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CONTENTS

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Walter Beebe Wilder

Campanula carpatica, White Star

Notes on a Few Campanulas Growing in a New York Garden

Helen M. Fox

There is no planting which the blue and white campanulas do not enhance by their presence. The tall campanulas are lovely in the perennial garden and combine well with lilies while the dwarf varieties bring color and interest to the rock garden after the Spring bloom has faded.

Judging from the space allotted to them in the catalogues, the Canterbury or Coventry Bells, *Campanula Medium,* would appear to be the most popular of the family. The plants require experience and care to bring them to the flowering point and since they are biennial and die after blooming and the process has to be repeated each year, it would seem advantageous to favor other biennial and perennial campanulas which flower with much less attention. It must be admitted that although many of the other biennial campanulas are handsome, none of them is as showy as the Canterbury Bells.

A biennial with a quiet charm is *Campanula cervicaria.* The clusters of pale blue flowers are born in the axils of the leaves all along the two or three feet of hairy stems and form a terminating cluster at the tip. The stem is ridged, rough and covered with fairly long hairs. The sessile leaves are linear, toothed and covered above and below with rough hairs. They measure six inches in length and ¾ inch across and grow smaller as they ascend the stem. A peaceful effect is produced by the way they curve up and down again as they arch from the stem. The flower cluster at the tip is 2 inches across and 2 inches high. The leaves subtend the cluster and partially envelop it. The flowers are hairy, seven-eighths inch long and five-eighths inch across. The style is blue, the three-parted stigma green and the pistil exserted. The flowers are white or grey darkened with "Bradley's Violet" and the leaves are "Spinach Green."

A much branched pyramid over three feet high, composed of slender stems ringing dainty bells is *Campanula patula,* called Spreading Bellflower, Wood Bellflower and poetically Fair-in-Sight. This campanula is biennial, thrives in semi-shade and in a fairly dry situation, so is doubly welcome for so few plants grow in these unfavorable conditions. It self-sows freely and once grown, is likely to remain in the garden. The stems and flowering panicles grow over three feet high and need to be staked. The stems are ridged and shiny. The leaves lower on the stems are somewhat spatulate, three and one-half inches long and about one inch wide while the leaves higher up are slender, pointed at the tips and vary in length from two to three inches with wavy and irregularly toothed margins. The flowers about an inch each way, grow in loose panicles, are rose-violet, the tips of the corolla lobes somewhat spreading and revolute. The sepals are united at the base, slender, and two-thirds as long as the corolla. The style is violet, hairy and the three-parted stigma is pale yellow while the stamens are straw-colored.

A pretty biennial is *Campanula barbata.* The basal leaves lie flat on the ground like spokes in a wheel. In the rich soil of the garden the numerous stems clothed with glistening hairs rise as high as twenty inches, although they

are said to be only nine inches high in the wild state. They bear racemes of pale violet nodding flowers at their tips. The flowers measure three quarters of an inch long and an inch across, and are shaped like open bells with slightly revolute, pointed lobes. There are fine hairs along the center of each petal, and the calyx is hairy too. The plants thrive in semi-shade and are handsome with *Lilium pumilum* and white Columbines.

There are some striking species among the tall perennial campanulas. The Clustered Throatwort, *Campanula glomerata,* flowers in June and has an architectural quality. The stems are round with sparse, short, stiff hairs and grow two feet or more high. The purple flowers are born in whorls in the axils of the long leaves and form a tight Victorian bouquet toward the top of each stem. The basal leaves have long petioles, are ovate, round at the tip, and roundedly and irregularly toothed. The stem leaves hug the stem, have no petioles, are opposite, from two to three inches long and grow shorter as they ascend. The flower clusters measure 2¼ inches across. The flowers are "Lobelia Violet" and sessile. The individual blossom is one inch long. The calyx is white at the base and the sepals are tipped green, hairy, pointed and linear. The corolla is tubular and flaring. The pointed petal lobes turn out gracefully and the style looks like white velvet, while the pale yellow stamens cluster at the base of the pistil.

In *Campanula glomerata* var. *acaulis* the stems are only seven inches or so high and consequently there is not enough space between the clusters, so that the flowers appear crowded.

Names with a Chaucerian flavor grace *Campanula latifolia* for, besides its name of Giant Bellflower, it has been called Gowk's Nose and Haskwort. The stems are four feet high and the clumps increase in girth every year. The only fault with the Giant Bellflower is that the life of each blossom is only a few days, but while they flower they are so brilliant a purple they fully deserve the large space they preempt the rest of the year. There is a white form but the flowers look as if they had been dipped in blueing and not been rinsed long enough afterwards. The stems of the plant are round and slightly hairy and unbranched. The leaves are coarse, hairy but soft to the touch, ovate and acute and without stalks. They measure six inches in length and over three inches across and have irregularly crenate margins. The flowers are boldly "Amparo Purple," bell-shaped and form a spike as long as seventeen inches. The sepals at first unite, then separate, clasp the corolla and feel smooth and cool. The corolla is thin-textured and one and three quarters inches long and one and one-half inches across. There are long silvery hairs on the margins of the corolla lobes. The ovary is white with a slight lavender tinge; the style is thick and the stigma, as is characteristic of the campanulas, is three-parted. A larger form is *C. latifolia* var. *macrantha.*

The whole plant of *Campanula lactiflora* is hairy, with rough hairs particularly noticeable in the flower heads and calyces. The stalks are leafy, sometimes grow six feet high and carry large trusses of white, or pale blue, starry open flowers. They have a sweet fragrance which is unusual in campanulas. When *Campanula lactiflora* is grown on a slope where it can follow its natural inclination and hang down, it not only looks highly decorative but also requires little attention. Elsewhere the plants have to be staked and where labor is scarce they frequently suffer from lack of attention at the right time,

Walter Beebe Wilder

Campanula cervicaria

and sprawl and grow untidy. The plant self-sows so generously it is likely to create a thicket of descendants around the original parent. *Campanula lactiflora* requires a partially shaded position and flowers from the end of June through July and sometimes repeats in August. The leaves are clasping, about three by two inches, pointed at the tip, and crenately and irregularly toothed. The sepals are long and pointed. The anthers look furry. The individual flowers are one inch across and the petal lobes are reflexed.

Several of the campanulas are too coarse for the border but look handsome in a semi-wild association where they can be seen in a mass effect as with tiger lilies or day-lilies. Along these is Throatwort, *Campanula Trachelium* and *Campanula Grossekii* a similar but later blooming bellflower. Both are eighteen inches high and the principal distinction between them is that in *Campanula Grossekii* a tiny leaflet turns down between each sepal which is absent in *Campanula Trachelium*. The stems of both are bristly with hairs, the leaves are coarse, crenately and unevenly toothed, the longest is two inches long and one and three quarters inches across. The flowers are hairy, violet blue and one inch long and are borne in the leaf axils along the stems in one, two or three.

Campanula punctata is coarse too but handsome, with long white bells and lush leaves. The much branched stems are twenty inches high, shiny, light yellow-green, ridged and slightly hairy with long green hairs. The basal leaves have stalks six inches long and are thin textured, widest at the base, and crenately and unevenly toothed with long hairs along the margins and on the veins of the under surfaces. Elsewhere the hairs are almost invisible. These basal leaves are three inches across and four and one-half inches long rounded at the tip. The leaves on the stem are similar but with almost sessile and much narrower in proportion to their length. The flowers are borne in loose clusters or singly and their stalks bend sharply just before the calyx begins. The calyx is composed of five, long, toothed, narrow sepals, half as long as the corolla. In the space between them they form a growth like a fold. The corolla is two inches long and one inch across, with five short lobes, each with a sharp point in the center. They are very hairy inside with some purple lines and dots. The white style is half as long as the corolla.

Two campanulas with grey foliage, attractive for the garden and blending charmingly with herbs are *Campanula sarmatica* and *Campanula alliariaefolia*. *Campanula sarmatica* is medium sized with stems fourteen inches and clothed two-thirds of the way with flowers. Unfortunately it is not a hardy plant. The whole of it is grey and the stalks and leaves feel soft because of their fine hairiness. The blossoms are large, bell-shaped and pale violet "Light Mauve" over white and grow out of almost gray calyces. The lower leaves have long stalks but as they ascend the stem gradually become stalkless. The margins are sinuate and irregularly toothed. The leaf narrows almost to a point at the tip. The flowers have wooly stalks and wooly calyces tinted slightly with magenta. The sepals are joined together at the base, then spread apart and fold on either side of the center as they do in *Campanula punctata* and then narrow to their tips. The calyx begins in a tube with many ridges and two-thirds of the way up the sepal lobes, separate and are slightly revolute, narrow to the tip, are hairy inside and outside, particularly along the margins where the hairs are long. The pistil

Walter Beebe Wilder

Campanula Trachelium

Walter Beebe Wilder

Campanula Grossekii

Walter Beebe Wilder

Campanula patula

is a long pale yellow club. The flowers measure one and one-half inches across at the mouth and one inch high and are pretty, nodding and growing in the axils of leaf-like bracts.

Not quite as grey as *C. punctata* is *Campanula alliariaefolia* which has a soft wooly hairiness. It is absolutely hardy and grows in sun or shade. The stems grow two feet or more high and are topped by a loose cluster of cream-colored, nodding flowers, often a foot long. They are lovely with the slender yellow spires of *Digitalis ambigua* or *Digitalis laevigata*. The basal leaves are cordate with petioles six inches long and measure five inches in length and four and one-half inches in breadth. They are hairy on the under surface but practically smooth above. The blossoms are one inch long and in the calyx there is an appendage at the base of each sinus which looks as if a fold had formed between each of the pointed sepals. This is the type of growth present in *sarmatica, punctata,* and *Grossekii*. The petal lobes are hairy along the margins.

The list of flowers thriving in the dry shade is so short that the Peach-leaved Campanula or Beachbells, *Campanula persicifolia*, is most welcome. In one garden it seeded itself under the spreading branches of a spruce where its violet-blue, light blue or white flowers contrasted with the dark evergreen foliage and where no one would have thought it could thrive. But it flowers more freely in sunnier situations and where the soil is not quite so acid.

All winter the tufts of slender foliage, shaped like peach leaves, persist on the *Campanula persicifolia* and in summer the stems as straight and vertical as plumb-lines carry terminal racemes of bowl shaped blossoms. The plants are extraordinarily vigorous and floriferous and in time grow into wide mats. A blue-flowered plant once bore seventy stems and a white variety sixty-five, with flowers measuring an inch and a half across. The double varieties such as *Moerheimei* with white and Telham Beauty with dark violet flowers, when grown from seed will not all come true but a few will reward the grower.

There are many delightful alpine species of campanulas. Most of them require moraine conditions, with a deep, cool root run but a few will do well when shaded by taller plants or in the half shaded border, well at the front.

Campanula carpatica is the most satisfactory of the low perennial bellflowers and does equally well in sun or semi-shade. In the sunny border, at the feet of phloxes it spreads into fat plants with stems and seeds itself freely. The new varieties have larger and more saucer-shaped flowers than the type and are more dramatic in their appeal, yet the parent type with its tangle of thin stems bearing quantities of saucer-shaped flowers is delightful, especially when grown in drifts and with the different colors intermingled.

The stems of the *Campanula carpatica* are smooth and round, the leaves are toothed, have a few hairs on the under surface and are ovate and long-stalked. The petal lobes are shaped like the Mohammedan arch or a baroque bracket, with two curves meeting in a point. Of the new forms, var. Isabel has deep violet-blue flowers, White Star is a white version of Isabel, and Riverslea has dark violet flowers two inches across while Porcelain Blue, one of the best, has flowers in a lovely tone of pale blue. The stems and foliage of *Campanula carpatica* var. *turbinata* are hairy. At one time, this variety was classified as a separate species but once again has been returned to a varietal classification. It is difficult to get the true *turbinata* from seed, but after

Walter Beebe Wilder

Campanula Cecilii

many trials one is likely to succeed.

A low gem with bell-shaped blossoms is *Campanula caespitosa*. The species is exceedingly floriferous and carries grey-blue bell-like flowers dropping to one side of the stems. It was formerly called *pusilla* because of its smallness but perhaps *caespitosa* suits it better because it describes the tuft-like habit of growth.

There are several species similar to *Campanula Poscharskyana* which comes from Dalmatia. The plant is starred with blue flowers and spreads mats sometimes three feet across over rocks and is exceedingly hardy. The stems are round, sometimes hairy and very long. According to Dr. Bailey they grow to two and one-half feet, but are much shorter in my garden. The basal leaves on four-inch petioles are cordate-ovate, and toothed. The blade is one and one-quarter inches across and equal in length. The stem leaves are much smaller and have shorter petioles. The leaves are hairy on the upper surface but sparingly on the under side. The flowers are wide open. "Light Wistaria Violet" and borne in loose racemes along the stems and at their termination. They bloom in late June and last deep into July. The sepals are slender, pointed and less than a third as long as the corolla and with hairs projecting from the margins as also from the veins and ribs of the calyx. The pointed petals overlap at the base. The stigma, the upper half of which is purple, is exserted and bears aloft its three-parted stigma. The stamens project a little in the spaces between the petals. The flowers are one-half inch high and three quarters inch across. There is an elegance and charm about the whole plant and it does well on half shady banks.

There are true annuals among the campanulas too. A particularly pretty species bought as *Campanula Cecilii* is a little plant with roughly hairy stems and leaves. The flowers are carried at the tips of the stems which are much branched and about ten inches high. The leaves have sharp points extending from the margins and are distinguished by three parallel veins. The open bell-flowers are blue and oddly have red lights showing through and appear ruddy when the flowers are held against the light.

Peekskill, N. Y.

The Moutan Tree Peony

JOHN C. WISTER

THERE is no small shrub which has a more interesting or more romantic history than the tree peony, nor is there any which will give an equally spectacular bloom. In spite of all this the tree peony has been but little known in this country, even though it has been cultivated here for at least 130 years.

The longest known tree peony is the Moutan, the name being derived from the Chinese Mow tan, or Muh tang, or Meu tang. The botanists now call it *Paeonia suffruticosa*, although it is much better known as *Paeonia moutan and Paeonia arborea.*

The Moutan tree peony grows wild in the Province of Kansu in China, to a height of five feet. The wild forms, which have both purple and white flowers, have been discovered only comparatively recently. There is practically no literature about them, most of the historical, artistic, horticultural and botanical references being to garden forms originated by the Chinese, some of them nearly 1,500 years ago. Even the most ancient of authors mention it as a flower long cultivated, and it was known to our western civilization from the Chinese designs and poetical references long before there was any real interest in the plants.

