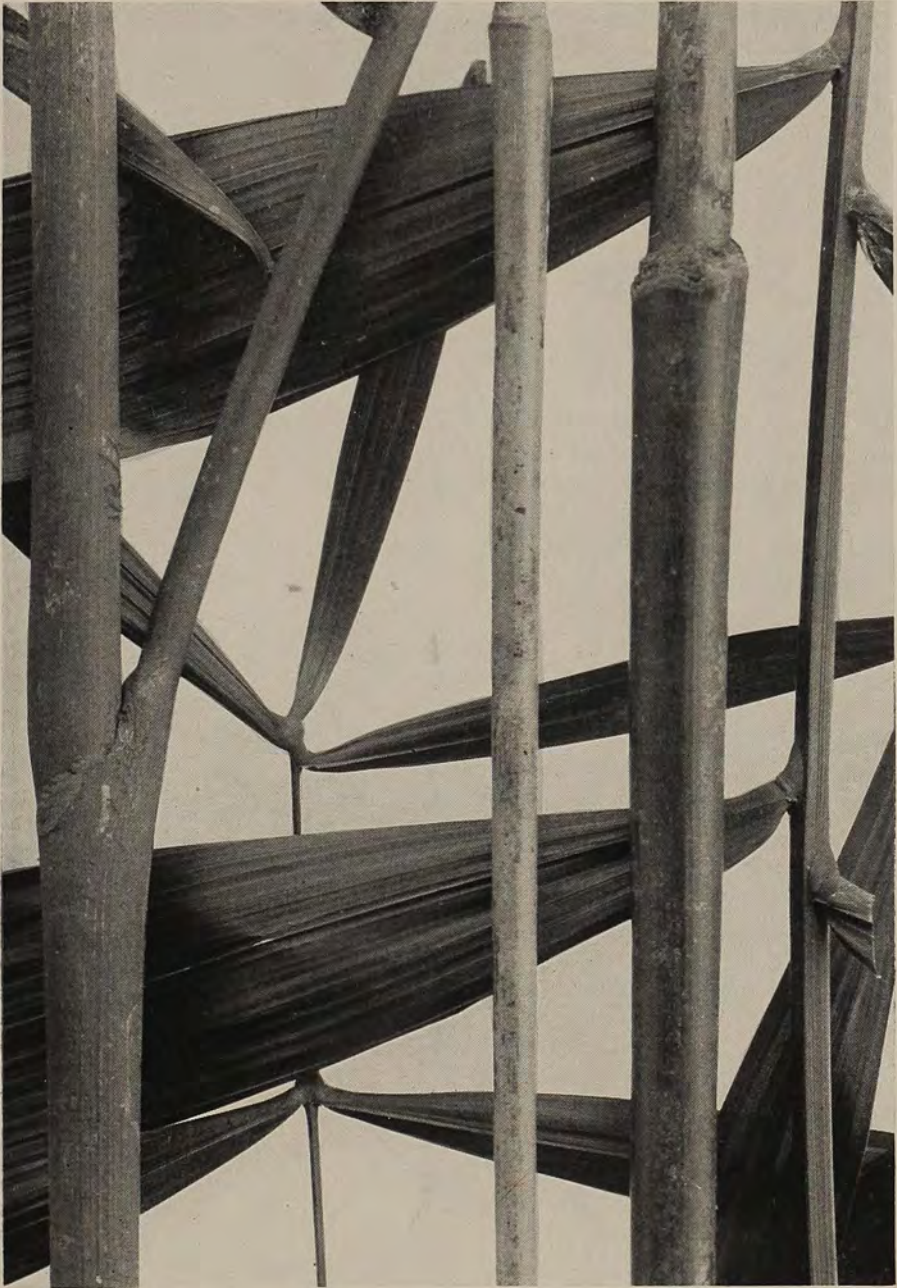
Some of the species of *Chamaedorea* collected in Mexico a century ago by the Danish botanist Liebmann are represented in the U. S. National Herbarium by original specimens from the Copenhagen Museum, so that direct comparison is possible. The specimen of *Chamaedorea scandens* is No. 6580 of Liebmann's *Plantae Mexicanae*, collected "in silvis circa Mirador." No such abrupt narrowing or buckling of the pinnae is indicated as in the Guatemalan palm, the largest pinna, 38 cm. long, is broader above the middle, the width 3 cm. at 20 to 25 cm. from the base, with gradual tapering above and below. The apical section of the leaf,

with several pinnae missing, had a rather close cluster of four to five pairs of small pinnae, spaced from the end at 3.5, 4.5, 5, 6.5, and 16 cm. Pinnae of the fifth pair from the end, 24 cm. by 2.4 cm., the others much smaller. Terminal pinnae, 10 cm. long by 1.2 to 1.4 cm., rather narrowly corrugate. The axis of the inflorescence, 13 cm. long with 15 branches, rather slender, attaining 20 cm., ending abruptly, some of the abortive buds indurated and persistent. Two joints of the peduncle are attached, the lower 5.5 cm. long and the upper 6.5 cm.

Flower-scars rather widely scattered on the branches, the receptacles oblong-oval, surrounded by a rather thick, prominent ring deeply impressing the calyx. Sepals broadly subreniform, separate, imbricate, the central area swollen and prominent outside the impression of the receptacle; margins thin and smooth. Corolla rather large, more than 5 mm. wide in the mature dry state, less than 2 mm. deep. Petals broadly rounded, with rather thin, even margins, regularly sloping from a semi-circular ridge enclosing the irregular central portion. Inner surface of petals smooth around the broad margin, longitudinally grooved and ridged in the central area.

The petals are imbricate and regularly unequal, one smaller than the other two, the smaller petal covering the very small stigmatic cluster. Intercarpellary suture not distinct. Dry fruits about 9 mm, in diameter, very prominently and unevenly wrinkled. Seed nearly spherical, about 6 mm. in diameter, the simple raphe branches strongly divergent above the hilum.

The original description of *scandens* refers to two large basal leaves as "permanent," of rigid texture, with blades two feet long, much like the leaves of *Carludovica*. The leaves of



G. N. Collins

FIG. 2—*Anothea palm*, trunk and leaf sections. Natural size

the trunk are said to attain 6 to 8 feet, the pinnae a foot and a half, and an inch wide. The topmost pinnae are said to be "connate," which doubtless refers to the opposite pairs as joined by the swollen basal pulvini.

Large Simple Leaves

The small seedling leaves of most of the members of the *Chamaedorea* family have a simple V-shaped blade similar to that of the *Omanthe* palm shown in the NHM for July 1943, page 93. The compound seedling leaves of the genus *Neanthe*, of the same form as the adult leaves, shown in natural size in NHM, January 1938, page 3, are a notable departure from other members of the group. Thus the *Neanthe* seedlings are peculiar in their lack of a simple-leaved stage, while *Anothea* is peculiar in the development of the simple leaves to larger size than in any related group.

A plant probably representing a young *Anothea* was noted at Cordoba, Mexico, May 26, 1905, with V-shaped leaf blades attaining 70 cm. in length, 20 cm. broad, with 15 oblique veins, the midrib 47 cm. long, petiole 5 cm., leaf sheath 10 cm. The trunk was about 30 cm. tall, the sections 4 to 5 cm. long, 3 to 4 cm. thick.

From these data it appears that the largest simple leaf is formed on one of the lower trunk sections, and this may be confirmed by the fourth joint of the palm shown at the left in Figure 3 ending in a broadened leaf scar. One stage of the transition from the large simple leaf to the mature leaf form may be seen at the left of Figure 6, in the leaves with pinnae rather short and broad, as well as closer together than those of the palm shown at the left of Figure 3, also represented at the right of Figure 6. These figures 3 left and 6 right, as well as Figure 1, may be con-

sidered as representing juvenile stages of the Guatemalan climbing palm. Figures 2, 4 and 5 are from photographs made in 1902 and 1904 at the Sepacuité coffee plantation of Messrs. Owen and Champney, where much cooperation was given.

Compound Juvenile Leaves

A specimen that represents one of the intermediate stages was collected at Trece Aguas, a few miles from Sepacuité in 1906, No. 350. Three sections of the leaf are represented. The lower pinnae, about 40 cm. long, the greatest width 3.3 cm., about 10 cm. from the base, these pinnae deciduous, the leaf scars about 10 mm. long, 2 mm. wide. Middle pinnae 8 to 9 cm. apart, 39 to 41 cm. long, 3.9 cm. wide. Sub-terminal pinnae 34 cm. long by 2.5 cm. wide. Terminal pinnae 29.5 cm. long by 3.8 cm., the united base 3 cm. long, the pulvinus continuous underneath on each side of the rachis, but the veins of the upper side meet the ridge of the rachis. Tips of the terminals only 10 cm. apart, the shape fusiform, notably wider in the middle. At this stage of development the terminal specializations, attenuation of the rachis, reduction and separation of the pinnae and enlargement of the basal pulvini, to turn the pinnae backward, have not yet begun. Further study of the succession of leaf-forms is needed in order to determine the extent of specialization in the various species or subspecies.

Contrast in Trunk Sections

To appreciate the extent of specialization involved in the climbing habit of *Anothea*, comparison may be made with opposite courses of development in the same organ, as shown by the trunk sections of *Anothea* and *Vadia* in Figure 3. Living in the same forests, the two palms encountered the



Robert L. Taylor

FIG. 3—Contrast in trunk sections, *Anothea* and *Vadia*

same problem of avoiding the ever-increasing shade of the trees, but have progressed in different ways, *Anothea* by developing long-jointed trunks to reach above the canopy of shade, *Vadia* by growing in the stream beds, which remain more open to the sun.