The tree peony first reached this country from England some time between 1800 or 1810. Some of the pioneer American nurseries offered tree peonies as early as 1828. There were articles about them in American gardening papers as early as 1836, when Marshall P. Wilder, president of the Massachusetts Horticultural Society, exhibited one hundred cut flowers in fifteen varieties. Prof. Sargent brought in one of the earliest Japanese collections in 1892. The largest public planting today is that in Highland Park, Rochester, where there are many thousands of plants 3 feet or more in height, practically all of them seedlings raised from original imported plants which later died. The largest public collection of named varieties as far as I know, is that at Swarthmore College, which comprises over 200 kinds, mostly of Japanese origin but some of Chinese, European and American growing.

There are several good commercial collections in this country from which plants can be purchased at prices that are reasonable in view of the slowness and difficulty of propagation.

I will tell later something of the history of this beautiful flower because it seems so little known. A few notes on cultivation are first in order. In spite of all that has been written about it, and all the trouble people have had with it, I do not think it should be regarded as a difficult plant to grow in the great geographical section of this country bounded by Boston, Cleveland, Cincinnati and Washington. Further north and further west it may be tender when the thermometer drops to 20 or 30 degrees below zero. Further south it may be unusually subject to injury by spring frosts, because there it may start into early growth in January or February and then be injured by a temperature of 27 or 28 degrees.

But inside of this great geographical rectangle, gardeners ought to try it oftener. It will grow in any reasonably good garden soil and should be planted in September or October and well mulched. It may be wise also to tie up the tops to prevent winter injury by rabbits. The really difficult

time in the life of the tree peony is in early spring, and more specifically the last week in March and the first few weeks in April, in the region of Philadelphia. A few warm days at this time will bring the flower buds out rapidly. Then we are apt to have many nights when the thermometer may drop to 31 or 30. This temperature apparently does not hurt the buds if they are protected from sun the following mornings, but a temperature of below 28 will then ruin the flower buds as well as destroy much foliage. It is generally recommended that a north slope may be safer than a south one because it keeps the plants dormant later, and that there should be evergreen trees to the east to break the early morning sun.

Lime is undoubtedly good for all tree peonies. If the soil is not of the best it may be improved by adding some humus or well rotted cow manure and some wood ashes or bonemeal.

In addition to winter attacks by rabbits, the stems may be hurt occasionally by San Jose scale, which can of course be controlled by a late November spray of miscible oil. A summer danger, particularly after sudden temperature changes or foggy weather is botrytis, which causes a wilting of the stems. Most persons can control this by cutting and burning the affected parts, but some experts recommend a Bordeaux spray as a preventative.

The tree peonies can be propagated by seed which some believe to be the safest and surest method of getting healthy plants, but most people find a good deal of difficulty in getting more than a small percentage of the seed to germinate. Prof. A. P. Saunders has been exceptionally successful with seed, which he stores in a root cellar.

Propagation of named varieties is best done by grafting on herbaceous roots about the second or third week in August. This is not a difficult process for anyone who has had practice in grafting other plants. Even the most skilled propagator, however, does not get as high a percentage of success as he does with apples, pears, roses, etc., probably due not so much to the lack of growth between the stock and cion as to the often discouraging refusal of the stock to send out quickly the needed young feeding roots.

The number of grafts which can be made from a given plant is limited because while the plant is called a tree peony and has woody stems, a large proportion of the new stems do not produce eyes in the leaf axils. Therefore this part of the new growth of the year dies back like an herbaceous stem and cannot be used for propagation. It is probably this habit of the plant which more than anything else will prevent large scale mass production such as is common with roses. For all these reasons gardeners must expect to pay from $3 to $5 or $10 a piece for plants.

Many members of the American Peony Society have done fine work with the tree peony and it is because of them that a few American nurseries have been willing to undertake propagation. It is certainly my hope that these nurseries will have profitable sales, for if they do not they cannot be expected to continue to grow the plants. If the American gardeners refuse to pay a proper price for a plant so difficult and slow to handle, they cannot expect to purchase the tree peony. They will instead more and more have to confine themselves to shrubs of the type of California privet, and plants like zinnias, verbenas and marigolds, which can be produced in enormous numbers very cheaply and quickly.

I shall not write about the beauty

of the flowers of the tree peony, for I assume that every reader of the NATIONAL HORTICULTURAL MAGAZINE will have seen the flowers or at least paintings or photographs of them. Few if any outdoor plants have such a great range of color. They begin with white and go through rose pink, salmon pink, rose red, scarlet, crimson, purple, magenta and various shades of magenta to lilac pink. These latter colors are difficult to use and should be kept by themselves. And of course the most brilliant of the scarlets should not be planted too close to pinks. In the main, however, there need not be much fear of color clashes among well spaced plants and the ample foliage acts as a peacemaker between the various colors.

No one knows how long a given plant may live in this climate, but I personally know of a number which have been grown near Philadelphia for more than a century. Apparently the first hundred years are not the hardest but certainly in the first five or ten years even with the best of care there will be losses higher than those expected with other shrubs. After that there should be less and less difficulty.

The ancient Chinese considered the tree peony an improved form of the common herbaceous peony, possibly because they revered it for its ornamental value, while the herbaceous peony was valued only for its supposed medicinal properties. Apparently some of the old Chinese gardeners believed or pretended that with their gardening skill they had produced the tree peony from the herbaceous peony. In any event they called it the King of Flowers.

As early as the year 750 the Chinese enumerated by name as many as thirty different varieties, with fantastic descriptions in the Chinese manner, such as "Thousand Petaled," etc. Some of the most ancient of these descriptions refer to yellow varieties, but it is now believed that white varieties with prominent yellow stamens were referred to. Perhaps the color was produced by dyes. The true wild yellow tree peony, a separate species, *Paeonia lutea,* was not discovered until 1849 and apparently the ancient Chinese gardeners never did possess it. Some people think that the belief in yellow varieties may have come from the common name of a white variety, which meant "a hundred ounces of gold."

One of the members of the Dutch East India Company who visited China in 1656, wrote an account of the trip and described tea, pineapples and tree peonies, the latter being "like roses but twice as large and without thorns." These stories apparently were not believed and it was not until more than a century later, about 1784, that Sir Joseph Banks, who had seen also certain Chinese drawings, believed that there might be something in them. He asked travelers of the British East India Company to look for the plant. One of them, a doctor by name of Duncan, sent to England a plant which flowered at Kew about 1787. It was named Paeonia Moutan Banksi and was propagated in Europe quite early.

Some of the early tree peonies in England created quite a sensation. One bush at the age of twenty-four years is said to have been 7 feet high and 40 feet in circumference, producing 660 buds. Another plant at fourteen years of age was 5½ feet high and 27 feet around. The plants in the early years of the century sold as high as ten guineas apiece.

Nurseries in England, France and Germany began as early as 1836 to list many varieties with long Latin names. The French plants were reported to have sold as high as 1500 francs.

In the early 19th century importations to England many plants perished. It has been charged that the

Canton merchants deliberately cut off the roots before potting, because they did not want the plants to live. Some even have intimated that the Chinese scalded the seeds before they sold them to foreigners. It seems quite evident from old gardening records that many thousands of plants were exported from China to Europe in the first half of the 19th century. These were supposed to include hundreds of distinct and superior varieties, but when they bloomed they proved to be the same five or six which had been imported between 1780 and 1810. Robert Fortune, who went to Central China in search of plants about 1840, brought back from Chinese gardens the first really desirable varieties. It may be noted that his varieties were the finest ever brought from China, and that apparently there is no record of any new Chinese varieties having been imported since.

There were, of course, disappointments in those days when the so-called black peony bloomed and turned out to be merely a deep purple, and when the recommended wistaria-blue varieties were merely a magenta-lilac, but on the whole the reception given to the plants was enthusiastic. During the 60's and 70's one nursery firm claimed to have 350 varieties while another one advertised 25,000 plants for sale, which is certainly more than there are in America today.

The tree peony was introduced from China into Japan in the 8th century by Korean and Chinese monks, and its name was soon changed or corrupted to Botan, which is still the Japanese word for peony. Old Japanese authors speak of as many as 500 or 1,000 distinct kinds. The records of the Japanese gardens are so reminiscent of certain Chinese stories that it seems likely that the stories, as well as the plants, were imported. Among these stories are references to a variety called a "Thousand Petals," to a black peony and to one for which wealthy people used to pay one hundred ounces of silver.

The first European references to tree peonies in Japan are in 1712, and they are contained in a short note written by the botanist, Kaempfer. Thunberg a little later described it more fully but later travelers omitted any mention of it, which may have been because they thought the varieties they saw were identical with the Chinese varieties which had been sent to Europe. It was not until about 1890 that any tree peony plants were exported from Japan to this country.

By that time publications both in Europe and in this country were quoting remarks from various Japanese gardening manuals about them. These manuals contained often the most minute directions for preparing the soil and such curious statements as that the entire soil must be changed every year or else the plants would stop blooming after five or six years. Some old references insist that the only proper date for transplanting is the autumn equinox or the day before. Even more curious is the statement that the soil must never be tamped with the foot but left loose. Fertilizers such as ashes from burned straw, rape-seed oil-cake and fish are mentioned.

The Japanese seem to have been very much afraid of superfluous moisture or burning sun, and plants had to be protected from each. One old gardening book says that stems have to be scraped each autumn with a spoon of willow wood, and then rubbed with linen "containing a camellia fruit," to give an oil polish. One Japanese author, however, who gives most minute directions for cutting out worms with bamboo needles, later remarks that "a plant attacked with rot often suddenly

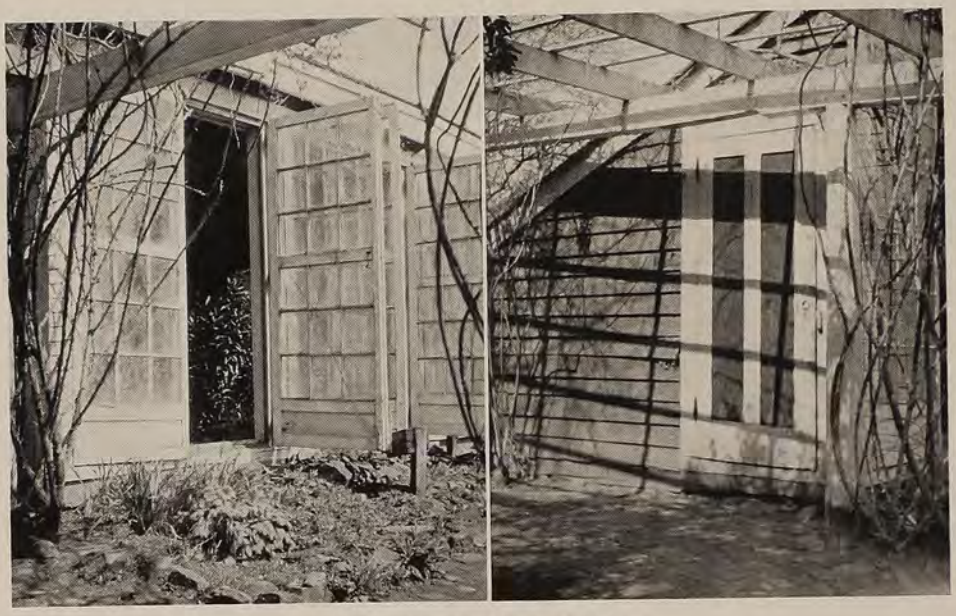
dies," and that "individuals must work these things out for themselves," which if not particularly enlightening certainly is philosophic.

Tree peonies flower in Japan about the first of May. It is common practice to remove two or three of the buds to make the remaining flowers larger. Many of the plants are grown in pots and during blooming period placed under bamboo or straw mats to shade them. It is evident that the Japanese are willing to take much more trouble over their flowers than we are, and that is perhaps why they had developed this particular flower to such a marvelous degree. The poet Tung Po states, "the flower of monarchs should be visited in the morning. He who would see their splendor in the afternoon cannot be considered a good judge."

While preparing my tree peony article for the Manual of the American Peony Society in 1928 I spent many days looking up tree peony literature. When all of the many articles were assembled it was amazing how few of them contained anything whatsoever of value. Most of them were practically copies (without credit) of one or two excellent articles written in the 1820's. All of them travel in a circle of ecstasy about the beauty of the flowers; the hopes of immediate great popularity; the astonishment that the plants are little known; the dangers of spring frost; and the propagation difficulties.

It is curious that it took botanists so long to discover the original wild species in Western China. Hugh Scallan and G. Giraldi first discovered it in their travels between 1890 and 1896, but did not collect any living plants or seeds. In 1910 Purdom found it and sent seeds to England and to the Arnold Arboretum. In 1914 Farrar came across it again and his well known gift for description is amply illustrated when he tells about it in his book, "On the Eaves of the World:" "So I sat at last and rested, gazing down the steep loess tracks to the little village so pleasant-looking in its grove of poplars, till my eye was caught by certain white objects farther along the hillside, that were clearly too big by far to be flowers . . . Through the foaming shallows of the copse I plunged, and soon was holding my breath with growing excitement as I neared my goal, and it became more and more certain that I was setting eyes on Paeonia moutan as a wild plant. The event itself justified enthusiasm but all considerations of botanical geography vanish from one's mind in the first contemplation of that amazing flower, the most overpoweringly superb of hardy shrubs. Here in the brushwood it grew up tall and slender and straight, in two or three unbranching shoots, each one of which carried at the top, elegantly balancing, that single enormous blossom, waved and crimped into the boldest grace of line, of absolute pure white, with featherings of deepest maroon radiating at the base of the petals from the boss of golden fluff at the flower's heart. Above the sere and thorny scrub the snowy beauties poised and hovered, and the breath of them went out on the twilight as sweet as any rose. For a long time I remained in worship and returned downward at last in high contentment. . . ."

I hope that more and more readers of NATIONAL HORTICULTURAL MAGAZINE will want to try this fascinating plant in their own gardens and I can promise them great pleasure if they do so. I will not, however, guarantee immunity from exasperation!



The pit—South and West

The Sun-Heated Pit in Virginia

VIOLET NILES WALKER

THE recent revival of interest in the "Heatless Greenhouse," which has found such adequate expression in Mrs. Taylor's admirable book "Winter Flowers in the Sun Heated Pit" moves me to offer a few further notes on this interesting topic. I say "revival," advisedly, for though the sun-heated pit may be a new discovery in New England, throughout the Upper Middle South generally, and Virginia and North Carolina especially, sun-heated pits have been in use for generations.