The long, robust roots that enable the *Vadia* palms to hold their place in the rocky beds of the mountain torrents are the positive adaptive feature, the diminution of the trunk a negative feature. Long, upright trunk sections like those of *Anothea* would be out of place in a plant with the habits of *Vadia*. While the trunk sections of *Anothea* have been developed to much greater length than in related genera, those of *Vadia* have been reduced as far as possible. As shown in natural size at the right of Figure 3, the trunk sections of *Vadia* are only long enough for the insertion of the roots. A few of the root-scars can be seen on the upper face of the rootstock, in Figure 3. This specimen of *Vadia*, grown as a houseplant, remained much smaller than the greenhouse plants that were described and illustrated in the NHM for January 1947. Even in the small potted plant, the roots grew more than a foot long and in nature would form a tenacious network.

Numerous Modified Features

Although the climbing habit may be viewed as a single specialization, the incidental modifications are numerous. Thus the relatively shorter and thicker internodes at the base of the trunk are better developed than in the species that have only short trunks, as though to provide a base from which the next series of very long and slender internodes can climb into the tree-tops.

The very long and unusually firm and fibrous leaf-sheaths evidently strengthen and stiffen the trunk near

the growing end while the tissues are soft. The long persistence of the sheaths continues this support until the enclosed internodes are mature, when they become extremely hard and tough. The sheaths are unusually thick at the insertion of the petiole, and have a distinct shoulder-like prominence on each side. Sections at this point show that the bundles are larger and farther apart, giving a much increased strength where the strain would come, at the point where the petiole forms an angle with the sheath.

The shortening of the petiole may be considered as a consequence of the lengthening of the two adjacent elements, the sheath and the rachis. The flexibility of the rachis permits the retrorse pinnae to find more numerous supports. The prominent ridge on the upper side gives the rachis strength with the least decrease of flexibility. The folding and narrow insertions of the pinnae give them greater rigidity and at the same time permit the efficient working of the greatly swollen pulvini which push the pinnae downward, into their retrorse positions. The narrowness and rigidity of the pinnae, the reduction of the terminal pairs, and their opposite position are alike calculated to increase their efficiency as climbing organs and to permit them to be carried out as far as possible by the slender extremity of the rachis.

The rupture of the living leaf sheaths by the inflorescence is an adaptive consequence of the extreme length and close wrapping of the sheaths, and their persistent vitality. The peduncle is not long enough to carry the inflorescence out of the sheath, and there would be friction difficulties in forcing it out. The inflorescences have not become infralior and thus able to avoid the living sheaths as occurs in many



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FIG. 4—*Suppressed petiole, erumpent inflorescence, natural size*

palms, including some of the genera of this family.

In the interest of more detailed study of the adaptive characters of the adult palms, it may be well to state the several features that were observed in Guatemala. These include the thick, short basal internodes, the long slender upper internodes, the very long overlapping tough sheaths, the thickening of the sheaths at base of petiole, the persistent vitality of the sheaths, the very short petioles, the long, flexuous rachis, the prominent dorsal ridge of rachis, the long intervals between the pinnae, the narrow, closely reduplicate insertion of pinnae, the extreme development of the basal pulvinus, the retrose direction of pinnae, the narrow forms of upper pinnae, the firm, stiff texture of the pinnae, the extreme reduction of terminal pinnae, the opposite position of upper pinnae, and the rupture of the living leaf-sheaths by the inflorescences.

Anothea at Cordoba, Vera Cruz

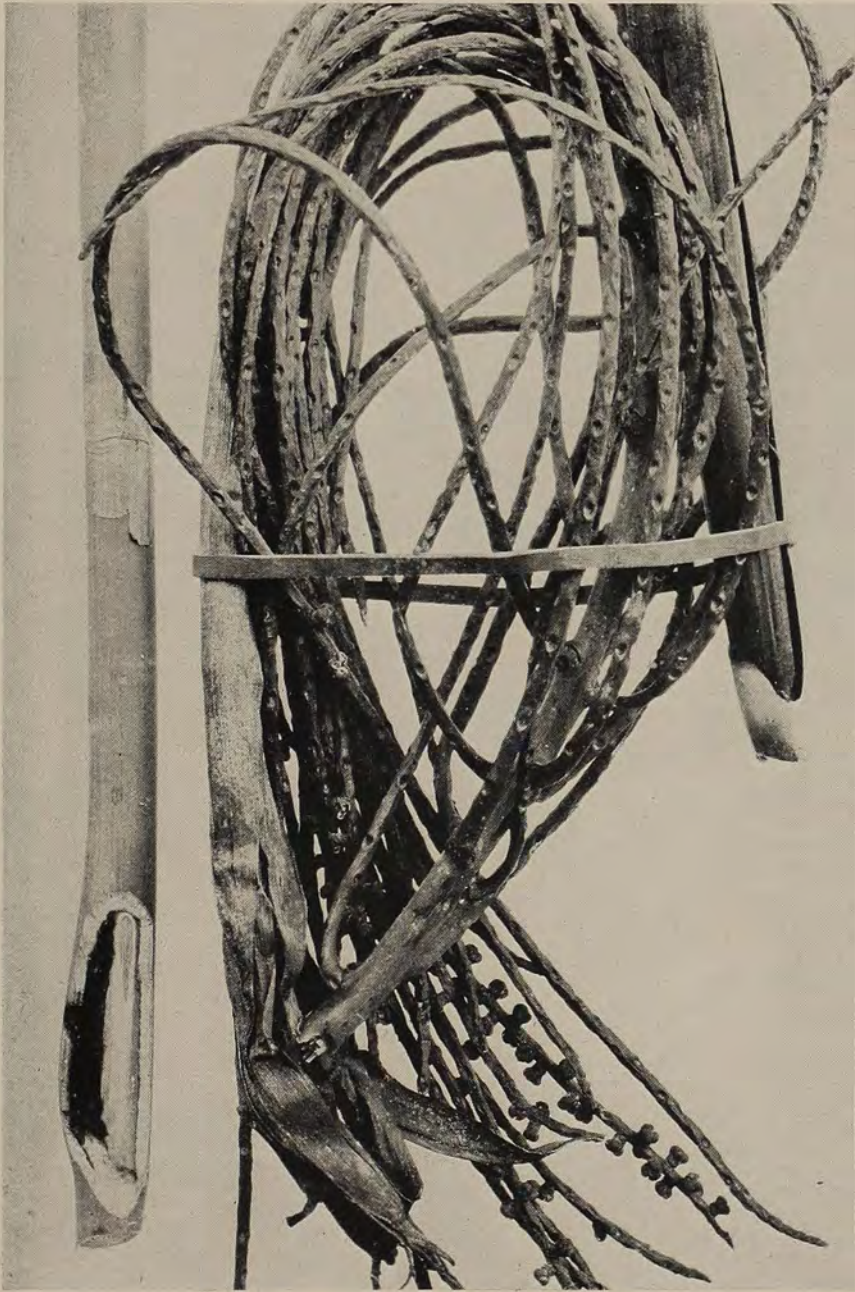
A climbing palm with the same habit of producing inflorescences near the ground was noted in a garden at Cordoba, Mexico, a few miles east of Orizaba in the State of Vera Cruz, in May 1905. The basal internodes were 3 to 13 cm. long, about 2.5 cm. in diameter. Leaf-sheaths 26 cm. long, petiole 5 cm. long, one centimeter in diameter. Rachis 106 cm. long, tapering to a very slender tip. The lower pinnae are 15 to 20 cm. long, 7 to 15 mm. broad, the middle pinnae 33 cm. long by to to 3.8 cm. broad, the terminal pinnae reduced to 4 cm. by one cm. Number of pinnae 17 on a side, the last four to five small. Color dark green.

Inflorescence total length 34 cm., to first fruiting branch 11 cm.; branching

axis 9 cm.; branches 11 to 16 cm. long, all very short. Number of branches 15, some of the branches with the articulation carried out from the axis for 2 mm. or less, with the bract broad and short. Spathes three, spadix deep orange at maturity. Fruit spherical, black, one centimeter in diameter.

Basal joint of peduncle 1.5 cm. broad, the second about 8 mm. broad; the articulation through the third joint strongly curved forward in the middle above and below, median length seven to eight millimeters, lateral length eleven millimeters. Third joint 2.5 cm. long, also curved forward in the middle. Fourth joint 4.5 cm. long; fifth joint 3 cm. to first branch; the last articulation marked by a rudimentary spathe.

Calyx with the sepals fused at base, the united portion forming a rather flat even ring surrounding an oval elliptic fruit-scar somewhat prominent in a distinct oval impression. The lobes of the mature calyx beyond the flattened portion are broadly rounded, more than twice as broad as long, one of them larger than the other two which subtend the smallest petal covering the stigma. Petals broadly rounded and widely imbricate, the apex rounded, slightly angled, or submucronate, the margins thin, the central area irregularly thickened, the ring of the calyx not always corresponding with the notch between the lobes, but usually near it. The calyx and corolla are of the same texture and color, the thin margin brownish with swollen areas dull olive. The stigmas are removed from rim of the fruit scar by about the width of the scar with the abortive carpels separated by a fine groove. The ripe fruits fall off or are eaten by birds leaving the old flower attached.



C. B. Doyle

FIG. 5—*Anothea palm*, male inflorescence, natural size



Robert L. Taylor

FIG. 6—*Anothea* from Mexico and Guatemala



Robert L. Taylor

FIG. 7—*Platythea palm*, type specimen reduced; fruits natural size

Anothea at Los Angeles

The palm shown at the left of Figure 6 belonged to the Doheny collection, in a greenhouse at Los Angeles, California. The lower trunk sections were much shorter than those at the left of Figure 3, representing the stock from Eastern Guatemala, raised in a greenhouse in Washington. A male inflorescence was produced near the ground on this plant at Los Angeles, as may be seen in the photograph. This inflorescence was infrafoliar, though others farther up were bursting through the overlapping leaf-sheaths. The peduncle as a whole measured about 7 cm., the branching axis about 15 cm.; branches about 25, all simple, the longest 24 cm.; branches all erect, the lower horizontal at base, then curving upward. A dull yellow color of the flowers was noted, and a rather unpleasant odor.

A short peduncle, exceeded in length by the branching axis, was described by Martius in *Chaemaedorea elatior*, a species that several writers have considered as one of the climbing forms, although Martius described the trunk as twelve feet tall and an inch thick.