Indeed, few of the older country farm houses, and even homes on larger estates, have been without their "greenhouses" as they were called, where, in addition to the storage of vegetables in winter there were grown such cherished potted plants as the house windows could not care for regularly, but which could be brought into the house when in bloom, such as a gardenia or two, always a *Camellia japonica,* calla lilies, etc. It is true that these greenhouses were not developed aesthetically to the high level now reached, partly because explorations into suitable plant material were far more limited in extent, and largely because the utilitarian side had been the primary factor for their construction. They grew out of the underground storage pits used to carry over winter vegetables, together with such potted shrubs as needed protection and a rest during the winter

months, and the date when the use of glass opened up new possibilities in adornment is not at the moment, available.

However, tradition has it that sun-heated pits are known to have been constructed in Piedmont, Virginia, shortly after the Revolution, possibly earlier, and during the early eighteen hundreds they were to be found in almost universal use.

Moreover, after 1861, when life changed for the Southern rural dweller of all ranks, and labor was long to be non-existant for many who had previously enjoyed ease and beauty of life, these little greenhouses had to take the place of any outside garden. The potted plants, which could be nursed during the winter, and moved to strategic spots at the front of the house for summer, constituted, in many cases, the only possibility of flower adornment, so that the almost infinitesimal space had to be carefully balanced between winter and summer bloom.

Yet, simple as they are, the possibilities for development of bloom are greater than is realized at first glance, for although any attempts at regular garden making with such materials as are now successfully used, were unthought of, the list of plants long in use that could stand low temperatures is unexpectedly large, while an enthusiastic flower lover with a "green hand" and the needed patience, could keep a fine display of bloom throughout the winter. Many of these plants still exist, handed down for several generations, such as eighty-year-old lemon verbenas or "citronalis" (*Aloysia citriodora*) a fifty-year old *Camellia japonica*, oleanders thirty-five to forty-five years old, etc., to say nothing of rare tropical plants whose owners knew nothing of their botanical nomenclature, simply cherishing them under pet names, as for instance *Marica*, known only as the "House orchid," *Euphorbia splendens*, the Crown of Thorns, or *Euphorbia pulcherrima*, the Christmas flower, calla lilies, abutilons, impatiens, chrysanthemums, amaryllis, *Asparagus Sprengeri*, zephyranthes, geraniums, Kenilworth Ivy, *Plumbago capensis*, tender ferns, etc., etc., are the plants most comfonly met with, while here and there are still found rare and unlooked for varieties.

These pits are of various construction, some of brick, some of wood, and a few of stone, these latter being largely underground, with only a small portion exposed to the sun. Some were architecturally ambitious, planned to fit into the design of the home ground, others were more purely utilitarian and located unobtrusively, though always convenient of access from the house.

In Madison County, one of Virginia's mountain counties, where the winter temperature drops once in so often to twenty below zero, and almost every year touches zero several times, several of these houses may be found, ranging from seventy-five to one hundred and fifty years in age.

The lean-to type prevails. The position of the glass sash, however, is the reverse of the generally accepted form followed by the modern New England pits. The sloping side faces north, and forms the heavily insulated roof, while the upright side of the lean-to is entirely of glass, facing always south, and giving the greatest possible amount of sun.

At Woodberry Forest, one of the estates developed about 1785 by General William Madison (a brother of the President) from the original grant of land to his grandfather, Ambrose, there is a simple but effective development of the heatless greenhouse or pit.

This pit follows the general type of a lean-to, with the roof sloping to

the north. The outside walls are clapboard, the sloping roof shingled, the inside walls tongue and grooved. There is an eight inch space between the outer and inner walls, with twelve inches between the shingled roof and the inside ceiling, and these are tightly packed with sawdust to provide the insulation. The upright front which faces due south is entirely glass, the four doors being fitted with a double thickness of 10 by 12-inch panes. The entrance door is at the side, with two steps down to the floor level. A four foot walk crosses the little house, and on the right there is a shelf, fourteen inches wide, running across the front, at the base of the windows. On the left are five removable shelves, fifteen inches wide, rising like steps across the back wall to within eighteen inches of the sloping roof. Under these shelves are placed half dormant tender shrubs which only need rest and shelter during the short winter months.

The temperature of this house sometimes falls very low, but where ambition attempted over-tender plants, as was so often the case, an ordinary oil lamp—even a lantern, kept burning on extra cold nights, afforded ample protection. The uses to which the pit can be put are many and varied. It is in constant use for early raising of plants from seeds, for developing lily bulblets from scales, or from stems, or for rooting cuttings. Tender perennials of special value, which are wanted for cuttings for succession, are potted in the fall and placed here, and will continue their bloom far into the winter.

While some of these cool greenhouses have been abandoned, as in one case where a fig bush was allowed to gradually drive out all other occupants, many still exist, and today some are advancing along the aesthetic side in company with general modern horticultural development.

Propagation of Hybrid Azaleas by Means of Greenwood Cuttings in Outdoor Frames

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Some unfortunate misconceptions are prevalent concerning the requirements for propagating and growing azaleas; actually they are more easily handled than is generally supposed. Greenwood cuttings of some species root with exceptional difficulty, but none of these was a parent of the hybrids used in the following experiments. With these exceptions few plants are better suited to quantity production by vegetative means. An outdoor frame of the type described previously in this magazine* is ideal for the rooting of cuttings of many of the hardy evergreen or semi-deciduous Asiatic azaleas and their numerous selected clones, both of collected forms and of hybrids.

Object of the Experiments

Several objectives were sought in this study. Perhaps the primary was a test of the suitability of ordinary cold frames to quantity production of azaleas. Another was a measure of the lasting benefit secured from the use of growth substances on cuttings which are to remain in the frame for long periods; in these, mere speed of rooting might prove an advantage not worth securing. A question has been raised as to the advantage secured from use of growth substances on cuttings which root freely without treatment.

Parentage of the Crosses

The 550 clones used in these experiments were selected from a large number of hybrid seedlings produced by Mr. B. Y. Morrison and associates; these clones were derived from about 100 parent combinations using as a basis not only the type form but also various strains and clonal selections within the section Tsutsuji.

As might be expected, the seedlings included a wide variety of forms and colors, covering a long season of bloom. Some of the seedlings combined the large flowers and varied colors of the forms useful only in the South with the hardiness of both wood and flower buds, characteristic of the types useful in the North. The diversity of the types propagated in these experiments indicates that the results are applicable to a great many commercial forms.

Making and Setting the Cuttings

In 1939, all cuttings were taken, between July 5 and 20, from the young, slightly succulent growth of the current season at the tips of branches. They were trimmed to lengths of about five to six centimeters. Leaves were removed only from the basal portion inserted in the rooting medium.

When the cuttings were set, the necessary sash were removed and the cuttings were inserted in the conventional manner, in small trenches cut with a large sharpened wooden label. A six inch board constituted a moveable foot path, avoiding tramping of the rooting medium. The cuttings were watered freely to settle them firmly and sash and shade were both replaced as soon as possible. Avoidance of undue wilting and drying out at this stage is

*Stoutemyer, V. T. The use of simple outdoor frames for rooting of summer cuttings. Nat. Hort. Mag. Vol. 20: pp. 208. 1941.

important. A slight wilting of the cuttings may occur during the hottest portion of the day during the first week, but if the frames are closed tightly, the cuttings will become turgid each night and suffer no permanent damage.

No ventilation was given until after the cuttings had rooted heavily, which was after six to eight weeks. In early fall, air was admitted to harden the cuttings before the advent of cold weather. The frames were watered as required according to weather conditions. At first, several waterings weekly were necessary, but later one every five or ten days sufficed.

Many of the cuttings inserted in July and August produced several inches of new shoot growth before autumn, particularly those cuttings treated with growth substances. With the approach of winter, ventilation ceased and the sash were kept over the frames during the winter. The lath shades were never lifted from the sash. In the vicinity of Washington, D. C., this was adequate protection for the majority of the varieties, but the terminal buds of the cuttings from certain crosses were injured and the bark cracked below them. The winter of 1939-40 was relatively cold for the locality and some mulching or other protection to the frames would have been advantageous to certain lots of the more tender sorts. The losses were not large in any case, however, and usually the tops of the cuttings grew again from buds below the terminal. Treatments with growth substances did not influence hardiness adversely. None of the crosses involving *Rhododendron obtusum Kaempferi* Wils. showed winter injury, although in many cases the other parent is of partial hardiness. The moisture in the rooting medium was checked at intervals during the winter, but watering was rarely needed.

The Use of Plant Growth Substances

In recent years several synthetic chemicals have been introduced into common use as a means of promoting better rooting of cuttings. These are applied to the cuttings in various ways, including soaking the bases in dilute solutions or applying mixtures of the growth substances in talc to the bases of the cuttings. Indolebutyric acid is the best known and most generally useful of these substances, and is designated in the accompanying tables as IB. Another widely used growth substance is naphthylacetamide, designated as NAD. In these trials, applications were made in talc dust mixtures, which is the form most favored at present. The concentration was usually 4 milligrams of growth substance per gram of talc, although stronger mixtures up to 12 milligrams per gram of talc were also tried to a lesser extent.

Experiments of several workers have demonstrated the value of growth substances when used on cuttings of azaleas, but these experiments were conducted in a propagating green-house rather than in an outdoor frame. Virtually no information regarding the value of growth substances for frame propagation is available, and a consideration of the responses measurable after a relatively long period in the frames seems advisable.

Types of Responses to Growth Substances

The growth substances produced several different responses which occurred both singly and in various combinations. The semi-deciduous azaleas became decidedly more evergreen. Typical examples are shown in Figs. 1 and 2. In many cases considerable shoot growth took place, as may be seen in Fig. 3. The size of the root systems

Fig. 1 (No. 76,093). *Appearance of cuttings in frame on March 1. Cuttings in row 1 were untreated, but those of same clone in row 2 were treated with a mixture of 4 milligrams indolebutyric acid per gram of talc.*

was often increased by the treatment with growth substances. A good example of the increase in heaviness of the root systems is shown in Fig. 4. In still other cases the percentage of rooting was increased, although the excellent rooting of the control lots of most of the varieties did not leave much room for improvement in this respect. The greater vigor of treated cuttings left little doubt of the value of growth substances.

Varietal Differences

Varietal differences caused a striking diversity in the responses to growth substances; for this reason, any attempt to fix an accurate optimal treatment for these azaleas must be based on a particular clonal variety and on standardized propagating conditions. The genetic factors which influence ease or difficulty of rooting in azaleas have not been studied, but apparently they segregate freely in crosses. Thus cuttings taken from plants grown from seed from the same seed pod often showed great diversity of behavior. For instance, cuttings were taken from three sister seedlings of a cross of Vittata Fortunei × Miyagimo may be mentioned. Some of the cuttings of these three selections were left untreated and part were dusted with a mixture of one part of naphthylacetamide to 250 parts of talc by weight. In cuttings from one of the plants no improvement in either the roots or tops was observable. Cuttings from a second selection responded to the treatment largely by a marked increase in the development of foliage of the tops, while the application of the growth substances to cuttings of a third plant resulted in a much heavier development of both roots and tops.

Influence of the Rooting Medium

Rooting was excellent in sand alone, but the foliage was retained on the cuttings much better during the winter in the peat and sand rooting medium. One other advantage in itself justifies use of the sand and peat mixture, however; namely, when the cuttings are removed from the frame, the sand and peat holds together in a ball which is easily handled in transplanting or potting, and there is less shock at transplanting to the usual soil mixture.

The addition of peat to a sand rooting medium modifies the response to growth substances, giving the effect of an increased concentration. This important fact has not been emphasized sufficiently in connection with the use of growth substances. Often a treatment which is highly effective and safe

Fig. 2 (No. 76,115). *Above: Cuttings untreated. Below: Cuttings treated with a mixture of 4 milligrams naphthylacetamide per gram of talc causing increased retention of foliage over the winter.*

Fig. 3 (No. 76,080). *Above: Cuttings untreated. Below: Cuttings treated with a mixture of 4 milligrams of indolebutyric acid per gram of talc producing increased growth of shoots in length.*

Fig. 4 (No. 76,133). *Above: Cuttings untreated. Below: Cuttings treated with a mixture of 4 milligrams of indolebutyric acid per gram of talc causing the production of heavier roots.*

when used with pure sand is injurious when used with a peat and sand mixture. Conversely a treatment which may be effective in a sand and peat rooting medium may have less value with sand. Therefore the composition of the roting medium must be stated in recommendations for the use of growth substances.

Removal of Cuttings

The cuttings were removed in late March of the following year, and transplanted to other outdoor frames with wider spacing or were placed in flats in benches in a cool greenhouse and were moved to a lath house later.

The records taken at this time permitted an evaluation of the influences operating during the period of rooting. Table I summarizes the responses of the clones to various treatments and rooting media. Since cutting material was not abundant enough to permit a clone to be tested under many different conditions, the comparisons in this table merely show trends in behavior. This table indicates the number of clones showing a definitely beneficial response after teratment with growth substance and those in which the response was questionable or absent.

Table I.—Response of Clones to Treatment with Growth Substances

Treatment	Amount per gram of talc	Rooting Medium	Clones Benefited (No.)	Clones Not Benefited (No.)
IB	4 mg/g	Sand	134	60
IB	4 mg/g	Sand & Peat	42	1
NAD	4 mg/g	Sand	13	2
NAD	10 mg/g	Sand	16	5

Although these lots are not strictly comparable because of genetic differences between the various clones, these results suggest that the sand and peat mixture was superior to sand alone and that the peat, either because of some chemical or physical characteristics, aided the action of the growth substance.

The cuttings in the various treatments were graded and separated into various arbitrary classes based on the rooting responses. "Heavy roots" indicates cuttings producing exceptionally large masses of roots forming a ball larger than one and one-half inches in diameter. "Light roots" indicates cuttings with sparse roots not formed in a definite ball. The intermediate class is designated as having "medium roots." All of the cuttings in this group had excellent root systems which would be considered more than adequate for satisfactory growth. These data are shown in Table II.

Since the percentages of rooting were rather high in the untreated lots, the treatments given could not cause large increases in the survival of cuttings, but they usually produced heavier rooting.

Shoot Elongation Due to Treatment with Growth Substance

One of the most striking effects of the use of growth substances on azalea cuttings was the increased growth of shoots of the treated cuttings following rooting. In order to measure this response, the numerically larger lots of cuttings treated with a dust composed of four milligrams of indolebutyric acid per gram of talc were selected at random and measured. Similar measurements were made on the untreated cuttings taken from the same parent plants. In 34 paired lots, each from an individual plant, placed in a rooting medium of mixed peat and sand, the mean length of the untreated cuttings was 6.6 centimeters. The treatment

with growth substance caused an average increase of 2.06 ± .79 centimeters at the time the cuttings were removed from the frame. Since each treated lot of cuttings was paired with an untreated lot from the same plant, Student's method of testing significance may be used. In this test, $t = \frac{2.06}{0.79} = 2.60$. This value of t was significant at the 5 per cent level and was just short of the 1 per cent level of probability. We thus have a reasonable assurance that the differences in growth were due to treatment and not to chance variation.

Measurements were made on 72 typical plants grown from treated and untreated cuttings, arranged in groups after removal from the rooting medium. These were grown in a lath house in a mixture of two parts of leaf mold to one of sand. By mid-summer, plants from treated cuttings had produced nearly 50 per cent more shoots per plant, while the total length of shoots had almost doubled. Figures 5 and 6 show the typical growth produced by June 28 by cuttings removed from the frame and planted in a flat on March 28.

Rooting of Crosses with R. obtusum Kaempferi

Observations were made on cuttings taken from 35 different clones resulting from crosses having *Rhododendron obtusum Kaempferi* as one parent, a form which is often somewhat difficult to root particularly when the new shoot growth starts to harden. In no case did the influence of this parent cause any difficulty in rooting of cuttings of its offspring.

Results of Experiments with Cuttings in 1940

To determine whether the experience gained in 1939 would hold in another season, the studies with many of the same selections were continued during the summer of 1940. The cuttings were placed in both the sand rooting medium and in sand and peat in all those instances where the quantities of cuttings from a clone were adequate for comparison. The same growth substances used in the previous year were tried, but in addition to the concentration of four milligrams of growth substance per gram of talc, mixtures of twelve milligrams were included in these trials. In most cases, twenty cuttings per lot were used.

Table II.—Percentages of Azalea Cuttings Rooting Under Various Treatments

Rooting Medium	Treatment	Number of Cuttings	Rooting Response of Cuttings in Percentages: Total Rooted	Heavy	Medium	Light	Alive but Unrooted
Sand	Control	2,614	91.7	10.4	63.0	18.3	4.7
Sand	IB 4 mg/g	4,070	96.7	25.7	65.0	6.0	1.7
Sand	Control	259	94.2	9.3	73.0	12.0	4.2
Sand	NAD 4 mg/g	373	97.6	22.5	71.3	3.8	2.2
Sand	Control	229	94.8	23.1	60.3	11.4	5.2
Sand	NAD 10 mg/g	395	96.2	44.0	47.6	4.6	1.8
Sand & Peat	Control	546	98.5	26.7	61.4	10.4	1.3
Sand & Peat	IB 4 mg/g	1,160	99.2	59.3	34.6	5.3	0.3

The combined averages of rooting for all of the cuttings are shown in Table III, which includes results with forty-one clones. Since paucity of cuttings precluded giving all of the treatments to each clone, and since the various clones respond differently, the data may not be used for quantitative comparisons between the various treatments. Nevertheless, some important trends

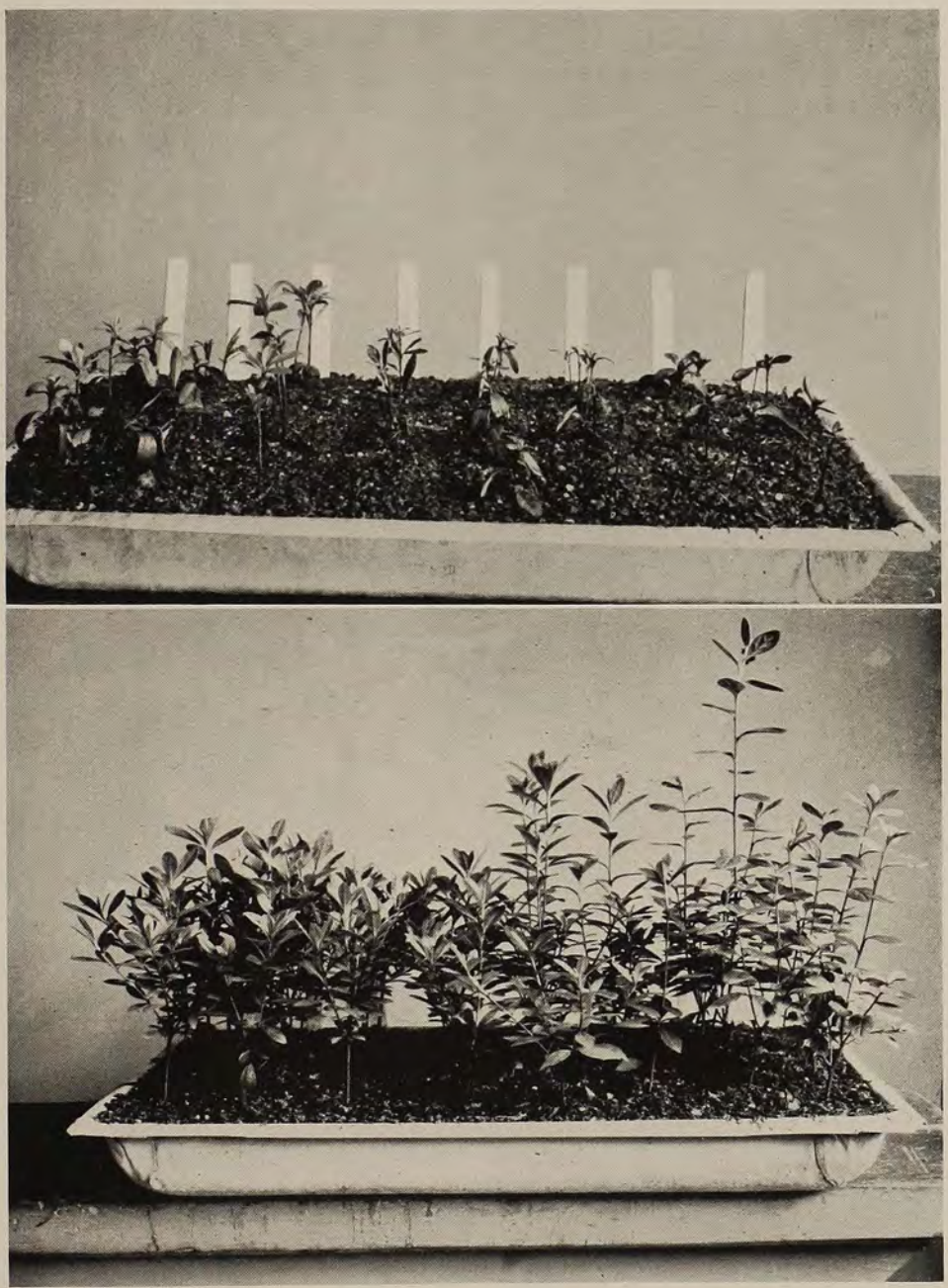


Fig. 5 (No. 76,155). *Treated and untreated cuttings planted in alternate rows in flat of leaf mold and sand in greenhouse on March 28.*

Fig. 6 (No. 77,635). *Shoot growth produced by cuttings after three months in flat. Started in greenhouse on March 28 and moved to lath shed.*

are shown clearly. The rooting was generally heavier with the peat as might be expected. Talc applied to the bases of the cuttings increased rooting in the sand medium but not in the peat and sand mixture. Indolebutyric acid increased both the percentage of rooting and the heaviness in both media. In one instance the results are at variance with those secured the previous year. Application of a mixture of four milligrams of naphthylacetamide per gram of talc produced no injury in 1939, while in 1940 this mixture was unmistakably injurious to cuttings of many of the clones in both rooting media. The cuttings were made on practically the same dates in both years. Apparently, the naphthalene growth substance is more toxic to azalea cuttings than the indole compound. Cuttings of various other species of outdoor plants taken during 1940 were unusually susceptible to injury by excess dosages of growth substance. Possibly some combination of growing conditions in the season of 1940 produced a more tender type of growth than in 1939. This experience demonstrates that the optimal treatment does not remain constant from year to year. For this reason, except possibly with cuttings which root with unusual difficulty, the concentrations should be kept near the lowest which produce satisfactory results.

The response of cuttings to various concentrations of growth substances also depends on the environmental conditions of the parent plant. As a rule, we may state that any factor of growth which produces a more succulent growth reduces the dosage requirement. This is illustrated in experiences with cuttings of the variety, Indica Alba, properly *R. mucronatum* G. Don, made on June 26 and removed on August 5. These cuttings were taken from two stock plants growing in closely adjacent situations, one of which had received frequent watering during the season, while the other grew without any artificial watering. Cuttings from the watered plant were injured severely at the bases by concentrations of growth substances which produced heavy rooting without the slightest injuries on cuttings taken from the unwatered plant.

As in 1939, only a few clones did not root well without the use of growth

TABLE III.—ROOTING OF CUTTINGS OF AZALEAS UNDER VARIOUS TREATMENTS

Rooting Medium	Treatment	Number of Cuttings	Rooting Response of Cuttings in Percentages: Total Rooted	Heavy	Medium	Light	Alive but Unrooted	Dead
Sand	Control	608	61.1	8.4	30.3	22.4	32.7	6.2
Sand	Talc	230	82.6	17.8	48.7	16.1	10.4	7.0
Sand	IB 4 mg/g	520	88.6	45.6	31.7	11.3	5.2	6.2
Sand	IB 12 mg/g	190	88.4	41.6	34.2	12.6	5.8	5.8
Sand	NAD 4 mg/g	137	57.0	9.5	33.6	13.9	15.3	27.7
Sand	NAD 12 mg/g	60	46.6	28.3	8.3	10.0	11.7	41.7
Sand & Peat	Control	351	91.4	41.3	43.3	6.6	4.6	4.0
Sand & Peat	Talc	150	88.6	36.7	44.7	7.2	2.7	8.7
Sand & Peat	IB 4 mg/g	301	97.0	79.0	13.0	5.0	2.7	0.3
Sand & Peat	IB 12 mg/g	88	88.7	75.0	5.0	8.7	1.3	10.0
Sand & Peat	NAD 4 mg/g	80	66.2	20.0	32.5	13.7	6.3	27.5
Sand & Peat	NAD 12 mg/g	60	65.0	43.3	10.0	11.7	5.0	30.0

substance of any kind. At the other extreme a few clones formed roots so readily that all treatments produced inconclusive results. The well known variety of Kurume azalea, Hinodegiri, is an example of a sort which rooted so readily that treatments with growth substance produced no benefits. With the majority of azaleas of types described here, the use of growth substances produced considerable increases in the heaviness of both roots and tops, which would be welcomed by the average propagator. The peat moss and sand rooting medium was superior for cuttings of all the azaleas tested.

Those who have empty greenhouses will find that they may be used advantageously for the rooting of cuttings of azaleas during the summer. If enclosed cases are not available, the cuttings may be placed in open propagating beds, if the ventilation of the house is restricted. Moderately heavy shading should be applied to the glass. Light cheesecloth shade may be used over the cuttings if they appear to need further protection. The walks and benches should be sprinkled frequently to keep up the humidity within the greenhouse.

The outdoor frames require far less attention than a greenhouse and often produce superior results. Another advantage of the frames is that they provide a large amount of storage space for overwintering the cuttings and the operation of potting or transplanting is obviated during the same period. This method truly offers very nearly the ultimate in low cost production of these plants by vegetative means.

Crinums

Forman T. McLean
Oneco, Florida

Giant relatives of the showy and popular amaryllis, the crinums are among the truly popular bulbs in tropical and warm temperate climates, where they will thrive outdoors. The flowers are neither so massive nor so brightly tinted as the amaryllis hybrids, but their profusion of tall, many-flowered umbels of fragrant flowers and their great masses of tropical foliage make them truly superb. Most of them are evergreen, so they do not leave the bare spots in the garden that many bulbous plants do. The largest growing crinums being the most popular in warm climates, and most abundant, they are apt to be the ones tried indoors in the North. When the purchaser of a crinum bulb receives one of these long-necked mammoths, six inches in diameter and about a foot long, he is apt to try to economize space by cramming it into an eight or ten inch pot, and then to expect it to behave like an amaryllis, sending up a proportionately huge flower spike directly out of the bulb, before the leaves develop. The hesitant and tardy pushing out of pale green stubs of leaves is accordingly a disappointment, and if the sprouting plant is not promptly given more commodious quarters, in a large tub fitting to its potential size, the venture is apt to soon terminate in failure and disappointment. Only a few of the smaller crinums are worth while to grow indoors in the North though the large ones will make a grand show, if given the space, warmth and sunlight they require.

The species most frequently seen in southern gardens, along the Gulf, in Florida and California and southward, are two of the real giants. The one most often seen is *Crinum amabile,* with pink flowers, broadly striped livid red through the center of each recurving segment. The great clusters of dark green leaves, often rising three or four feet above the ground and having a spread about twice as great, is lifted a foot or more off the ground by the stout neck of the massive, half-buried bulb. The crimson-purple flower stalk arises from the neck of the bulb at one side of the cluster of leaves, and arches up through them, to lift the giant umbel of flowers well above the foliage. It is at first topped by a large crimson sheath, which bursts and folds back with the opening of the first bloom. After a day or two of warm weather, the full head of eight to a dozen large spidery flowers will be open at once, and will scent the air of the whole garden with their heavy perfume. As the flowers age, the stalk is apt to fall over and lie on the ground, unless held up by a stake or a hoop around the plant. Plants of *amabile* are apt to be seen as single specimens in the lawn or in rows of such single specimens along paths or fence lines. There may be diminutive offshoots at the base, but these seem seldom to reach much size, unless detached and given space to develop alone.

Second in popularity to amabile is the feathery white flowered *Crinum asiaticum,* likewise from tropical Asia. It forms massive clumps of several closely crowded plants, each consisting of a cylindrical bulb, rising a foot or two above the ground, and topped by a cluster of long, broad, wavy pale green leaves. From among these masses of lush foliage there arise at intervals throughout the year, stout green flower

Crinum asiaticum (*upper*)
Crinum amabile (*lower*)

stalks, each topped by a cluster of very narrow petalled white flowers with pale yellow anthers. They more resemble the blooms of a Hymenocallis or an Ismene than a Crinum, and their lemony perfume is milder and less oppressive than that of *amabile*. The plants increase rapidly by division, each usually dividing into two annually; and they also seed freely. Though they resent cold and frost, both *amabile* and *asiaticum* will flower quite well in winter, in mild climates.

Some of the smaller, less imposing crinums may prove more widely useful than these giants. *Crinum zeylanicum* (often miscalled C. Kirkii) is a shorter and paler colored edition of *amabile*,

Crinum × Louis Bosanquet (left)
Crinum Kirkii (?) (right)

the bulb having only a short neck, barely lifting the leaves off the ground, and the large cluster of flowers, on relatively short stalks, are pale pink with deeper pink central stripes and have a strong, refreshing perfume. Its foliage will spread three to five feet, so it needs space, as do most of the crinums. *Crinum fimbriatum,* the milk and wine lily, is a still smaller, more graceful plant from Guiana, the carmine central stripes of the flower segments contrasting with the white ground color. The hybrid *Crinum virgineum,* with its large rose-pink tinted white flowers is another recurved-flowered sort of moderate stature.