Platythea, a Creeping Palm

A very slender palm with the habit of creeping over rocks, instead of climbing to the treetops, would seem anomalous, as though the basic need of reaching the sunlight were being disregarded. But a different reckoning must be taken, an adaptation to a new habitat not hitherto considered among the ecologic attainments of the various groups of palms. In the mountainous countries of Central America are many districts where rocky outcrops occur, and such locations are subject to very complete clearing and exposure after being swept by fires, that often spread from adjacent forests or grasslands. Palms that survive such fires may have

notable advantages, and a slender, spreading, rapid-growing palm would avoid much competition in promptly occupying such clearings.

In a dry period the humus that accumulates among the rocks may be so completely burned that many years are required for a new covering of shrubs, vines and small trees to be established. But the burning may not kill the palms and an ability to grow rapidly and to reoccupy a denuded area doubtless would be important. Once a rooting-place among the rocks has been gained, a surrounding area might be utilized by a slender creeping palm, like that shown in figures 7 and 8.

The advantage to be gained would be the same as for a climbing palm, without the need of the trunk growing erect or the leaf-sheaths being strengthened, or the midribs especially lengthened. Yet the development of a creeping palm would seem to have come from a climbing palm, or at least would seem more feasible by this course than by supposing that a short-trunked palm should specialize toward a creeping habit.

The name *Platythea* was intended to convey the idea of creeping over a level surface, to contrast with *Anothea*, which climbs to the roof of the forest. The palm shown in figure 7 was named *Platythea graminea* in allusion to the grass-like appearance of the foliage. The herbarium specimen was collected in Mexico by Purpus, No. 10494, the locality not stated on the label but supposed to be Zacuapam, in the State of Vera Cruz. The last figure has no proven connection with the preceding, but shows a palm that in nature must have had a closely similar habit, while the greenhouse specimen had been trained in an erect position on a wire screen. It belonged to the collection at Los Angeles, of Mr. E. L. Doheny,



FIG. 8—*Platythea palm* in greenhouse

and was photographed in November 1914, with the following note:

Pinnae 13 on each side, the upper opposite. Basal pinnae not greatly reduced, but terminal very strongly so. Largest pinnae attaining length of 19 cm., width 2.5 cm. Rachis becoming extremely slender and filiform near the end. Petiole 5 cm., rachis 72 cm. Lowest pinna 13 by 1.5 cm., the second pinna 16 by 2, the fifth 19 by 2.3, the sixth 15.5 by 2. Penultimate pinna 10 cm. by 1 cm.; last pinnae 8 cm. by 7 mm.

Trunk and Leaves of the Creeping Palm

The terminal sections of the trunk of *Platythea graminea* are represented in the specimen shown, about half natural size, in figure 7. The trunk is extremely attenuate, of delicate texture, and strawlike, only 4 mm. in diameter. The trunk sections are 5 to 7 cm. long, not thickened at the ends, nor the leaf scars widened as in *Anothea*.

Leaf-sheaths 16 cm. long, widely overlapping; petiole 15 cm.; rachis, incomplete, 39 cm., probably attaining 40 cm. or more; younger leaves with petiole 4 to 5 cm., rachis about 30 cm. Rachis near the tip very narrow, filiform, less than half a mm. wide, finely ridged above, canaliculate below.

Pinnae narrow, like blades of grass, attaining 12 cm. by 8 mm., the apex attenuate for 3 to 4 cm.; basal pinnae reduced to 2 to 3 cm. long by 2 mm. or less; the terminal pinnae reduced to 4.5 cm. by 2.5 to 3 mm., with no tendency to become retrorse. Pinnae with relatively few veins, only the midvein and submarginals distinct. The pinnae are widely spaced, 3 to 5 cm. apart on the larger leaves, the upper pinnae opposite, the others less regular, narrow at the base, with a distinct pulvinus forming an abrupt prominence

underneath, but apparently lacking a pulvinus on the rachis above the pinnae, which causes the upper pinnae of *Anothea* to become retrorse.

Fruiting Characters of Platythea

The inflorescence, as shown in figure 7, is short and rather compact, attaining 28 cm. in total length; peduncle 17 cm. axis 11 cm. the branching portion 4.5 cm.; branches 9, the lower 8.5 cm. long, the upper 7 cm.; all the branches simple, the sterile apex rather short and abrupt. The joints of the peduncle measure in millimeters 6, 4, 15, 35, 60, 55.

The attachment of the branches is a notable feature, with the branch decurrent upon the axis, some of the upper branches to nearly half the length of the axis section, and with the basal point marked by a short projecting bract, perceptible on the sections shown in natural size at the bottom of figure 7.

Calyx much smaller than the corolla, the sepals definitely united, the lobes broadly rounded, with rather distinct margins. Corolla with petals apparently not united, but distinctly overlapping at the base, with broad, distinct, smooth margins.

Another Creeping Palm

A Mexican palm that Wendland received from Leiboldt as *Chamaedorea repens* and described later under the name *Chamaedorea resinifera* may prove to have had a creeping habit, as the original name would imply, that Wendland disregarded. Wendland notes that the trunk is weaker than in other species, and that the leaf-scars are less thickened, which means that the leaf sheaths are not indurated. The leaf blades are only four and a half to five feet long, the pinnae rather narrow and short, with five to seven of the basal pinnae closely crowded. The

number of pinnae, eighteen, is the same as in *elatior* and *desmoncoides*, but the rachis is shorter. The complete absence of a petiole, the twice-branched

male spadix, and the resinous secretion covering the female inflorescence are further indications that no close alliance with *Anothea* is to be expected.

Rhododendron Notes

CLEMENT GREY BOWERS, *Editor*

Factors Affecting Hardiness

Variety testing may seem simple and easy to some, but if the work is to have any comprehensive value it must involve a good many things. Some reports concerning the success or failure of plants, as word circulates among amateurs, fail in their purpose because they tell only a part of the story. This can be the case with ordinary garden plants. Introduce some other kinds that have special requirements, such as acid soil, and the chances of error mount. Add to this a group of species that are on the border-line of tolerance to heat and cold, or alpiners that thrive only on fog and snow-water, and you pose a first-rate problem.

This is pretty much the situation with those who for years have been experimenting with the newer Asiatic rhododendrons in the Eastern United States. Obviously, the old techniques don't work; they failed long ago. In 1926 this writer was told by E. H. ("Chinese") Wilson that scores of Asiatic rhododendrons had been tested at the Arnold Arboretum in Boston and that no evergreen species, except the miserable little *Rhododendron micranthum* from Manchuria, was really hardy in the full sense of that term. Since then some progress has been made, but the amount of misinformation that reaches readers' ears is very apt to expand as we hear more about

them. Reports will err on both good and bad sides, and these will be conditioned very largely on small local factors which cannot be listed as rules of thumb. The fact that a certain species grows to bloom in the semi-wooded shelter of some Long Island cove, does not greatly help the would-be grower in Cleveland or Boston or Washington, D. C., but might be of certain value to him if all the prevailing conditions of growth were clearly stated by someone who knew these facts and was not carried away by over-enthusiasm.

Reports of beautiful new species and hybrids coming from England have long made American growers hungry for these gorgeous things. More recently, considerable success has been attained by growers in the Pacific Northwest, and glowing reports are now coming from there. The value of these reports to other sections of our very vast country is questionable, but the work of the West Coast growers is of exceedingly great importance to all of us in that it will enable everyone to obtain hundreds of kinds of new species for testing and hybridization that have been previously unavailable because of the plant quarantine and other drawbacks.

Naturally, everyone asks, "How hardy are they?" Perhaps this is the most pertinent question that sophisti-

cated gardeners ask. Up to now, we Americans have had to rely almost wholly upon the hardiness ratings of British growers, and even these occasionally are changed by their authors. For total want of any other yardstick, these ratings were employed in the writer's 1936 book on these plants, with the admonition, however, that the reader is not to take them too seriously, because "climatic differences render the English ratings unreliable for general application." The same was more or less true of English merit ratings. No doubt these ratings are of considerable value to the growers on the West Coast who are pioneering with these new species, but elsewhere in the United States it has been demonstrated that the British symbols and ratings are practically valueless. West Coast growers are the only ones who should permit themselves to become British-minded in their rhododendron work; the rest of us had best cut our own patterns to suit our own local conditions and abandon all preconceived rules. After all, it is no compliment to the ability of any gardener to say that he grows something well in a region where almost any rhododendron can be grown superbly and with apparently the greatest of ease. It is a real tribute to gardening ability, however, to say that one grows things successfully in spite of an unfavorable environment.

While those in milder climates may concentrate their attention upon *what* to grow among many kinds of available species, we, in most parts of America, must be more concerned with *how* to grow any of the newer species at all. Illustrative of this, in Britain most of the rhododendron literature is concerned with encyclopedic plant descriptions and cataloguing, and very little with the physiology and genetics of the subject. We in America, on the con-

trary, must concentrate upon the latter. While this is a large order, American scientists have already outstripped all others who have worked upon any phase of rhododendron study except their botanical classification. One needs only to refer to the pioneer work of Coville in demonstrating the relationship of rhododendron growth to acid soil, and to the remarkable nutritional experiments of Shive with his culture solutions. Both of these are landmarks of rhododendron knowledge, and I question if these Americans are receiving their full share of credit due.

I bring up these points because, at the present time, there is a tendency in some quarters to accept the well-worked-out British conclusions regarding rhododendron growing as standard for America without realizing that the situation in America is more complex. Mild-climate practices make poor examples for most of us to follow. In a country so vast and diversified as ours it is almost impossible to formulate a set of values that can be employed everywhere with equal success. We shall have to work it out almost on a local basis.

While I always dislike to say anything that might be construed to imply that rhododendrons and azaleas are difficult or finicky, it must be admitted that they are highly specific regarding their requirements. One is prone to think of hardiness in terms of simple resistance to cold temperature, or, in arid regions, to drought-resistance. But it is not so simple as that in any plant, much less a rhododendron. Off-hand, I can think of more than a dozen other factors that are involved, any one of which, operating independently or in combination, can absolutely determine the success or failure of a rhododendron plant. Fortunately, few ever need be considered by the average gardener.