Many of the crinums have entirely different flowers, broad petalled trumpets like lilies, or drooping open bells. These include some of the finest white and pale pink sorts. *Crinum giganteum* is a swamp lily of South Africa, and is a fine plant for moist, shaded stream banks, lifting its clusters of drooping white bells from a stemless clump of broad, lanceolate leaves in late fall or early winter, and often blooming again in early summer. Its spicy-scented, large blooms are greenish on the outside, nearly pure white within, and are graceful and interesting rather than gigantic. *Crinum campanulatum* has small clumps of greyish green leaves, and three-inch bell shaped white flowers, striped deep pink. There are many trumpet-shaped hybrid crinums also, in white and light pink colors. Pale pink Louis Bosanquet, deeper pink J. C. Harvey, and deep shell pink Ellen Bosanquet are all dainty flowers. But the finest of the lot is probably Crinum Powelli, a pink or white flowered hybrid between the South African *C. Moorei* and *C. longiflorum.* Both parents are nearly hardy in temperate climates with moderate mulching, and the hybrid seems still more amenable to outdoor culture in the North. Its long-necked bulbs may be sunk 2½ or 3 feet in well drained soil, covered in winter with a deep mulch to keep out frost, and had to bloom in midsummer as far North as New York or New Jersey.

Primula Malacoides

W. C. Blasdale

The extraordinary wealth of Yunnan, the southwestern province of China, in species of *Primula* of unusual horticultural merit, began to be made known to the western world toward the end of the nineteenth century. About 1883 M. l'Abbe Delavay, a missionary of the Catholic faith stationed in Indo-China, who had acquired an interest in plants, made his way into virgin territory by following up the great canyon of the Mekong to the Tali Valley, located in the southern part of the province on a 6,000 foot plateau, which includes a great lake and an important city of the same name. His collections made in this region were sent to Professor Franchet of Paris, who found them to contain twenty-nine new *Primulas*, which he named and described.

Among these species Franchet recognized one which resembled in its habit of growth a European plant known as *Erodium malacoides* and, presumably sorely pressed to find names for so many new species, he named and published this one in 1886 as *Primula malacoides*. It is to be regretted that so charming a plant has been burdened with so cumbersome a name, which gives no suggestion of the peculiarities with which it is associated save possibly to those which are familiar with the little-known species of Erodium.

Seeds of *P. malacoides* collected by Delavay and sent to France failed to germinate, and it was not until 1908 that a second collection, made by George Forrest for the firm of A. K. Bulley, reached England. From these, flowering plants were readily grown and the seed from them widely distributed. Forrest found the species in abundance in cultivated fields and waste places, even within the walls of the city of Tali. Later collectors have shown that it is rather widely distributed and appears, in a number of forms, in the valley of the Yangtse and as far west as Eastern Burma.

The effect of cultivation on this species has been phenomenal as to changes in its habit of growth, in the form, size, and color of the flowers, and in the rapidity with which these changes have been brought about. This is to be attributed in part to the ease and speed with which it can be brought to the flowering stage and in part to a certain predisposition to undergo variation under cultivation. Within a few years of its introduction notes describing and picturing improvement in its attractiveness began to appear in British horticultural magazines. Some of these improvements were achieved by amateurs; more by systematically planned experiments of such firms as Sutton and Sons and Carter Brothers, which are still being continued. On the continent similar work was carried on by Vilmorin of Paris and later by state-supported institutes at Oranienburg and Weihenstephan near Munich and Wädenswil near Zurich. The results of the activities of these agencies became known through the series of named varieties or strains which they put on the market, but only the last named published a detailed statement of the procedures used, which involved growing 40,000 plants. It is a very important contribution to both the practice and theory of plant breeding.

By 1918 English breeders had developed many varieties of real merit and had shown the latent potentialities of the species. On the continent serious experimentation, based on the results of English breeders did not begin un-

til about 1925, largely as a result of a desire to find an acceptable substitute for *Primula obconica,* whose rash-engendering properties had threatened legislation against its sale in both Holland and Germany. Incidentally it should be noted that the discomfort arising from the cultivation of *Primula obconica* has been greatly exaggerated; in spite of inquiries extending over many years I have learned of only one individual who suffered from it, although it is one of the most popular house plants in California. An unexpected and gratifying by-product of the campaign against it has been the perfection of a second species which is fully its equal in beauty and variability and is even more easily grown.

The English, German, and Swiss breeders have had slightly different ideals in mind and, working independently, have created new strains, which, though concerned with essentially the same variants, have given to their respective productions certain peculiarities which often betray their origin. Many of these strains lack stability, and growers of them find no difficulty in selecting plants which seem to possess, sometimes as the result of wishful thinking, superior features and though the improvement may be a slight one the temptation to put them on the market under a new name is hard to resist. As a result we have a truly formidable list of varieties, few of which have been adequately described and most of which rapidly disappear from trade lists.

A bird's-eye view of the varieties of *Primula malacoides* now available can be attained most easily by taking up in succession the nature and order of development of the six major groups of characters which enter into their composition. I regret that my experience in growing them has been too limited to deal with the subject to my entire satisfaction.

The original species is distinguished by a crown of leaves, most of which are held erect or ascending, up to the time at which the flower begins to wither. Each leaf consists of an ovate-oblong blade, which is slightly lobed and toothed, sustained by a petiole of about twice its length. During the earlier years cultivation had but little effect except an increase in the size and cordateness of the blade and the English breeders gave little attention to the foliage features. With the great increase in the abundance and size of the flowers it began to be recognized, especially on the continent, that the foliage was no longer adequate for a proper balance between the two and, especially at Wädenswil, strains with longer petioles and more perfectly formed blades were emphasized. A more distinctive feature, developed at the same institution, was the perfection of a "gracilis" strain in which the single crown was split up into a number of closely associated crowns, yielding a larger mass of foliage associated with many scapes of moderate size whose flowers opened more nearly at the same time.

A more deep-seated change arose about 1924 in the "gigantea" type. In it the blades are larger, rounded rather than ovate, only slightly longer than broad, clearly cordate and somewhat undulate, and the petioles are decidedly shorter. Further, the leaves were fewer and held more nearly horizontal, forming a rosette-like crown. Fig. 1 illustrates these differences. Accompanying this type of gigantea foliage are more sturdy scapes, larger flowers, and an increase in the size of the seeds and the pollen grains. These peculiarities are associated with the phenomena of "tetraploidy," that is an increase in the number of chomosomes from 18 (diploid) to 36 (tetraploid). It is now evident that gigantea forms arise in nearly all strains as the result of cultivation

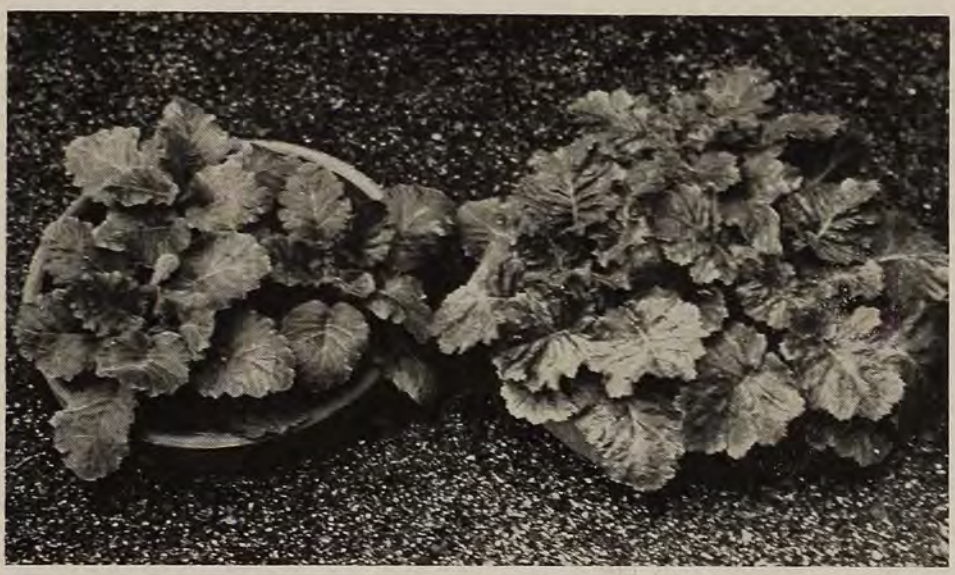


Fig. 1. *The six-inch pot on the left contains plants of the small-leaved variety, Fairie Jewel; that on the right of the gigantea-leaved variety, Peter Pan. Both pots were planted on the same date, given identical treatment and photographed 58 days after sowing the seed.*

in an overall average ratio of about one plant out of 200. Although somewhat unstable they are peculiar to many standard varieties such as Sutton's Dwarf Eclipse (1926) and Carter's Peter Pan (1939).

In the original species the scapes arise very early in the development of seedling plants; they reach a height of from six to fourteen inches and are so weak that only mutual support prevents many of them from falling over. Continued cultivation has delayed the appearance of the scapes, reduced their number per crown to a half or a third but increased their thickness by the factor two or three. This process began as early as 1912; its progress is shown in such varieties as Rose Queen (Dennison, 1912), Princess Mary (Carter, 1928), Duchess of Kent (Carter, 1936). Associated changes were decided decreases in the length of the scape and contraction of the distances between the successive whorls. Further differences have arisen in the lengths of the pedicels which support the individual flowers, usually in the direction of greater uniformity in the lengths of the pedicels of the different whorls, resulting in a compact cylindrical rather than a pyramidal inflorescence. These changes, in their extreme form yield so-called "dwarfs," which the uninitiated would find it difficult to associate with the name *Primula malacoides*.

The native species bears regular flowers in which the flattened corolla-limb is divided almost to its point of attachment with the corolla-tube, into five wedge-shaped segments whose edges are separated by an appreciable interval whose two corners are but slightly rounded off, and whose upper edges are clearly cleft at the centers. The net result is a pattern (See Fig. 2) suggesting that of a rose window. The first effects of cultivation were to

Fig. 2. *Illustrating differences in the size and form of the corolla of different varieties. Upper row from left to right* (1) *original species, (0.5 in. in diameter),* (2) *Princess Mary,* (3) *Atropurpurea (just opened),* (4) *Atropurpurea (several days after opening),* (5) *Baby Rose,* (6) *Snowflake. Lower row from left to right* (1) *unknown variety,* (2) *True Rose (fimbriated),* (3) *Peter Pan (with overlapping segments),* (4) *Peter Pan (with crinkled edge),* (5) *Roselle (with hose-in-hose doubling),* (6) *Roselle (with normal doubling).*

broaden the segments until most of the gaps between them were closed and to round off the corners still more, imparting to the corolla a star-shaped pattern, although each of the five points are bifid and their sides curved. An additional increase in the width of the corolla segments caused them to overlap yielding a disk-like or wheel-like pattern with sometimes a suggestion of doubling.

Another change which began to appear about 1924 was a slight and irregular indentation of the corolla edge, sometimes developing into a lace-like rim on its periphery, a change usually associated with the term "fimbriation," often an attractive feature. In this species it is associated with a similar change in the lobes of the calyx. Occasionally also the edge of the corolla is slightly crinkled.

Finally, the process of doubling began to appear as early as 1912 and by 1919 double forms of white, lilac, and mauve varieties (W. and J. Brown) were available. As in the Chinese primrose doubling is due to the development of outgrowths from the connective tissue at the tips of the anthers. In the initial stage it yields only a narrow fragment of a new petal which stands erect. In the more perfected stage these fragments are more numerous, larger, ascending rather than erect; in still other forms they produce a nearly perfect second corolla, parallel to the first and yielding a hose-in-hose effect.

Franchet's description gives the size of the flowers as ten to twelve millimeters, that is, about half an inch. Through cultivation flowers of double this size were soon produced and many of the modern varieties yield flowers 1.25 inch in diameter. More detailed information as to form and size of modern varieties is presented in Fig. 2.

The color of the original species is described in terms of a variety of shades and varies in nature. In all of them a pink rather than a lavender element predominates and cultivation has intensified the red rather than the blue component. White forms, which occur in

Fig. 3. *Variety True Rose. Two plants, just beginning to flower, in a six-inch pot.*

Fig. 4. *Variety Baby Rose. One plant in a five-inch pot.*

Fig. 5. *Variety Atropurpurea. Two plants in a five-inch pot.*

nature, appeared in 1912 (Sutton), a deep pink in 1914 (James Box), a rose in 1915 (Rose Queen of Dennison), and a lavender in 1917 (Sutton's Eclipse). Later the pink became a good carmine and almost crimson, sometimes with a tinge of salmon. Little success has attended the attempt to isolate and intensify the blue of the lavender varieties.

Normally a narrow and poorly defined band of a lighter color surrounds the corolla tube. With cultivation this became broader and began to acquire a yellow or greenish-yellow color. In time it became deep yellow or bronze and assumed the form of a clearly defined, five-pointed star, as in Carter's Golden Eye (1925) and the varieties Atrosanguinea and Radio.

In this, as in at least half of the species of *Primula*, a white powder is found on the under surfaces of the leaves, the calyx-lobes, and the upper portions of the scapes. This secretion is exuded by small gland-tipped hairs, and is composed of the substance known to chemists as flavone, associated with smaller amounts of wax-like substances. It has no function but adds appreciably to the attractiveness of the scapes and unopened buds. Cultivation has developed, on the one hand a few varieties, such as Atrosanguinea, in which farina is lacking, and on the other hand varieties in which the amount has been increased.

The items from the five sets of variables listed above may be associated in an almost infinite series of combinations, of which the named varieties now available are illustrations. The results already achieved by breeders indicate that new combinations of these items, representing desirable additions to our list of varieties, can be brought about. Further, we are here dealing with a species which has been stimulated to a point at which many mutations have arisen and new ones, possessing still other desirable features, are to be anticipated. Hybridization with other species has had no part in the development of the varieties of *Primula malacoides*.

To those interested in the theory of plant breeding it might be of interest to state that the development of this ornamental presents no unusual features. Most of the changes brought about are due to somatic variations, that is to changes originating in the vegetative tissues of the species, which have been segregated and intensified by cultivation and selection. The gigantea forms, on the contrary, are the result of changes in the sex-cells. The change from diploid to tetraploid germ-cells is associated with easily recognizable changes in both the foliage and inflorescence. It should be noted however that the gigantea strains are more variable and less easily stabilized than the diploid forms.