Yet he should know about them, for in making statements concerning the merit of new species all of these factors must be taken into account in order to avoid error.

For practical purposes I wish that some feasible scheme might be worked out by Americans for the hardiness rating of rhododendrons and azaleas on a national basis. The British have made a good start, but our problem is different and will have to be approached in a regional way and with stricter experimental controls. It must be set up so that those persons will be able to discern all the factors involved and not just a few. I have no formula for doing this, but just as an initial step towards relieving the present chaos, let me enumerate some of the factors which come to mind as important considerations in measuring any ericaceous plant with respect to its hardiness and merit in any given locality. The subject is voluminous and rather dull, so I shall not attempt to present anything more than random thoughts, without delving into the literature and without pretention of completeness.

1. *Trueness to Type*

Before we describe anything we must know for certain what we are describing. I am sure that some of the divergent results reported from tests of given species are due to variation, hybridity or wrong identification. Although coming under the same label, the material under test in two different places may not be the same thing at all. Although some will set weak seed to their own pollen, most rhododendrons require pollen from another plant to set good seed. Insect pollination is the rule in nature here. If growing in a large collection and blooming concurrently with other crossable species, a rhododendron plant would normally be visited by bees

who travel from plant to plant effecting cross-pollination. Seed taken from such a cross is hybrid seed and the resulting seedling may easily show no more relationship to its maternal parent than a distant relative. It might, indeed, be much better (and here lies the fallacy of describing only the "best" as representative of the species). In any event, a record made from such a hybrid could be greatly in error as respects the original species referred to on the seed-label. Judging from observed results, I believe some of the seedlings circulating in America have been derived from such impure origins.

When the seed comes directly from its wild habitat, the chances of its authenticity would seem almost perfect. Yet, even here, considerable variation may exist between individuals, especially if collected at stations geographically quite distant. It might also be surmised that the reported inconstancy of some wild species from Asia is caused by hybridity in a state of nature. I would not be surprised if it were ultimately found that many of the forms now classed as natural species were nothing but natural hybrids. A parallel to this exists in the case of the Louisiana irises where some sixty new forms, originally described as species, were reduced to a mere handful of true species after the natural hybrids were eliminated. Then, too, as in certain wild American azaleas, there are curious intergrades, where one species seems to merge into another, with intermediate forms. Although these are serious complications, it is easy to get authentic material by hand pollination and by vegetative propagation, once such authentic plants are found here or abroad. Arboreta and botanic gardens can aid greatly by maintaining collections of authentically identified living specimens which can be utilized as source material for varie-

ty testing and for hybridization purposes.*

Self-pollination, when it occurs, may produce seeds and these, in turn, are quite apt to grow into weak, feeble plants that are poor representatives of the parent type. Again, hand pollination, which is an easy operation, can circumvent this.

Care and a full awareness of the situation can overcome most of the difficulties here mentioned, but we cannot be sure of our tested results until we are sure of our material, so that the present hit-or-miss records, outside of those coming from scientific institutions, and a few very careful growers, are of small value except to those in the region from whence they came.

2. *Water Relations*

In my own experiments I have found certain Ghent and Mollis azaleas, reputedly tender on Long Island where minimum temperatures seldom touch zero, to be hardy elsewhere at -30° F. Investigation has satisfied me that the checking of growth in early June due to excessive heat and dryness is a cause of subsequent winter death or "dwindling," and that, with proper summer growing conditions, such species can withstand severe winter cold. These conclusions have been confirmed by further observations elsewhere. Thus, faulty summer conditions were the actual cause of erroneously reported "winter tenderness," the crux of the matter, in this instance, being water relations.

*The collections of plants in arboreta and botanic gardens are generally limited to those growing in public display areas, or parks, where it is impossible or impracticable to use them as seed-parents in hybridization or other controlled pollination work and where they are likewise unavailable as sources of scion wood. It would be a fine thing if such institutions would propagate and maintain duplicate plants in some enclosed or non-public area where they could be fully utilized for such purposes. I do not know of any institution in this country that maintains a scion nursery, yet such an establishment would be of great value to growers of all kinds and would go far towards eliminating unauthentic forms of plants that sometimes appear in the trade.

3. *Graft-union Relations*

For the same cause as above, namely, inadequate water supply during the active growing season, grafted azaleas were found to be considerably more sensitive to summer drought than azaleas grown on their own roots. Water and mineral salts from the soil appear to have difficulty in passing through the graft-union between rootstock and scion. Consequently, the mortality is very high. This is probably the main reason why thousands of Ghent and Mollis azaleas, imported as grafted plants from Europe years ago, have written a long history of failure in America. It is not improbable that the same situation obtains, to a greater or less degree, among some other kinds of rhododendrons. The answer is to use "own-root" plants.

4. *Checked Growth from Other Causes*

Hard, unthrifty wood is much more susceptible to winter injury than vigorously growing wood. This has been demonstrated on fruit trees and other woody plants, and is quite apparent on rhododendrons. Anything which checks growth in the normal active growing season is apt to be reflected by dying-back during the succeeding winter. Thus, defoliation or injury by insects, disease attack, soil troubles, or other inhibitors of growth, although not killing the plant directly, may determine its survival in subsequent winter cold.

5. *Age of Plant*

Very young plants are tender. In the East, the first two winters are usually spent under glass or in frames. Very old plants, when growth has become inactive and old wood has not been replaced by vigorous new shoots, are also susceptible to winter killing. Thus, a vigorous plant at three or four years

may reach blooming age and appear hardy, but when growth slows down it may prove considerably less hardy. Probably a plant should be five or six years old before its hardiness can be accurately appraised. No one can soundly make broad statements concerning the hardiness of plants that are under blooming age or those grown in exceptionally protected sites.

6. Site

Ecological conditions, such as exposure to wind and sunlight, make tremendous differences in results when a plant is on the border-line of hardiness, as so many species are. In British parlance, "shelter" often means protection from early Spring frosts; in America, this is not often implied. Rather, we think of protection against wind and excessive sunlight, applying at all seasons. A distance of ten feet around the corner of a hedge or building, may spell success or failure for us. Persons living in the same neighborhood obtain opposite results from similar material, and the causes of these inconsistencies may be difficult to find, but local site is something to look for in such cases. Frost pockets and air drainage are of considerable importance.

7. Soil Relations

Next to temperature, this is the most obvious factor influencing hardiness. It is self-evident that plants unthrifty because of wrong soil conditions will ultimately dwindle and die. If death occurs in winter, as it frequently does, it may be wrongly blamed on lack of hardiness, as it frequently is. Besides the ordinary chemical relations which are well-known as requisite for acid-soil plants, complications may ensue from aluminum toxicity (where aluminum sulphate has ever been used as an acid-

fier), from sulphur troubles, from poor drainage or the effect of "hard" water. I have seen good peat beds ruined by merely a few applications of "hard" water. I have seen seepage from a nearby neutral-to-alkaline bank destroy the value of a carefully prepared rhododendron soil. Most of these things are already known by competent growers. Less is known about certain biological relations within the soil. It is quite evident that typical rhododendron soil, filled with leafmold and other forms of decaying organic matter, is teeming with fungus growths and other organisms. Some of these are parasitic, some perhaps have no direct relation to the plant itself but affect the availability of the materials which the plant uses in growth, and others may be utterly unrelated. I have examined rhododendron rootlets and found mycorrhiza (root-fungi) invading their cells. Although these are probably parasitic on the plant itself, they may perform other useful functions in breaking down plant food. Nobody knows too much about this matter, but the relationship is probably a very normal one.

8. Thermotropism

This mouth-filling word refers to the rolling-up of evergreen leaves in response to cold temperatures. In some species, it is a definite determiner of hardiness, in other species probably not. I well recall the amazement of a prominent British horticulturist when he learned that *Rhododendron ponticum* was winter-tender in the Northeastern United States. "Why," said he, "it is a weed with us—naturalizes everywhere—and I have always supposed it to be the hardiest rhododendron on earth!" Yet it fails to roll its leaves in winter and kills to the ground at New York City.

9. *Rest Period and Dormancy*

These are two separate things, although operating concurrently. A plant with a short rest period will "wake up" on warm days during winter and start growth, while a plant with a long rest period is over, no matter how warm the weather gets. These are inherent qualities, peculiar to each species. Dormancy, on the other hand, is merely that state of inertia which, regardless of rest period, is enforced upon a plant by cold weather or some other environmental factor. Obviously, plants having short rest periods are subject to injury when unseasonably warm weather forces them out of dormancy and into active growth in mid-winter or too-early Spring. Plants with short rest periods are valuable for forcing into bloom under glass in winter, but are often "touchy" when grown outdoors. Dormancy is affected by site and climate. Hence, both rest period and dormancy are factors in hardiness.

10. *Sequence of Weather*

Such things as time and amount of snowfall, duration of snow covering, suddenness of cold waves, recurrent droughts, unseasonably warm winter weather, and other weather factors are important.

11. *Mulching and Protection*

Probably no universal rule for mulching is applicable and differences in method might affect results. The oak leaf mulch is standard practice in the East. With some alpine species, stone or rock mulches are sometimes used. Special protection is subject to similar variations and uncertainties.

12. *Erratic Behavior*

Some species appear to defy the well-worn rules. One sort, which is hardy in cold temperatures, often fails

to respond to conditions favorable to other hardy species, yet it grows vigorously when it strikes a proper balance and no one seems to know the complete answer. Probably there are other instances.

13. *Slow Death*

Rhododendrons, faced with intolerable conditions, often fail to die immediately, thus raising false hopes of success. Because they may "dwindle" or lapse into unthrift for two or three years or more before they actually succumb, growers are prone to ascribe their non-success to some cultural condition, when actually the plants themselves are inherently weak. Weaklings of this sort often appear in plant breeders' cultures from reliably hardy stock. A race of plants is like a race of men: there are all sorts, good, poor and indifferent, and they are all present in a population and in a seed-packet.

14. *Cold Temperature*

Only after consideration has been given to all the other factors may one say with assurance that cold temperature alone is responsible for winter death or injury. This, of course, being the most obvious reason, is too often regarded as the whole business.

* * * *

"Of what good is any species," you may ask, "if only an expert can handle it with success? Hence, why not accept ordinary amateur results in testing new things and let the matter stop right there?"

The answer is that such results can be so terribly inconsistent and misleading. Perhaps the greatest menace is the false hope that arises when someone sounds off prematurely about some new species presently in a half-tested stage. Or when contradictory reports are

heard from two sources. This, I should say, is the present general status in America concerning some of the novelties in the genus *Rhododendron*. If reliable information is to be obtained, some satisfactory method of evaluating rhododendrons and azaleas will have to be worked out. I believe this is entirely possible. This paper does not pretend to furnish a basis for such a program, but rather to suggest the necessity of considering the whole complex picture and to discourage those who might be tempted to over-simplify the matter to such an extent that the results would be worthless. The splendid work done by the arboreta and research institutions needs to be amplified and extended. Following their careful methods, it is probable that amateurs and growers of all kinds can ultimately produce an accurate and wide coverage of the whole country, starting on a regional basis.

CLEMENT G. BOWERS

Rhododendron Oldhami Maxim. (See frontispiece.)

Some years ago through the kindness of the late William H. Judd of the Arnold Arboretum, the writer was given small plants of a series of azaleas that could not be used out of doors there, in the hope that they might be useful here. As it turned out none was more than partly top hardy here though the roots have survived well enough in most cases and we have gotten an occasional flower from the shoots that were buried in the litter of leaves that is always allowed to accumulate.

One of the plants turns out to be *R. Oldhami* which is native to Formosa and which may be forgiven therefore for not enjoying the low altitude climates of Washington, D. C., either for summer heat or winter cold.

The plant also came to me from the Fruitland Nursery under the name "Rosea magnifica" which Mr. Bailie

felt was a misnomer of some sort. The plant from Georgia did not look too happy so perhaps it has not found a place in this country that does suit it. Since the plant is very hairy, though not specially glandularly hairy, it may be that it will be no more desirable in the deep South than the hairy glandular forms of *R. mucronatum* which are singled out by the white flies for attention.

Wilson writes in his Monograph of Azaleas (p. 67): This is the common red-flowered Azalea of Formosa, where it is endemic and widely spread from sea-level up to 2800 m. altitude but it is more abundant in the north than elsewhere. On volcanic Mt. Daiton, not far from the capital city of Taihoku, it is a feature on the wind-swept upper slopes." And so he goes on to describe other localities which are diverse in location and class.

The plant as it has flowered here certainly could not be described as having "red" flowers but Dr. Wilson's use of the term red on other occasions has been rather careless. In his defense, however, it may be that all the plants, that have flowered here, have not been red and may represent the variant. Its blooms which are produced before the shoots are much developed, when out doors, are a fine red-salmon color but the distinguishing feature from the point of view of color, is the lilac pink hue that is imparted to the upper lobe by the fine pattern of dots. The combination is quite striking and gives the lie to the "color arrangers" who always fight shy of combining these two series of colors, which they claim conflict.

The illustration shows the leafy ever-green leaves that persist over the winter as well as the broader thinner leaves on the new shoots. The persistent pubescence is very obvious on the stems and leaves, but it is not as beautiful as in midsummer when the hairs are still

somewhat fresh and their glistening rust red color picks up the light.

The flowers which were photographed for the illustration were from plants rooted as cuttings in a cool greenhouse and do not show the entire number of individual flowers that come together in the one terminal group.

Unless it grows to perfection in some locality in our South it does not seem likely that this will be one of the important species in any future garden scheme but for the collector it will be of interest as there are not too many plants from Formosa that we can grow with as little trouble as this azalea where it will grow at all.

The seed pods are very large, woody, pubescent to hairy and very slow to mature. Seed sets to a variety of pollens and the pollen seems to be highly fertile as well.

Takoma Park, D. C.

Correction

In the April issue of this magazine Mr. Halfdan Lem of Seattle had an article on some new Rhododendron hybrids. I typed the article and sent it in for Mr. Lem. I made a very bad

mistake on one of the crosses and would like to correct it. On page 113 near the bottom of the first column the following cross was listed: *R. Griersonianum*-*R. neriiflorum* \times *R. discolor*. There is no *R. Griersonianum* in this cross and it should have read: *R. dicroanthum* \times *R. neriiflorum*-*R. discolor*. The best form from this cross is a beautiful rhododendron. The basic color is a light apricot and the corolla is margined rose. *R. Margaret Dunn*, which is from the cross *R. discolor* \times *R. Fabia* has the same colors but the pattern is different. This one is apricot flushed with rose and no definite margin. Since *R. Fabia* has *R. dicroanthum* for one of its parents it is easy to see that it along with *R. discolor* are the determining influences in a new group of orange to apricot hybrids. *R. discolor* has much to do with the size and shape of the flowers which are medium trumpets three and a-half inches across and three inches long. No doubt much of the soft coloring and the blending is also due to *R. discolor*.

LEONARD F. FRISBIE

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Lily Notes

Growing Lilies in Northern Latitudes

There are two wild flowers of the prairies that have always appeared to me as exquisitely beautiful. They are the prairie lily (*Lilium philadelphicum andinum*) and the yellow lady-slipper (*Cypripedium parviflorum*). In the great stretches of meadowland, which lay about us in all directions in my childhood days, we picked armfuls of these flowers nearly every summer. The prairie lily is now the emblem of this my native Province of Saskatchewan.

From those earliest days I have always been interested in lilies. Thirty years ago I moved many of these plants into my own garden where they have flourished, died out, and been re-established. It was only natural for me that I should look to the cultivated species to extend my blooming season. Now in my small garden in the city of Regina I have some thousands of bulbs of about thirty different kinds if I cannot say varieties.

Unfortunately we have a most inhospitable climate and soil for the growth of lilies. We live on a plateau over eighteen hundred feet above the sea. Our soil is known as the heaviest "gumbo" in this part of the world. There is not an atom of sand in it and it goes down for a depth of over one hundred feet. Our winters are severe, occasionally falling to sixty below zero with very little snow. These severe winters leave nothing but the hardiest varieties behind them. I have dug into my garden yards of sand, sifted coal ashes and thoroughly rotten manure of which we have mountains in the district. About fifteen years ago I made a new lily bed. I dug a trench three and a half feet deep, six feet wide and forty feet long. At the bottom I put two lines of six inch weeping tile. I covered these with about eighteen inches of heavy gravel or small stones. This I covered with six inches of straw to keep the fine soil from washing down and filling the spaces in the gravel. The balance was filled with leafmold brought in by truck a distance of thirty miles. We are fortunate in having to the east of us a large area of "park land" as it is called, where native poplars and willows have grown for years. The hollows often hold leafmold to the depth of a foot. Although my lily bed has settled year by year, I have kept filling it in with rich leafmold and the lilies love it. This small bed is crowded with bulbs and carries bloom the most of the summer. The most of them are of the lily family.

Among the early bloomers are *Scilla sibirica*, variety Spring Beauty; four kinds of *Fritillaria*, *Kardaghensis*, *pallidiflora*, *ruthenica* and *pudica* (yellow bells). I have a long line of *Ixiolirion montanum tataricum*. Among these there are clumps of corydalis fumatory, *Mertensia virginica* (Virginia blue-

bells) and grape hyacinths. All these flowers die down and disappear as soon as they have bloomed. After these come the lilies proper. The first to bloom are the *pumilum* which we used to call *tenuifolium*. All my bulbs have come from the seed of a monster bulb given me by the Western Horticulturalist of the C. P. R., Mr. Almey. I have not found that these bulbs die out as they appear to do in eastern districts. Mine grow to a height of three feet and carry twice as many bells as those I have seen in the East. Many have flourished for eight years. Following *pumilum* are the upright lilies, and *concolor* (Dropmore variety). *Monadelphum* used to be the first to bloom but one of the very cold winters killed this clump and I have not got it replaced by flowering bulbs. I am not well enough versed to distinguish between the *umbellatum* family and *elegans*. Mahony does well and has never winter-killed. Mr. W. E. Marshall refers to *L. elegans*, Mahony; Alan & Esther Macneil refer to *umbellatum* Mahogany. I have bought both these lilies and they appear the same to me.

We in Canada owe a great debt of gratitude to Miss Isabella Preston of Ottawa and Mr. F. L. Skinner of Dropmore, Manitoba. They have given us some wonderful lilies hardy enough for the rigorous climate of the west. Mr. Skinner is growing them for sale and his bulbs always grow. Maxwill is a beautiful lily, easy to raise from seed and comes very true. Duchess is another beautiful lily of delicate yellow. Some of the other hybrids produced by Mr. Skinner that are good are: Skinner's Orange, Glow, Azalea, Russet, Margaret Johnson, and Scotiae. I have nearly all the introductions of Miss Preston and so far all have proved hardy. I believe that Brenda Watts is the most vigorous. It sends

up shafts as thick as my thumb and carries a grand head of bloom. The following are all good and hardy here, viz: Lyla McCann, Lillian Cummings, Edna Keen, Grace Marshall, Muriel Condie, Hurricane, Spitfire, Coronation, Mosquito, Davmottiae and Tigra-max.

The dark Martagon has always done well for me and seems to thrive in our heavy clay soil. A single bulb has increased to nearly thirty. I broke it up last autumn as they were too crowded. Martagon alba is not hardy with me. It has flowered only once or twice and I have bought new bulbs from time to time. Davmottiae and unicolor willmottiae are very vigorous and give grand heads of bloom.

Of the Backhouse hybrids Sutton Court is by far the best here. It has come through very severe winters and always bloomed and multiplied. It does this by merely dividing. It does not break up into a host of small bulbs that require years to reach the blooming stage.