I recall the thrill inspired by my first sight of a blooming plant of *Primula malacoides*. It was in Boston in the spring of 1914. During the course of the following season I experienced further satisfaction in discovering how easily it could be grown in an unheated greenhouse, and how readily it adapted itself to the winter and spring peculiarities of the California climate. This adaptability was soon recognized by florists in the central and southern parts of the State, and it is now accepted as one of our best winter-flowering bedding plants. A survey of seed catalogues, originating in many parts of the United States, indicates that it is widely grown, but apparently as a greenhouse rather than a bedding plant. Since I have known it to endure six degrees of frost for five successive nights without injury I am of the belief that it could be used more widely for out-of-door culture.

Fig. 6. *Variety, Peter Pan. One plant in a four-inch pot.*

Fig. 7. *Variety, Roselle. One plant in a five-inch pot.*

The varieties of which seed and plants are most largely sold do not do full justice to the potentialities of the species. In this part of the State at least local florists can supply white or pink or lavender flowered plants but they know nothing of the finer named varieties. This is to be regretted even when they are to be grown in masses in the open border or beds; it is most unfortunate when specimen plants are the objective.

The ideal conditions for greenhouse culture are almost identical with those accorded *Primula obconica,* except that the necessary pre-flowering period can be shortened by four weeks. The essential qualifications are a daily average temperature not exceeding fifty degrees and the maintenance of a steady but not rapid rate of growth up to the flowering stage. These conditions should insure a crown of foliage large enough to fill a five-inch pot and a mass of flowers, whose beauty of form and brilliancy of color are fully the equal of *Primula obconica.* One should not expect to grow such plants out of doors, even under the favorable winter climate of California, unless some protection, especially against long continued rains, is provided. A frame which ensures plenty of light and air satisfies these requirements almost as well as a greenhouse. The accompanying photographs of plants representing five varieties were grown in a frame with a glass roof but only slightly protected on its sides by adjacent buildings. Fig. 3 represents two plants of True Rose in a six-inch pot just beginning to flower. The foliage is abundant, the scapes tall and very stout, and the deep rose flowers of large size. Fig. 4 represents a single plant of Baby Rose in a five-inch pot. This variety is of the large crowned "gracilis" type, with an abundance of short scapes of deep pink, star-shaped flowers of moderate size. It begins to flower early and has a long blooming period. Fig. 5. My stock of this was derived from a florist who knew nothing of its name or origin, but its characters agree with those associated with the variety Atropurpurea. Its long scapes, star-shaped flowers with a conspicuous yellow eye suggest the variety Princess Mary. The pronounced change in the color of the flowers from deep pink to crimson, approaching maroon, is very distinctive. Fig. 6 represents a plant of Peter Pan in a four-inch pot, a dwarf variety although of the gigantea class. In this specimen the central three-whorled scape reaches a height of six inches; the large disk-shaped flowers are beautiful crimson pink with a light yellow eye. Plants grown from the same package of seed produced both longer and shorter scapes and fimbriated or crinkled corollas, whose color varied from crimson to pink. It is the most charming of all the varieties I have grown. Fig. 7 represents a plant whose seed was purchased under the name Roselle. I cannot see wherein it differs from the variety Fairie Jewel, and both are probably the same as the older variety Exquisite. The distinguishing feature is the double flowers which include rose pink shades of varying intensity, sometimes with a suggestion of a salmon tinge. It is one of the best of the double varieties, over which I am not especially enthusiastic.

Rhododendron Notes

CLEMENT GRAY BOWERS, *Editor*

AMONG gardeners, both amateur and otherwise, one often hears comment regarding trueness to type of plants. Such comment is perhaps most frequent among those who are growing plants of the genus *Rhododendron* and arises, first, from the fact that none of us, in this country, are too familiar with the host of new forms we hear about and, secondly, because the plants themselves, for reasons which I shall cite, are prone to be variable anyway. Having mentioned this matter on numerous occasions, I realize that my present words may be repetitious, but the continued interest of growers seems to warrant reiteration. At the present moment I have on my desk three letters regarding this phenomenon, one asking about the status of the azalea known as "Louisa Hunnewell," another about the failure of *R. Albrechtii* seedlings to conform to descriptions in the literature, and a third regarding the behavior of certain characters in crosses of *R. Kaempferi*. All of these questions are related to the subject in hand, in one way or another.

Suppose you are raising seedlings of a Chinese species, and when these plants bloom they differ in color, hardiness or some other quality from the official description in the botanical books. The first thing to do is to examine the source of seeds. If the seeds came directly from the wild station in China and were reliably labeled (which might not necessarily be the case), you can be fairly sure that the non-conforming seedlings are natural variants of the species; to be such, however, they must conform to the specific type in most respects and still be more like the given species than any other. If they depart too far away from the type to be reasonable variations—and by this you will do well to measure the extent of variation among our common native species—then they should certainly not be called by the specific name, because they are not of that species, but are either hybrids or members of some other group instead. I do not know how often natural hybrids occur within the genus in China, but occasionally one pops up in this country among our native sorts, so I suspect that hybridity is not unknown among the wild plants of the genus throughout the world. In other genera wild hybrids sometimes occur in quantity, as, for instance, among the irises of the Mississippi delta, where what were first thought to be more than 60 new species turned out to be considerably less species, with a large preponderance of hybrid forms growing among them.

But your seeds may not have come from the wild at all. If coming from some English garden, or a commercial seed house, or having occurred among a collection of plants in an arboretum or any other place where different species are grown in neighboring situations, you have no assurance that your seeds are not the result of crosses between the mother plant and pollen brought to it from foreign species by the bees. Although not all the species will inter-cross, there is always danger of crossing whenever two or more kinds of rhododendrons or azaleas are blooming at the same time. In fact, many are unwilling to set seed to their own pollen and actually require the pollen of another individual plant, either of their own species or something else, in order to set seed at all. Although it is claimed by Rothschild

and other breeders that flowers, once hand-pollinated, need no protection because the stigmas are too covered by pollen to accept any more, I have made laboratory tests in which it has been well demonstrated that several kinds of pollen can act at one and the same time. Although I am willing to accept Rothschild's view for most practical purposes, I insist that a good deal of care is necessary, both before and after the act of hand-pollination, to prevent pollen-bearing insects from contaminating the unprotected flower with unwanted pollen of other sorts if any related species are in bloom at the same time. When I make pollinations, I choose to bag the flowers before the buds open, and keep them under bags until the petals fall and there is no possible danger of contamination. So much for seedlings of definite species which do not come true to type.

Now, as to the status of a plant like the azalea, "Louisa Hunnewell." I am asked if the arboreta and certain other reliable gardens do not have correctly labeled specimens of this plant. Here is its history, as nearly as I can obtain it: In 1913 Mr. T. D. Hatfield of the Hunnewell Estate, Wellesley, Mass., raised seedlings of a cross he made between the pure species *R. japonicum* and *R. molle*. Plants first flowered in 1917 and were named "Miss Louisa Hunnewell." Whether or not this name was applied to one particular plant or to the whole batch is not known by me. Perhaps this first batch of F_1 seedlings were remarkably uniform in character, as sometimes happens. In any event, some plants, at least, were excellent and deserving of a varietal name. Some years later Mr. Hatfield showed me an excellent example of the original cross, and this *individual* I would regard as an authentic "Louisa Hunnewell." The facts are, however, that seeds taken from the original plant or plants were raised as "Louisa Hunnewell," and came to be disseminated, along with their seedling descendants, in the nursery trade under this name, in the same manner in which a true-breeding species might be multiplied by seed. Now the original plant, as I have said, was a hybrid, and the seedlings of the second and subsequent generations have exhibited all the variation of their hybrid origin, many being quite unlike the original "Louisa Hunnewell" that I saw. Not breeding true, the seedlings have no right to bear the varietal name. There is some evidence that these plants were, by certain authors, regarded as a "cultigen group" or race, to which the name "Louisa Hunnewell" was employed collectively. But, in my opinion, this was unjustified, since the plants were not sufficiently distinct from other *japonicum* × *molle* hybrids (already identified as "Mollis Hybrids" and classed as a cultigen group under *R. Kosterianum*) to constitute a group by themselves. Hence, I would regard as authentic "Louisa Hunnewell" only one definite individual, of Hatfield's original F_1 production, and such of its offspring as have been produced by vegetative means, to wit: scions, grafts, layers or cuttings of the original plant, and not seedlings therefrom. Whether or not the original plant, or any of its vegetative progeny, are in existence, I do not know. If not, then the variety "Louisa Hunnewell," has passed into extinction so far as I am concerned, regardless of what the labels in the botanical gardens may say. In other words, I regard azalea "Louisa Hunnewell" as a clone, but its seedlings merely unnamed *japonicum* × *molle* seedlings.

The same situation is doubtless true of certain hybrid groups in England, such as *R. kewense*, which have to be subdivided into clones in order to distinguish the varying individuals result-

ing from crosses between identical species. Variation of plants within a species is so great that when two species are crossed repeatedly, using different individuals within those species as parents, it does not follow that identical results can be expected. Indeed, there is every evidence that the use of carefully chosen individuals as parents is highly advantageous over run-of-the-mill breeding stock. While there is considerable advantage in having a good collective name to cover a group or race of distinct character and hybrid origin, such as the Ghent Hybrid azaleas or the Catawba rhododendrons, the narrowing down of a cultigen group to designate merely a few hybrid seedlings which do not breed true, as in the group of seedling azaleas popularly sold as "Louisa Hunnewell," is to be deplored, since the progeny does not retain the quality or character of the original nor does it constitute a new race. It is my conjecture that the custom of applying a single name to include several variant individuals of a given species cross has been considerably overworked in recent years by the British hybridists, and it is to be hoped that the practice will not extend further in this country.

Of course, there are other things beside race or variety which cause plants to vary in certain ways. So far as we can tell, the effect of ordinary environmental factors, such as soil, site and climate, does not produce permanent or heritable changes in the plant, although minor fluctuations in color, height or habit may be expected. For instance, the color of Camp's scarlet azalea which I collected on a Kentucky mountain-top, at 4,000 feet, is not the same brilliant shade of vermillion in my garden as in the higher altitude. Shade, soil and season sometimes alter flower colors considerably on given plants. But the effect is not permanent. Treatment with X-ray or colchicine, on the other hand, will sometimes induce permanent genetic changes in plants, many of which, however, are of a degenerative nature and not horticulturally desirable.

Several well known species of azaleas are exceedingly variable in genetical character at all times. The so-called "Indian azaleas" of the greenhouse, are frequently producing somatic mutations, or "sports," in which one branch of a plant ordinarily pink will start producing red flowers, or vice-versa. Variegation versus solid color is another quite common character which appears unstable.

The Obtusum sub-series, to which these Indian azaleas and many other Japanese and Chinese azaleas belong, seem packed full of variation as well as hybridity, and have presented classification difficulties to the taxonomic botanists who have tried to straighten out the species. In several instances, notably the Yodogawa Azalea and *R. mucronatum* (the clone commonly called "Indica Alba"), forms which seem obviously to be artificial or unnatural have been doing duty as "type species." The layman, therefore, should not be too willing to accept, as natural or "true breeding" races, all of the forms which have been set up as species by the botanists. For, while the latter have done their best to keep things straight, there are many discrepancies, particularly among those groups just alluded to, where classification is difficult, due to long years of cultivation with its accumulated cargo of hybridity and selective breeding.

Rhododendron Kaempferi, as has been noted before, is exceedingly variable by inherent nature. In many respects, it is so closely related to *R. obtusum* that no perceptible line of demarcation between the two species can be found. And yet, the extremes are

Claude Hope

[See page 212]

Rhododendron intricatum
(Natural size)

so great that *R. Kaempferi* and *R. obtusum,* at opposite ends of the scale, seem to stand alone as distinctive species. Other related species, too, seem to grade into *R. Kaempferi.* Consequently, what the botanists say about these forms must necessarily be quite arbitrary. But this does not alter the character of the plants or reduce their horticultural value. It merely emphasizes the importance of the individual, rather than the species, as the most horticulturally significant factor. In general, we hear too much about species of rhododendron and azalea, and not enough about certain noteworthy

individuals which occur within those species. This is particularly true of such groups as the azaleas of the Obtusum sub-series, in which individuals are easily multiplied by propagation from cuttings. But in most other groups of the genus *Rhododendron* which we grow in America, vegetative propagation is slow and difficult, while seedling production is satisfactory and exceedingly fascinating for amateurs. And, since seedlings are prone to be variable in character and often hybrid in origin, we may continue to expect a good deal of confusion in their classification. To assist in keeping the record straight, let us all be precise in our methods and our records, knowing the parentage of our seedlings and recognizing the fact that two parents, and not just one, is the usual rule and that the resulting progeny may resemble either or neither or both when hybridity is involved.

C. G. B.

The transmission of characters between *Rhododendron haematodes*, Franch; and *Rhododendron Fortunei*, Lindl.

An interesting life long study is opened to any person interested in the "transmission of characters" of the species and varieties of rhododendrons. All questions, doubts, and answers, in carefully conducted trustworthy investigations along the lines of hybridization, sterility, chromosomes, and genetics, are an advancement to science.

When it is considered that there are well over a thousand species of rhododendrons scattered throughout the continents of the world, from Asia, Europe, America, and even one in Australia, also that many of them are being brought together on the Pacific Coast of America for the first time, and that hybridization in its infancy has commenced, any discoveries along this line should be recorded for future generations. It is a well known fact on the American continent that the Pacific Coast area, near the 28-29 degree line, is "par excellence," for the growing of many more species and varieties of rhododendrons, than can be grown in the east, south, or west of this continent; owing to its milder climate, ranging on an average, minimum 25 degrees, F., to maximum 90 degrees, and with these extremes only for a day or so. The abundant rains (and sometimes snow), from October, November, to March, April, with a congenial winter climate, the partial shade or sun according to variety, and the landscape effect with a dark green background of this coniferous region, by a backing of conifers, or deciduous native flowering trees and shrubs, with its protective influences from strong winds, will eventually make this a New World mecca for rhododendrons.

In addition to this there are in some instances, areas of peat land in the Northwest, which, with some work, can be fully utilized in the growing of rhododendrons. Several excellent hybrids have arisen, some of which have received Awards of Merit, where the *Neriiflorum* series has been hybridized with some other good species. With these ideas in mind, the following paper is submitted of a genetical hybridization between a species, *R. haematodes*, that come from the province of Yunnan, China, which is near Burma, growing at an altitude of 11,000-12,000 ft.; and a species, *R. Fortunei*, from the province of Chekiang, China, and nearer to Japan, growing at an altitude of 3,000 ft. So that there is a distance of approximately one thousand miles between these 2 species in their natural habitat. The series and subseries involved in this fertilization are:

The characters of inheritance from one or the other parent are given. Only the characters showing wide deviation are included in the comparison, the many other characters of the 2 parents and its offsring differentiating to such a small degree that they are not given.