Cernuum is a beautiful little lily and one of the few fragrant lilies that are hardy here. Unfortunately it is short-lived.

Hansonii has always lived through our winters but I should not mind if it died. It has never bloomed satisfactorily and year after year I have covered it to keep off the spring frosts.

Amabile, in both forms, is good certain years but it splits into fragments and seldom blooms well two years in succession.

Henryi is only fair. It blooms very late for our short season and winter-kills in the severe winters.

Other lilies that I have are: Brocade, Wilson hybrids, Gleam, *callosum*, *duchartrei* v. *farreri*, and Seneca and of course *tigrinum* which has become almost a weed. I have bought many

bulbs of *tigrinum* but they give very poor bloom, seldom more than six blooms to a spike. Some bulbs that I got from Alan & Esther Macneil under the name of Tigrinum B.C.R. seem to have more vigor but bloom a good two weeks later than the other tiger lilies.

Seneca has never bloomed for me. I have replaced it twice and am hoping for results next summer.

It is my great regret that we have no hardy white lily. The only Regal lilies that have ever lived through the winter for me were a clump planted in a corner close to the house. These lived some years and occasionally bloomed. The Regal hybrids such as I have seen in the garden of Mr. Frank Palmer of Vineland Station in Ontario have never survived a winter and I have spent a great deal in making the experiment. *Duchartrei* v. *farreri* has not been a striking success with me.

I have read with great interest the report of the work being done by Mr. Jan de Graaff at Sandy, Oregon. It seems to me that he will have something from his *tigrinum* crosses that will not only be beautiful but hardy.

I could give a very long list of the lilies that I have tried and found wanting in hardiness. Some of these I fully expected would be hardy but I was disappointed. They are: *Canadense*, *superbum*, *auratum*, Shuksan, *candidum*, *testaceum*, *Sargentiaea*, Princeps.

Fortunately we are very free from insect pests and disease. I have never had a case of botrytis. Our summers are very dry and every spring as a precautionary measure I spray the whole beds with Bordeaux mixture. I have seen some mosaic in bulbs that I have bought but as I have always weeded them out immediately it has not spread. About the only plants liable to have aphid in my garden are some delphinium and I keep them well sprayed.

High winds are very prevalent during our summers and some of the week-stemmed varieties such as *dauidii* and the taller varieties require staking. I do this in an inconspicuous way with heavy wire. I make a kink in the wire at ground level so that I can press it into the soil about six inches from the bulb. The wire bends over at right angles to the lily shaft and then straight up. I attach the shaft of the lily to the wire with "twistems."

The great majority of my bulbs I have grown from seed or from off-sets or scales. Propagation is easy when you know how and seems to me to only require a common sense system of watering. I use a lath screen over all seedlings and water with soft water.

I can hardly hope that these notes will be of interest to many but I believe that lilies are growing in popularity in Western Canada through the efforts of Mr. F. L. Skinner of Dropmore, Manitoba.

P. H. GORDON

Regina, Sask., Canada

Planting Depth for L. auratum

There is a tendency of recent years to plant lily bulbs not so deep as was recommended a few years back. Writers of ten and fifteen years ago often recommended that *L. auratum* be planted 10 to 14 inches deep. Home gardeners found they were usually lucky to get even one season's bloom from their bulbs as the generally disappeared in their first or second year. Auratum bulbs will rot at these planting depths unless under very favorable conditions of gritty, porous soil and extra sharp sub-soil drainage. In our nursery on the South shore of the Georgian Bay about 100 miles north of Toronto, we grow about 50 lily species and varieties and find an average planting depth of about 5 inches to be about right.

A very fine race of auratum known

as the Esperanza strain are now being produced on the west coast of British Columbia. The growers there recommend their bulbs should have only a three-inch cover. Because of the wide variation in soil and climatic conditions across thousands of miles of Canada and the northern United States, we find this is too shallow for most gardens. At the Esperanza Farm the soil is a deep, rich alder-bottom loam. Bulbs there make an extraordinary growth of basal roots with a mass of fine feeding roots, so may not feel the lack of the stem roots, which this species naturally depends on for its best development. The climate of B. C. is more equable and they are not subject to the periods of heat and drought that usually obtain with us at mid-summer. Our soil often dries quite seriously in July and bulbs planted at three inches would undoubtedly suffer from the drought.

We have handled some thousands of *Esperanza auratum* bulbs in recent years and recommend to our customers a planting depth of 4 to 5 inches and find auratums are giving much greater satisfaction to home gardeners. We have noticed in our beds that bulbs planted 4 to 5 inches deep a couple of years ago have pulled themselves down a couple more inches by means of their contractile roots and this would seem to indicate their optimum depth here would be 6 to 7 inches. At that depth there is a sufficient length of underground stem to put out a considerable mass of stem roots.

In a general way the broader leaved lilies such as *auratum*, *Henryi*, etc., prefer some shade for at least part of the day. Nurserymen grow their lilies in the open field in full sunlight and generally do not trouble to cater to the needs of any species that are too particular. We have one clump of auratums that get shade from overhanging trees

for about half the day and these make more vigorous growth of leaf and stem and the flowers are of greater size and substance.

Home gardeners get such a thrill when they are successful with auras-

tums that they should not be discouraged by failure with auratum bulbs but continue to try to get them established in their gardens.

E. O. CLEMENT

Penetanguishene, Ontario, Canada

A Book or Two

Your California Garden and Mine.

Sydney B. Mitchell. M. Barrows and Co., Inc. New York, 1947. 261 pages, illustrated. \$3.00.

Whatever Dr. Mitchell has to say is worth paying attention to whether it be the spoken word or the written record of his long years of garden experience. His previous books have a special place in the horticultural work of California, a state that rather prides itself in the difference in conditions and possibilities.

Having once known the garden that is described gives this reviewer a rather special interest in the descriptions which after all are written for the author's Californians and none others. The garden and house are so particularly worked out for the uses desired by the owners and for the rhythms of the owner's living that no one who has not known the garden can fully appreciate how excellently well done the work is.

The Foreword tells precisely what the author had in mind in writing the book so no one can cavil that it is not other than just what it is. The one thing that one, not living in California, may regret is that it was written for Californians and not for all of us. The common basis of material overlaps that known for other parts of the country rather amazingly and one feels a mo-

mentary doubt that the author may not have omitted much that would be peculiar to the region of the Bay and the outsiders would have particularly liked to have known.

Gourds of the Southeastern Indians.

Frank G. Speck. Published by The New England Gourd Society, Boston, Mass., 1941. 114 pages, illustrated. For their members.

This is a rather specialized small book, which deals only with the "Lagenaria Gourd in the Culture of the Southeastern Indians." It has nothing to do with the culture of Gourds but is rather a most entertaining and instructive text which gives a report on all the data that Prof. Speck and his colleagues and assistants have brought together about the gourds that were used in the households of the Indians and in their ceremonial life.

Soilless Growth of Plants.

Carleton Ellis and M. W. Swasey. Second Edition, Revised and Enlarged by Tom Eastwood. Reinhold Publishing Corporation, New York, 1947. 277 pages, illustrated. \$4.75.

There has always been a lively interest in growing plants in other media than soil and the programs that have been worked out have not always been under circumstances that would show

the advantages of the method nor clearly state the conditions under which it might reasonably be recommended and approved. The Foreword to this Second Edition states the case well and specifically and we quote: "Hydroponics has a definite place in agriculture. Its chief value lies in two applications: the first is in areas wherein suitable agricultural soil does not exist, but the climatic conditions are suitable for crop production. The second is its use as an improved type of forcing technique in greenhouses for growing crops which have a high return value." The text is admirably and clearly written in a style that will be satisfactory to the technical man and yet not beyond the use of the amateurs who would like to know precisely what this is all about. The book should go far to clear up some of the erroneous ideas that have been presented carelessly in the popular press and should be of use in discouraging those persons who have built their ideas on partial information. For those who are in position to use it, it will be excellent since it contains the data and the defense necessary to prove the points offered.

Dahlias. What is Known About Them.

Morgan T. Riley. Orange Judd Publishing Company, Inc. New York, 1947. 213 pages, illustrated. \$2.50.

This is one of a series published under the general heading of the Farm and Garden Library in which Mr. Riley already has one title on the dahlia.

It is an excellent small book, written in a somewhat breathless semi-conversational style that will please many and annoy others. The fact will remain, however, that the author has brought together under one cover an amazing

amount of material, historical and scientific, written on the amateurs' level and brought up to the minute by first hand reports and personal experiences. There are good reference lists after most of the chapters. Recommended.

Bulbs for Beauty. Charles H. Mueller. M. Barrows and Company, Inc. New York, 1947. 296 pages, illustrated. \$3.50.

If someone were to ask for a single book that would give a generous and varied outlook over "bulbs in general" with all the needful data on their cultivation as well as personal opinions on varieties to choose, this would be the book. The author is reported to have had a long experience in growing bulbs and writes as if that were certainly true. The reviewer who has been growing bulbous plants as well as bulbs even longer than Mr. Mueller has read it with pleasure, and commends it to you. The pen illustrations are not too good as they lack in indication of scale although they give clearly the structure and suggest habit but the halftone illustrations are rather hackneyed and suffer from the particularly unpleasant captions that seem to infest most of the books from this publishing house. One begins to wonder if the authors are really responsible. Unless you are already expert in bulb growing in all its phases, this is a must for you.

American Honey Plants. Frank C. Pellett. Orange Judd Publishing Company, Inc. New York, 1947. 467 pages, illustrated. \$6.00.

Essentially this is a manual of plants that grow in all parts of the country from which bees gather either pollen or nectar or both. The entries are made under common names with the scientific names given in the text although without the usual authorities

added. The text descriptions are often brief but very often include data that would be hard to find in any other work. The illustrations which are numerous are not all equally good but even the poorest has the virtue in many cases of being the only illustration easily available to the amateur who may want to know what the plant looks like quite as much as to have an estimate of its value to him as a beekeeper.

The writer has had years of experience in the field and has the liveliest interest in Nature and in the plants that he studies in the field and in his own garden, maintained in addition to his duties as Editor of *The American Bee Journal*. The book will be read with interest by any one, even those who have not the faintest intention of ever raising bees.

The Daffodil and Tulip Year Book, 1946. The Royal Horticultural Society, London, England. 175 pages, illustrated.

It is a pleasure once again to have a Daffodil Year Book from The Society and for those who feel as strongly about the tulip as the reviewer does about the daffodil, the inclusion of material about tulips will make the book doubly welcome.

From the scientific point of view probably the most important article in the book is the longish paper by Drs. van Slogteren and de Bruyn Ouboter, "Investigations on Virus Diseases of Narcissus," originally prepared for publication in the year book of 1940 and already published as publication No. 64 of the Laboratory of Flower Bulb Research, at Lisse, Holland, because war restrictions made it impossible to forward MSS to Britain.

For the amateur, Guy Wilson's reviews of the seasons 1942 to 1945 is

enough to fire one to new zeal in purchasing novelties from abroad, no matter if they may not always be as lovely here as there. Biographic notes, obituaries, reports from various parts of the Kingdom, a longish deGraaffish paper from these United States fill up the pages till one comes to the briefer and less impressive tulip papers. Of these latter the most important is "Modern Tulip Development," by J. F. Ch. Dix. The usual records close the volume.

An Introduction to Plant Anatomy.

Arthur J. Eames and Laurence H. McDaniels. McGraw-Hill Book Company, Inc. New York, 1947. New second edition. 424 pages, illustrated. \$4.50.

This is a textbook for students but it is none the less a book that can be read by any intelligent amateur gardener with interest and profit. No concessions are made to the amateur in vocabulary or presentation but the clarity of the text and the excellent illustrations would commend it to all except the mentally lazy.

To the student of design, there will be a fine harvest of beautiful patterns that can be had with little to no adaptation, surely as intelligent a field for exploitation as some that have already figured on the printed cottons and silks of the last two seasons. Even the flower arranger might profit by a little study of the last chapters, to discover that every plant has its own structural growth rhythms most of which are completely unknown to the makers of arrangements or else are brutally ignored!

This makes it an excellent book for it not only scores high in the field for which it was designed by the authors but carries a dividend of considerable proportions, for those who will look.

The Gardener's Pocketbook

Pyracantha crenulata kansuensis

(See page 246)

The firethorns are among the many brilliantly fruited shrubs that came into prominence as a result of various explorations in China, the variety of this note among them. In spite of the publicity given them particularly in European journals, they have not become as popular in this country as they might in those regions suited to their cultivation.

There are several reasons for this, most of which have to do with practical garden matters.

The first firethorn cultivated was not an Oriental but a European species, *Pyracantha coccinea* particularly in its clonal variety *Lalandi*. This south European plant has some definite limitations in cold hardiness which have limited its use to the Atlantic coastal states with New York its probable northern limit of dependability. From the gardener's and nurseryman's point of view, the important fact is that it is one of the many plants with a root system that is impatient of disturbance, so that plants grown in pots are the most satisfactory for transplanting and are therefore more expensive than plants which can be produced in ordinary nursery rows. In addition, the choicest form, Laland's clon, is raised from cuttings which also raises the production cost.

All of the pyracanthas are evergreen in their native locations, but in cultivation are able to shed some of their leaves and adjust to colder temperatures. In habit, the plants may develop as small trees, but more commonly grow as large shrubs with many strong shoots from the crown, reaching in time up to 18 or 20 feet. The first year these shoots grow up almost with-

out branches, but quickly develop stiff lateral branches which in turn develop small, often spiny-tipped secondary laterals. These last are the wood from which the flowering spurs arise. The flower heads are corymbs bearing few to many creamy white, 5 petalled flowers not unlike those of the ordinary hawthorne. In time they are followed by fruits which begin to color in late summer and persist through the winter or until eaten by birds.

The usual color of the fruit is a brilliant red, but as in many other red fruited plants, there are variations in nature to yellow and to somewhat darker, more purplish reds. In some of the forms of *P. crenato-serrata*, illustrated in THE NATIONAL HORTICULTURAL MAGAZINE for January, 1929 (page 29) as *P. gibbsii yunnanensis*, there are individuals in which the reds tend to pinkish colorations as compared to the usual scarlets.

In planting it should always be remembered that the eventual spread of the plant is greater than one would imagine, largely because the upright growth is almost never strictly erect, but usually inclined at various angles. Pruning, as for apples, should be planned only to help the formation of the skeleton framework of the plant and to hasten the formation of the lateral branchlets with their flowering wood. Because of the spiny-tipped character of the branchlets, the bushes should not stand too close to paths where the passer-by will be caught.

The practice, more common in Europe than in this country, of planting firethorn against walls where it may be trained as an espalier, or merely as a woody vine-like shrub is useful in this country particularly in the northern limits of its hardiness, as the protection of the wall is often sufficient



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Pyracantha crenulata kansuensis



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Lonicera fragrantissima

to insure good growth. In such positions, additional corrective pruning must be used to insure branch growth in the proper directions. Later some surface shearing such as is given hedges, may be required if the effect desired is formal or semi-formal.

The specimen photographed is from a plant growing at the National Arboretum, where it has no particular shelter but has shown no winter injuries although temperatures below zero are not unusual each winter.

As has been mentioned in this JOURNAL before this note, firethorns are subject to attack from the fire-blight that are so destructive, particularly to pears and in regions where this disease is prevalent, their use is not strongly recommended, although the beautiful orange-berried *P. angustifolia* is the species which suffers most severely.

No adequate data are available to indicate the absolute hardiness ranges but in general it is safe to say that the Chinese species are less cold hardy than the European, and that the *P. crenato-serrata* and its variants appear to be the least hardy.

Lonicera fragrantissima

(See page 247)

This bush honeysuckle is another plant with a long garden history and a record in garden journals that appears even more important than it well might be. The reason for this is that it is almost always included in any report on winter flowering plants.

The honeysuckles as a family are numerous and diverse in form, habit and beauty of flower and fruit. Many have no garden value and some become pests because of their invasive vining habits, or their dissemination by birds which greedily eat the fruits.

There are, however, some species which have particular merits.

Among these latter, is the subject of this note.

As far as this writer has observed, the species is semi-evergreen, even in our South where it is a more showy ornamental shrub than in its more northern limits. Many shoots rise from the base with irregular lateral branching until a dense round-topped shrub some 6 to 8 feet high is built up. In the North practically all of the almost leathery, rough, dark green leaves fall, but in the South many persist until Spring. The flower buds are formed in late summer and being quickly responsive to mild warmth will flower very early in the season, often during the winter. Cut branches are easily forced into flower in the house.

The flowers themselves are fairly small, sit tightly in the axils where they are clustered and make no great show because the creamy white color is not one that carries well at a distance. The great value of the bloom is its delightful perfume which is as strong and characteristic as that of the summer-flowering "honey-suckle" that song writers dote upon and that gardeners have to fight to keep in bounds. The perfume is not the same though akin and does not fill the air as pervasively as that of the summer-blooming species, because the cool atmosphere of winter or spring is not conducive to such spread.

To the gardener who insists upon an "evaluation" of all plants, one must admit that this is a plant of secondary importance, if we accept as a criterion the necessity of "display" whether of flower, fruits or foliage as the main feature of an ornamental shrub.

Up to this time, the writer has never seen a fruit, though doubtless it must



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Ilex purpurea

mature fruits in favored localities. If these are like those of its even less showy next-of-kin, *Lonicera Standishii*, they will be red, doubtless succulent and beloved by birds in spite of the flavor of honeysuckle fruits which are generally puckery, the most commonly reported exception being the form *edulis* of the European to Asian *L. coerulea* a species which has regularly refused to grow permanently in Washington, D. C.

Ilex purpurea

(See page 249)

Among the evergreen hollies, not native to this country, only one as yet has made much progress in establishing itself in nursery trade or private gardens, the Chinese holly, *Ilex cornuta* and its several forms only two of which have received much attention, the heavily fruited *Burfordi* and the charming globe-shaped clone recently propagated by Mr. E. A. McIlhenny of Avery Island, Louisiana. There is no doubt that other clonal varieties of the Chinese holly could be segregated and put into cultivation.

This species, however, should not be the only contender for attention. The beautiful Japanese *Ilex pedunculosa* has already been reported and illustrated in our JOURNAL (January, 1939 page 70) and the subject of this note has been mentioned.

It comes from China as well as Japan and has been in limited cultivation in our South since about 1900. There is always the possibility that seed from the northernmost limits has not been had as yet and that more cold hardy forms will be found. There is a good specimen at the U. S. Plant Introduction Garden at Glenn Dale, Maryland, which has shown no winter injury except occasionally to foliage although sub-zero temperatures

are regularly experienced. As yet it has not flowered so the sex of the tree is not known. At the comparable garden in Savannah, Georgia, there are trees which fruit regularly and from which seed has been sent to the nursery trade.

The illustration gives an adequate idea of the character of leaf and berry. The latter is of the typically red.

The habit of the tree is excellent as branches can be maintained to the ground level so that fine specimen plants can be used. Doubtless these could be pruned away to show the fine grey barked trunk if one needed such a specimen. Since the plants are still growing actively in the formation of the leader, the ultimate shape of the crown is not reported but the ascending pointed shapes of the plants give an outline not unlike that of vigorous young native hollies though the lateral branches are more ascending than in that species.

The China Aster (*Callistephus chinensis*) (See page 251)

This is merely a provisional note, given chiefly to pick up once more the series of notes on annuals that has been running through the JOURNAL for several years.

Nearly all gardeners have at one time or another grown China asters in one or more of the many strains that have been developed. Like many other genera in the Sunflower Family (the *Compositae*), this genus shows interesting variations in the structure and character of the flower head.

In the wild plant, the flower has a somewhat daisy-like form in which the center of yellow disc-flowers is surrounded by a row of ray-florets in which the petal-like development has colors varying from blue and red purples through lighter hues to white. As



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China Aster

in other plants, for example the dahlia and the chrysanthemum, the disc-florets are subject to modifications, showing chiefly in color changes and development of the tubular floret so that we have what is commonly known as the "anemone" type. There is also an increase in number of the "ray-florets" until complete "doubling" appears.