I assume that *R. haematodes* was the ♀, as it is the usual practice in scientific plant breeding to put the female first.

The analyst of
Rhododendron haematodes; ×
Rhododendron Fortunei.

Rhododendron haematodes, in its native habitat grows to a height of up to 10 ft., although the plant when cultivated is usually 3-4 ft. high.

Rhododendron Fortunei, in its habitat is usually a shrub of 10-12 ft. although some authorities give it as 15 to 20 feet. The hybrid plant is about 3 ft., but as it is a young plant no mature height at present can be given.

1. In the young shoots both parents transmitted their characters, but the glandular feature of *R. Fortunei* was predominant over the glandular character of *R. haematodes.*

2. The influence upon the size of the leaves show that the hybrid had the leaves intermediate between the parents.

3. The smoothness of the leaf beneath, of *R. Fortunei* was impressed, with the indumentum of *R. haematodes* suppressed, but in other characters it was not.

4. The influence of *R. Fortunei* in increasing the number of veins is well seen, and approaches its character more so than the other parent.

5. The character of woolly tomentose petiole of *R. haematodes* is evident, and the peculiarity is that while in No. 3 this character was lost, here it is regained and holds its companion character in subjection.

6. In this case the glandular character of *R. Fortunei* is dominant; this parent apparently transmits this character freely.

7. The influence of *R. Fortunei* in the glandular sepals is noted, and the red coloring of this organ is broken up, somewhat, but a small percentage is evident in the bright red.

8. The crimson pigment of the flower of *R. haematodes* is vanished or latent, and can only be seen as an influx where the lobes are edged a deeper pink.

9. The influence of *R. Fortunei* gives the offspring an extra petal.

10. The crimson pigment of the nectar pouches now reasserts itself, and is plainly evident as scarlet crimson lines, the few or 0 yellowish green spots of *R. Fortunei* is held in subjection.

11. Again the influence of *R. Fortunei* asserts itself in giving the offspring a few extra stamens.

12. The glandular character of *R. Fortunei* overcomes the glabrous or floccose character of the other parent.

13. The glandular character is again strong, while the tomentose is vacant.

14. The influence of *R. Fortunei* is faintly seen here as increasing the number of chambers. The number of chambers of *R. haematodes* was indefinite, but related species contain 5-6 and very rarely 8.

15. The seed capsule of *R. haematodes* has given up its character and the oblong capsule is dominant.

HERBERT PRUVEY,
Horticulturist
Seattle, Wash.

(For tabular analysis of characters see next page.)

Rhododendron haematodes; Series *Neriiflorum.*
Subseries: *Haematodes.*

Rhododendron Fortunei; Series *Fortunei.*
Subseries: *Fortunei.*

		Characters of *R. haematodes.*	Characters of *R. Fortunei.*
1.	young shoots:	woolly tomentose, not glandular.	glandular.
2.	leaves:	intermediate, 1¾"-3⅛" long × ¾"-1⅛" wide.	2¾"-7" long × 3¼" wide.
3.	leaves below:	densely rufous woolly tomentose.	glabrous to the eye.
4.	veins:	7-10.	14-16.
5.	petiole:	woolly tomentose.	glabrous.
6.	pedicel:	woolly to bristly.	very glandular.
7.	sepals:	not glandular, usually red.	glandular, green & red.
8.	corolla:	crimson, not fragrant.	pale flesh pink, fragrant.
9.	petals:	5-6.	6-7-8.
10.	spots	with 5 nectar pouches at base.	yellowish green, few at base, or 0.
11.	stamens:	10-12.	14-(15 sometimes).
12.	style:	glabrous or floccose.	all glandular.
13.	ovary:	tomentose or glandular.	all glandular.
14.	chambers:		7-8 up to 10.
15.	capsule:	short, thick, straight.	oblong, up to 1¼" × ⅜"-⅝".

Characters of
Rhododendron haematodes, Franch; × *Rhododendron Fortunei,* Lindl.

1.	young shoots:	woolly tomentose, glandular.
2.	leaves:	4½" long × 1½" wide or less.
3.	leaves below:	glabrous to the eye.
4.	veins:	12-14.
5.	petiole:	woolly tomentose.
6.	pedicel:	very glandular.
7.	sepals:	glandular.
8.	corolla:	pinky white, edged pink.
9.	petals:	7-rarely 5.
10.	spots	scarlet crimson and in lines.
11.	stamens:	10-14.
12.	style:	all glandular.
13.	ovary:	all glandular.
14.	chambers:	8.
15.	capsule:	thick, oblong.

Claude Hope

[See page 212]

Rhododendron impeditum
(Natural size)

Two Chinese Rhododendrons [See pages 207 and 211.]

For the gardener whose sole acquaintance with the species of this note is based upon a few plants purchased for his rock garden, it may be difficult to imagine an alpine meadow dotted with these plants or bordered with tangled masses like mountain chaparral. Both belong to the Lapponicum Series of rhododendrons that takes its name from *R. lapponicum* Wahlenb. native to "Greenland; Lapland; Scandinavia; N. Canada." This last species, with *R. nivale* Hook. f. from "Sikkim; Bhutan" and *R. parvifolium* Adams from "E. Siberia" are the only species of the series not from China, essentially Szechwan and Yunnan Provinces.

In the Notes from the Royal Botanic Garden, Edinburgh (Vol. IX, No. XLIV-XLV) Prof. Bayley Balfour published a long paper "New Species of Rhododendron" with considerable attention to this series. While Professor Balfour was more concerned with taxonomic matters, he points out (p. 301) the diversity of growth, the carpet-forming species, the tall shrubs, the dwarf-cushions and the like, while he points out (p. 302) the diversification of soil and natural situation, boggy peaty pasture, open peaty pasture, open marshy pasture, and so on, all bits to excite and aggravate the gardener.

Rhododendron impeditum Balf. f. & W. W. Sm. described by the younger Professor Balfour and the then Prof. William Wright Smith from the Edinburgh Botanic Garden in 1916 (l.c., p. 239-40). Their data is found translated and carried over in Millais Rhododendrons (Vol. I, p. 189). He repeats two Forrest notes — "Dwarf matted shrub of 6-12 ins. Flowers light purplish-blue. On open peaty pastures. * * * * June 1910." "Shrub 6-20 ins. Flowers deep purplish-blue, throat white. Forming symmetrical rounded tufts on alpine meadows. * * * * June 1910." The first referred to a collection on the eastern flank, the second to a collection on the western flank of the Likiang Range, Yunnan, between 12,000-16,000 feet.

According to Millais, this plant was often in trade then (1917) under the name *R. fastigiatum*. Various descriptive points are given to differentiate them, only one of which need be cited here, that the corolla in *R. fastigiatum* is lepidote ( ) outside, but in this species is not.

Its "nearest ally" was supposed to be *R. scintillans* Balf. f. et W. W. Sm. which has "oblong leaves narrowed to the ends, not elliptic or rounded" as in our species.

Rhododendron intricatum Franch. was based on material collected by Soulié who first collected it "in the neighborhood of Tongolo, Western Szech'wan." "Wilson found it in grasslands around Tachien-lu in the same district at an elevation of 3,600-5,000 m." Forrest found it "on dry ledges and clefts of limestone cliffs on the eastern flank of the Lichiang Range, N. W. Yunnan." "He describes it as a spreading dwarf shrub 2-3 ft. high. Flowers lavender-blue, base of corolla white." (Millais, l.c.)

For propagation, half ripe wood in July is used to make cuttings. These are given a sandy-peat medium with gentle bottom heat. Possibly some modification might be needed for our American temperatures. Although no British gardening dictum need be taken too literally, it is wise to recall that Millais says that this species likes a cool temperature and moist air.

The plants which furnished the photographs were sent from Mr. Carl Starker, Jennings Lodge, Oregon, for that purpose. Recalling our torrid summers and the fate of other high alpine plants, one is almost tempted

to return them.

Mrs. Starker contributes the following notes from their joint experience:

R. impeditum is a small, compact plant, with many small branches which all tend to turn upward, so that it is almost flat on top. It is very slow growing; our fifteen year old plant is nine inches high and has a spread of fifteen inches. The dark green, leathery leaves are about three-eighths of an inch long and about half as wide. They are somewhat hoary on the back, and the new leaves, too, have a grayish cast, so that the general effect of the plant is a sort of grayish green.

The bright blue-lavender flowers are produced in clusters of four. They are an open funnel shape, and are quite large in comparison to the size of the plant. They are produced in such profusion on the crowded shoots that the whole plant is a mass of color. *R. impeditum* will bloom when quite small. We have a plant which is less than three inches high which has ten blossom clusters.

R. intricatum is very similar to *R. impeditum* except for its size. With us, plants of the same age as those of *impeditum* are almost exactly twice as large; our fifteen year old plant is eighteen inches high and has a spread of thirty inches. It has much the same habit of growth, but, as it is taller with longer branches, it makes a more upright bush. It branches well from the base, but, as all the shoots tend to turn upward, the lower parts of the branches are quite visible. The leaves, which are about twice as large as those of *impeditum*, are not quite so heavy in texture, and are rather bronzy on the back, so that the general color tone of the plant is russet, or brownish green.

The bright orchid-lavender flowers are produced in terminal clusters of six, which makes up for the fact that they are not quite so large as those of *impeditum*. They appear in great quantities, quite covering the plant. They appear off and on during the summer and fall, after the main blooming season is over.

The Olympicans

The Olympicans, Inc., whose sole object is a state development and beautification are creating much enthusiasm to propagate, plant, protect and publicize the Rhododendron—the Washington State Flower. They sponsor annual Rhododendron Tours, conduct an annual Rhododendron Congress and stimulate Community Rhododendron plantings.

The Washington State Federation of Garden Clubs, Business and Professional Women's Clubs, Congress of Parents and Teachers and many other prominent clubs are supporting the Olympicans in their efforts to popularize the rhododendrons.

At the first community Rhododendron planting, December 8, 1939, at Montesano, there was launched a drive to encourage and assist in the planting of 100,000 rhododendrons, each year, for 10 years.

Governor Martin's proclamation declared December 5, Rhododendron planting day for the State of Washington. Over 1,000 rhododendrons were planted in Olympia, on the Capitol grounds, private homes and other public places in answer to the Governor's request. Throughout the state citizens, clubs and other organizations likewise responded.

The 4th Annual Rhododendron Tour will be held May 18 this year. Citizens, garden club members and other groups are making arrangements to make this annual Rhododendron Tour, and enjoy this unique State Flower exhibition.

W. L. Fulmer

Seattle, Wash.

Rock Garden Notes

ROBERT C. MONCURE, *Editor*

ROCK gardening in America is humming with activity. Every horticultural publication has its section or articles on this subject. Almost every issue carries at least a note about rock garden plants, construction or maintenance. More and better rock gardens are being built. Each year knowledge about the culture and propagation or rock garden plants increases. Is this rosy outlook marred by troubles and problems? Frankly, I think we must admit that here and there it is. So let us sit down at a mythical round-table and seriously discuss the long-range outlook and problems of rock gardening in America.

The first rock gardens on this continent were built many decades ago. Carl Cramer, in his book *The Hudson*, mentions "rockwork covered with alpine plants" in Andrew Jackson Downing's garden built over one hundred years ago near Newburgh, New York. However, this form of gardening was not enthusiastically taken up until recently. During the boom years of the twenties and into the early thirties the number of rock gardens increased almost unbelievably. This was the period of numerous "rock piles" and "dog cemeteries." Probably these names are apt, but why criticise gardeners who did not, at that time, possess the knowledge to build better? These "atrocities" gave pleasure to their owners and were an important step forward; they were, I believe, merely the outward signs of healthy growing pains. The selection of plant materials in these gardens was poor and very limited. This was probably due to the relatively small number of rock garden plants "in the trade," the lower cost of "easy" kinds, and inexperience on the part of the gardeners. Since then these difficulties have become less acute.

In spite of these advances we probably agree that trustworthy information about some phases of rock gardening is rather scarce. No doubt, we have all learned through experience that many of the oft-repeated rules, at first regarded as gospel truths, are not even shadows of the truth when put into practice. Of course, reliable information is accumulating, but it is often hidden by the mass of fallacies and half truths. We might well ask "What can be done to correct this situation?" To me, there is only one answer—direct the future of rock gardening in America through a systematic, far-sighted program.

Rock gardening, I believe, after passing through a period of over popularity, is becoming more stable. Its problems are now clearer and can be more easily attacked. These problems, it seems to me, may be readily divided into four major types—(1) those concerning the propagation and culture of rock garden plants; (2) those dealing with the landscape aspect of rock gardening, which include placement, construction, and proper use of plants; (3) those connected with nomenclature; and (4) those relating to education, that is, getting reliable information about rock gardening to the public.

The method of attack which seems to me to offer the most hope for success calls for *very close cooperation between organized groups of gardeners and scientific institutions engaged in horticultural research*. This type of program has been carried on with marked success by persons interested in roses and other garden plants through their respective societies. Gar-

den clubs and horticultural societies could more actively sponsor and support scientific investigations of rock gardening problems at the various universities and botanic gardens capable of carrying on such work. The technical knowledge, skill, and equipment at these institutions will make possible a more *rapid* and *orderly* progress than will the undirected efforts of individuals no matter how sincerely and vigorously they attack the problems. Such a program would not detract from the pleasures of rock gardening. In fact, it would remove many of the "headaches" which now plague us and certainly would open this type of gardening to many more persons in addition to vastly increasing the kinds of plants grown. When all is said and done, the basic idea behind having plant scientists study horticultural problems is to add to the knowledge of man and thereby have him benefit both culturally and practically.

But do not assume that the individual rock gardener is unimportant. He has been responsible for almost all progress to date and we look to him for further advancement. His findings, when carefully recorded in detail are valuable to both scientific workers and other gardeners. The results obtained by many individuals under varied garden conditions serve as a check on the practices recommended by scientific investigators and frequently make improvements in such practices possible. And, in the last analysis, we can agree that scientific workers only carry out wishes and supply the needs of the individuals.