The character of the petal-like development also varies. In the asters, these changes as yet have to do chiefly with the profile of the petal so that its carriage produces an incurved type or the reflexed type, such as is shown in the illustration.

The particular problem that confronts the gardener is usually in relation to the disease known as "aster yellows." In modern catalogues, there are many strains clearly indicated as "resistant" and it is to these that the beginner should turn first, although they do not yet embrace all the flower types.

Since the plant is an annual that flowers from late summer into early autumn, it is one that must be kept growing and healthy until it reaches its flowering season. For gardeners where summers are long and hot this frequently is difficult and only personal experience will tell if it is worth the effort. Perhaps the fact that there are now available among the races flowers with very distinctive pale gray and blue lavenders, is excuse enough for trying. Horticulturists and breeders have worked to produce pure reds and whatever degree of yellow may be possible. Not too much progress has been achieved in the latter, but there are now some rich reds, not more free of purple than some of the "red" petunias, but vastly better than the old strains.

Where the China aster can be well grown, it makes a welcome beginning to the abundance of cut flowers that follow first with dahlias and then with chrysanthemums in their main season blooming.

Heliotrope

(See page 253)

In most parts of the United States, this South American shrub is treated as an annual, unless the gardener has a greenhouse in which case they can be and often are trained as shrubs in standard form with a woody trunk and somewhat drooping head.

Once the gardener has come to know the pungent scent of heliotrope he is not likely to forget it or fail to wish for it. In hunting for his plants, however, he may well decide to look for one of the old-fashioned varieties in which the characteristically twisted (lyrate) inflorescence has not been developed greatly, nor the individual flowers enlarged in size or deepened in hue, but rather has to offer only the smaller inflorescence with its gray-lavender blooms and heavy scent.

Flowering Almond (*Prunus glandulosa sinensis*) (See page 255)

At least for the Atlantic seaboard from New England southward well into the South, this is the common "flowering almond" of old gardens where it is quite as usual as Harison's yellow rose, common lilac or bridal wreath. Suckering slowly and closely from the base, it eventually forms close thicket-like masses that need no more pruning than an occasional removal, at ground level, of the oldest stems.

It is not possible to say precisely how long a shoot may last in decent



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Heliotrope

growth, so one must depend on observation. Thinning can well be done after flowering so that the remaining shoots will have their entire growing season for development to fill the gaps left by removal of old branches. Since these latter, with age, assume in miniature many of the picturesque aspects of growth one may observe in full-sized plums, they should be left as long as possible, but a regular series of new shoots must develop for future replacements.

The form illustrated is the more common pale rose pink double variety. There is also a similar double white but it is more rarely seen and perhaps would not be as much valued in the spring garden. So far the writer has never encountered the single wild type.

Since the bush never reaches any great height it is one of the flowering shrubs that can be introduced into the perennial border, just as an old Hermosa rose will add a delicate foil for Belladonna delphiniums or the golden leaved form of Lemoine's hybrid philadelphus will accent an anchusa.

Flowering Peach (See page 257)

Although the peach is not considered a long-lived tree in many places, the double flowering forms of peach, of which there are several, are so spectacular in their flowering season that one is prone to use them and replace them as may be needed.

The illustration gives a good idea of the profusion of bloom, the size and carriage of the individual flowers. These may be had in white, pink and rose red.

Most nursery plants are grown with relatively low trunks and the typical wide-spreading head of the orchard peach. If one has time and patience to

force by pruning, the development of a trunk, similar to that sometimes seen in old seedling peaches, the crown that develops later will be much more picturesque.

Magnolia Soulangeana *Lennei*
(See page 258)

As has been mentioned before in this JOURNAL, there is something of a revival of interest in the Chinese flowering magnolias with the introduction of various clones that do not always fit neatly into the technical descriptions of the botanists. Since *M. liliiflora* and *M. denudata*, the parents of the hybrid *M. Soulangeana*, each have darkly colored forms it is not surprising that there should be some doubt at times as to what plant one has. Perhaps the character used by the taxonomists will serve as an easy distinction for a preliminary division.

According to Rehder, the sepals and petals in *M. liliiflora* and *M. Soulangeana* are unlike in size, the sepals being small; in *M. denudata*, the sepals and petals are alike in size.

Both parents and their hybrids belong to the group of magnolias that flower before the leaves are produced, running an annual race with late spring frosts for their successful development. For this reason, if no other, they should be planted in a site where there is excellent air drainage, but nevertheless in a place where the soil will not be dry to aridity.

The questions of the proper amount of soil moisture is difficult to state precisely, since plants are known to the writer that have come to good maturity in locations where the soil is relatively dry. The only apparent difference in growth seems to be that the plants in dry soil are quicker in assuming a tree-like habit.

Transplanting is best done in Spring



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Flowering Almond

as then the spongy roots are less likely to decay after any damage in transplanting.

If one has room and time, it is good sport to sow any seed that may develop, cleaning off the oily pulp and planting as for any other hard seed, out-of-doors in autumn. Growth is rapid but some years must elapse before first flowering.

Before the Leaves.

As will have been suspected by members who have been in the Society for years and who have kept the copies of the Magazine, there has been a rather definite attempt to keep some themes recurrent in the continuing issues of the journal. This refers not only to the several departments that have been set up to care for the rather full interest in those subjects, but also in various groups that warrant attention from a subject matter point of view rather than from the desire to study any particular group.

In this issue, for example, there are figured a number of plants that bloom before they furnish themselves with leaves. There have been many other illustrations that might well fit into this category.

The editorial difficulty that is ever present in bringing together material for a quarterly that must go to all parts of our great land, is that it is almost impossible to know all the plants that would properly belong in any one grouping, since each climatic zone makes possible the use of plants that would not be possible or perhaps even suitable in another.

There is only one certain way to correct this difficulty, namely the active participation of the members themselves in bringing to the attention of the editorial group, those things that have been outlined in the published discussion.

Would it be possible, therefore, to ask each and every reader, to think as he reads the material presented, what has been omitted that would be important, had the text been prepared for his own region alone?

If one reads all that he can find in the publications available to him, he may do a fairly good job of summarizing the total data, but there is always the chance that he will miss the matter that would seem almost obvious to the reader in some other area. No amount of travel can quite make up for the lack of experience that is perfected only by living and gardening in an area. One needs to have gone through, not only the full cycle of one year but of several in order to know the changes that are imposed by sometimes slight alterations in temperatures and illumination, as well as precipitation on the sequences of plant growth and manifestation.

For example, had one asked the writer when his plant of wintersweet bloomed he would have glibly said that it was always in flower for Thanksgiving. This year for no apparent reason, there was no stirring or swelling of the buds that lined its stems until almost Christmas and it was not until New Year's Day, that it had opened enough flowers to warrant saying that it was in bloom. There had been no unusual cold followed by milder weather but rather a decent passage into Winter and a not too severe Winter as compared to some when the plant had been in bloom and had lost all its flowers by freezing temperatures.

If one keeps a garden diary in which are recorded weather data as well as flower or fruiting records, it is possible to review all such matters, but this writer has never had zeal enough to manage records of that kind in addition to all the outside work that he thought he might do after his regular work day.



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Flowering Peach



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Magnolia Soulangeana Lennei

As has often been noted in these pages, Winter as a season, has various charms, not the least of which is that during the cold months, be they many or few, the gardener has a release from the physical activities that make the growing season a race between his own inventiveness and energy and the natural refusal of Nature itself to follow his dictates. In a way this may seem treasonable to admit, but it is perhaps something that can be rationalized, if one must excuse himself, with the thought that during these sleeping months, the processes of life are so slowed down that one may observe the body at rest.

If one works only within the limited areas that usually make up a garden plot, it is sometimes difficult to remember, once planting has been undertaken, precisely what the earth looked like before one intervened. In winter, even in the small plot, when all the trees have lost their leaves, one can see in a startling clarity, the excellence or otherwise, of the plan of the place, the balance between one's own intrusions and the natural scene that had its functional expression and balance before the garden was begun. Then and then only can one observe sharply defined the pattern of path and roadway in relation to the free areas, the balance that may exist between the evergreen mass and the flat surfaces where deciduous things have disappeared.

Should this type of observation be obscured in the garden, one can sense it more sharply by looking at almost any bit of woodland. Covered by the fall of the leaves the earth shows its modelling as clearly as if it were bare. Tree trunks rise with a clarity that they never show in summer save in meadow lands. The thin stems of young seedling trees and shrubs make little impression in the image.

This is the time above all others to see the earth itself. The greatest difficulty is that one, in viewing such a scene is moved to believe that perhaps he had better not have planted anything at all, that he had better have left it to the slow moving natural processes that had controlled all before his arrival! He is reminded that this art, if it be art, is often merely a practice in emphasis, perhaps even in overstatement. True it is that one of the perfectly legitimate methods of art in any medium, is the employment of overstatement. It is the only means at times of demanding the attention of the passerby. The balance that is needful is that which must be had between the maneuvers to catch the attention of the visitor and the calmness that must be there for the person who lives on the spot. One may excuse himself by thinking that most visitors will probably miss the purpose of his contrivance in any case and that he alone need be satisfied, in which case he may resort to the equally defensible method of understatement.

As any one knows who has gardened long, the easiest sin in gardening is to attempt too much. It is a conviction that grows on one, not simply because one is growing older, but because, one must either sink into an endless fuzziness of expression, or strip oneself of the non-essentials. It is an inner compulsion.

Make out your lists early! The advice is sound, but make them out and then start reducing them brutally, until you know precisely where every new thing is to go, how much work will be required to maintain it and whether or not in July you will be of the mind to do what needs to be done, not just to the new plant, but to the whole of the garden that will claim your attention, regardless of the novelty.

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THE AMERICAN HORTICULTURAL SOCIETY

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

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

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

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