The horticultural organizations and scientific institutions each play an important part in disseminating facts to gardeners. Through printed material, radio talks and lectures, they act as clearing houses for rock gardening information. As *reliable* data are obtained, they could greatly expand their work. But it is essential that research precede release of information! A great deal has been written and spoken about rock gardening, much, you will probably agree, had been better left unsaid. This misinformation is unfortunate, especially so because we know it was unintentionally given as the truth. Failure of rock gardeners to realize the complexity of the problems with which they were dealing apparently caused the difficulty. Pointing out some of the fundamentals which must be kept in mind if these problems are to be solved will serve to illustrate this complexity.

Since these problems are directly concerned with the physiology of plants and soil relationships, all work must necessarily be approached through these two fields of study, if the fundamental problems are to be understood and solved. Rock garden plants are not unique; their internal processes and responses are governed by the same laws as other plants. This vitally important point is often unknowingly overlooked by non-technically trained gardeners who apparently believe that rock garden plants are subject to their own peculiar set of laws. Many physical and chemical phenomena occur in all green plants. The more important are: food manufacture (photosynthesis); energy release (respiration); movement of materials (translocation); and loss of water to the atmosphere (transpiration). The external, atmospheric environment exerts an influence mainly through light, temperature, humidity, and gases (carbon dioxide and oxygen); the soil mostly through its nutrients, water, oxygen, hydrogen ion concentration (pH), and temperature. All these factors, and others, plus the inherent tendencies of the plant regulate its growth. *The essential point to remember is that changing any one of these factors almost invariably causes*

a change in one or more of the others. Many persons frequently do not recognize this effect and draw false conclusions from their work. For example, a plant which has been growing poorly in a wet soil is moved to a dry soil; it responds with greatly improved growth. In such cases, dryness of the soil is often given as the cause of the improved growth. This may or may not be the truth. It is possible that the reason the plant grows better in a dry soil is because of improved aeration, since dry soils always contain more air than wet ones. If aeriation is the important factor, growing the plant in moist but well aerated soil would produce the best possible growth.

Gardeners know well the confusion and attendant evils that exist in the nomenclature of cultivated plants as a whole. The names of rock garden plants are no exception. The proper classification of these plants is difficult because there are few horticultural books which deal with the subject accurately. Troubles beset the gardener even if he locates the names. He has no assurance that they are botanically correct. Authors, in most cases, are forced to use the names supplied by seedsmen and nurserymen, who, frequently not being botanists, apply incorrect names to the plants. The solution of this problem is not easy, but it can be attained, I am sure, if an orderly program is undertaken. Botanists at institutions where the study of nomenclature can be carried on could be encouraged, or better still, sponsored, to investigate problems in this field. Their work is, of necessity, slow and painstaking, but correct names will gradually supplant the incorrect ones in common use, provided the horticultural world feels its responsibility in accepting and using correct nomenclature. The essential fact is—something must be done immediately! The longer the present situation continues, the more difficult it will be to correct it.

The problems involving the landscape aspect of rock gardening, are, in a sense, not so complicated as those already mentioned. Here, artistic taste is concerned. Persons knowing little about growing plants can construct a rock garden that is artistically correct. Determining the suitability of a rock garden for a given location, for example, and matters involving rock garden design are aesthetic questions. Solutions to these questions are as varied as the tastes of the individuals solving them. What, then, is the problem? It is, I believe, the need for more widespread publication of specific information already available about where and how to build rock gardens. Even though artistic qualities are difficult to define, a methodical approach to the problem is possible. A clear understanding of the fundamentals by gardeners, I feel, would help the situation. But great advancement in the knowledge of rock garden construction can hardly be expected immediately; much work has yet to be done in solving the problems of rock garden plant culture. Since rock garden construction is so intimately connected with these cultural problems, its progress will necessarily be delayed until greater knowledge in this field has accumulated.

So far, only the multitude of problems and difficulties which surround rock gardening have been mentioned. You might well ask, "Has anything of value been accomplished?" Indeed, we can all see that much has been accomplished! As rock gardening on this continent gained in popularity and was taken up by more and more persons, a great many valuable facts were discovered. Although this was the period of unorganized effort, of trial and error, it contributed much towards the development of rock gardening. Now the

movement has been organized and the American Rock Garden Society is its official head. This organization, along with the American Horticultural Society and many others, if given the wholehearted support of rock gardeners, can through directing the future of rock gardening make rapid strides in overcoming the many existing difficulties.

WARREN C. WILSON.
Ithaca, N. Y.

Chrysogonum

According to Small's Flora of the Eastern United States there are two species of *Chrysogonum*. We who have collected these plants in different sections believe we have three. That however, is not the point. If you have never grown any of them you are missing a mighty good plant for shady rock gardens or woodland plantings.

Chrysogonum australe is found in the foothills and sprawls close to the ground. The foliage is rough and rather course but remains green all winter. The flowers which are carried on stems some six inches high are yellow composites. As they spread by runners one soon has a nice colony and as a ground cover they are useful. In spring the many yellow flowers are apt to be one of the best attractions in your garden.

C. virginica grows further east and is more erect. This plant gets to be about ten inches high and instead of creeping, it makes large mats which have the same bright yellow blooms. They flower the most of the summer. This plant acts more as a biennial with me but as it seeds readily one is always ready with new plants.

ANNIE LEE R. CLEMENT
Asheville, N. C.

Potentilla tridentata

When we think of potentillas we usually think of sprawly coarse plants which as a rule have yellow flowers. These need not be passed by as some horticultural developments have a place in the garden. It is for one of our natives that I want to put in a word. Without any "fuss or feathers" we have a delightful plant which is found on our high mountains, yet does well in almost any situation. *Potentilla tridentata* is one of the best all-round plants I have ever handled. Its a woody shrub some six inches high. The dark glossy leaves are attractive at all times. The small white flowers bloom over a long period. In the rock garden it's ideal, as a few plants in between the stones soon make a compact mat of green. They spread by underground runners as well as seed.

In nature they cling to rock crevices in the most windswept places or grow down in the tundra of the "balds." The soil is often very lean but acid. In cultivation they seem to grow under any condition.

To use them where they can be seen at night is ideal as the five petaled flowers look like stars in the grass.

ANNIE LEE R. CLEMENT
Asheville, N. C.

Cactus and Other Succulents

Echinocactus Grusonii Hildmann.

In *The Cactaceæ* (Vol. III p. 167—seq.) the authors quote freely from a correspondent Mr. E. C. Rost "a private grower of cacti in southern California." Quoting their quotation one reads, "In my garden these plants bloom at irregular intervals for a period of about six months each year. The first flower of the current season opened on May 15 and one is in blossom today, while a number of well-developed buds will open unless killed by unseasonable frosts. The hour of the day that the flower opens varies according to the time that the warm rays of the sun reach the plant. Just as soon, however, as the sunlight leaves the flower, it closes whether it be in the forenoon or afternoon. Clouds obscuring the sun for more than a few minutes or any artificial shade will cause the flowers to close. If conditions are suitable the flowers will open for three consecutive days, closing each night. The perianth-segments of the flower separate very little.

"New plants can easily be obtained either by means of seeds or from cuttings. I have been very successful in obtaining cuttings by slicing off the top of a large plant which causes it to bud freely, and these buds can be cut off and will develop into good plants."

All of this is rather far removed from the potted specimens here, one a resident for three years, the other a newly arrived seedling plant. Here, alas, far from the climate and sunlight of its preferred homes, the plant does not come into its own, for the translucent spines give only a faint suggestion of their yellow color and possibly half of their proper dimensions. The plant remains, however, an otherwise happy resident, very little out of its normal size and showing the rich green color which in nature makes so fine a foil for its spines.

Being interested in the historical side of all introduced plants, it is interesting to go back to Hildmann's original diagnosis and note in "Monatsschrift für Kakteenkunde" of March 1890 and sense the enthusiasm of the writer or to read Meyer's even more enthusiastic notes in the same journal in 1915—"From the transparent bright golden spines of well cultivated specimens, there is almost a radiance that is not equalled in intensity in other species known so far." He mentions the difficulties of smoke and dust in city cultures and the need of protection of the green color from too intense sunlight. Other writers particularly E. Hesse (Gartenwelt Aug. 1897) stress the difficulties that beset the cultivation of the plant in pot cultures abroad, especially to offset the changes in growth habit that result from modified living conditions.

Since we in the East must grow the species in pots, we must be content with half a loaf and find our pleasure in the fine form of the plant, the translucent spines, the vivid green.

A word of warning comes from California that seedlings must be kept dry in winter since then they are most susceptible to fungus attack if kept too wet.

A Book or Two

Winter Flowers in the Sun-Heated Pit. Kathryn S. Taylor and Edith W. Gregg. Charles Scribner's Sons, New York, 1941. 294 pages and plan. Illustrated. $3.50.

This excellent and timely book covers a wider field than its title indicates. It contains an interesting introductory chapter on the origin and development of the greenhouse, implemented by a carefully compiled bibliography, and in addition to the main theme of pit houses, covers the construction and management of a lean-to greenhouse and a comparison of advantages and disadvantages from actual experience, and the pitfalls to be avoided. While it does not pretend to be exhaustive of the subject and is based on the authors' actual experience, it adequately covers the subject and is interestingly written, as well as conveniently and systematically arranged for frequent use, with a wealth of detail.

The first section is devoted to the construction, cost, management and general gardening procedure in greenhouse and pit, and the second section to plants for pit and greenhouse: necessary tools, culture and propagation, woody and herbaceous plants, cacti and succulents, hardy bulbs, bulbous, cormous and tuberous-rooted plants. There then follows a tabular list of plants for pit and greenhouse, with data arranged by columns as to type, season, whether for greenhouse or pit, soil moisture, propagation, and any special treatment. Last of all there is a drawing clearly showing the construction details of a pit greenhouse. Likewise the book is amply illustrated.

This book, from the standpoint of pit and cool greenhouse, is especially timely in view of the threatened shortage of fuel in the coming winter. It should be a great help to beginners and even some help to old timers. A wide range of plant materials can be grown in a sun-heated pit, such as azaleas, camellias, alpine plants, begonias, early seedlings for flower border and vegetable garden, etc., and a pit is economical and easy to operate. The pit especially offers, I believe, an economical and satisfactory solution in this country of the problem of wintering, propagating and growing of difficult rock and alpine plants; at least in those portions where it is very difficult to grow them. The reviewer has seen a modification of the pit here described in use in central New York State for the successful wintering of choice alpines under difficult conditions and temperatures of twenty or more degrees below zero.

Mrs. Taylor is chairman of the horticultural committee of the National Council of State Garden Clubs, Chairman of the New England Section of the American Rock Garden Society, as well as instructor in the Lowthorpe School of Landscape Architecture at Groton, Massachusetts. Mrs. Gregg is one of the early pioneers in the art of pit gardening.

R. C. M.

Hortus Second. Compiled by L. H. Bailey and Ethel Zoe Bailey. The Macmillan Company, New York, 1941. 777 pages. $12.00.

It is perhaps an admission of childishness to write that a dictionary is always a delight, no matter what the quest. This book, so much enlarged and rewritten over last time, holds the same sort of casual pleasure, even for the person who is not searching. For the latter, the present edition, which is not a reprint, offers much that is new.

There are murmurings among the botanists that all is not as it should be in some cases; there are remarks from the gardeners in others, but what could be expected that might suit each camp equally well?

For the present reviewer the most interesting inclusion is the apparently greater number of tropical and sub-tropical species that are making their appearance, which should delight the winter gardener in the South. The latter will not find keys, since they are not within the purpose of the book, but he will find many bits of general information that should serve as guides and make his searching shorter. Like its predecessor, this is indispensable.

Correction

Note to the Editor

DEAR MR. MORRISON:

The pictures of tropical water lilies in the recent issue of THE NATIONAL HORTICULTURAL MAGAZINE were very interesting. However, I note that the first one is named Alice Tricker. In 1939 on a visit to Mr. Tricker's, I first saw this lily. It was obviously Mrs. G. H. Pring, unchanged and unimproved. I spoke to Mr. Tricker about it, and told him if I ever saw the lily published under the name Alice Tricker, I would feel obliged to write the organization responsible for the publication.

He admitted that it was a selection from Mrs. G. H. Pring, and the time I took specimens from both varieties for comparison. The bulletin describing Mrs. Pring (reprint from our Annals) was in Mr. Tricker's library and was used for the final identification. Alice Tricker checked in every detail as a typical Mrs. G. H. Pring, and I had thought I had convinced Mr. Tricker.

Since this is the first time I have seen the lily published as Alice Tricker, I hope you will make this correction in your next issue. With best personal regards and good wishes, I am

Very truly yours,
(signed) G. H. PRING.

GHP/RL
Copy to Mr. Tricker.

Editor's Note. Alice Tricker was first listed in the Tricker catalogue in 1936, was illustrated there in 1937 and has appeared there every year since. The root was purchased, as were all the others, in the open market, this root from Tricker's. B. Y. M.

The Gardener's Pocketbook

Symplocos tinctoria L'Her.

Many a gardener has started on a trail of discovery from what he has seen or half seen from a train window. In mid-March, en route to Wilmington, N. C., the view from such a window was made interesting by the sight of an unfamiliar flowering shrub in the mixture of willow, aronia and the like. As it grew in what appeared to be cut over woodland, it made a many-stemmed bush not over ten feet high with the stiff, upward-angled branches, leafless apparently and clothed with creamy-white flowers that obviously studded the stalks.

Inquiry at Wilmington gave no clue, so an afternoon trip in the direction of Castle Hayne made collection possible, and in turn an identification through the kindness of Doctor McVaugh. This it seems is the sweet-leaf (*Symplocos tinctoria*), an American representative of a large family that is more largely represented in warmer climates than our own.

The only exotic species cultivated here is *S. paniculata* which has been figured in our magazine.

In Hough's useful handbook of Trees of the United States and Canada (p. 381) there are several quotable passages.

"The sweet leaf is a small tree occasionally attaining the height of 30 or 40 feet with rather wide open top of slender branches and a trunk 8 or 10 inches in diameter. *** Loves shade of forest. *** Each branchlet is upturned and bears near its tip a cluster of drooping leaves. Its identity can at once be detected by the segmented pith of its branchlets and the agreeable somewhat sweetish flavor of its leaves. It inhabits rich well-drained but moist soils of the forest of the South Atlantic and Gulf States, from the coast to an altitude of about 3,000 feet on the Allegheny Mountains and is an especially pleasing object in early spring when its old leaves of the preceding season are withering and falling to the ground. *** The leaves and fruit yield a yellow dye and the bitter roots have tonic properties."

No word is mentioned as to the color of the fruits though they are pictured and described here and elsewhere as dry drupe-like fruits! Doubtless, if they had been blue as in *S. paniculata,* some mention would have been made.

No notes have been discovered so far to suggest that the plant has been grown in gardens. One certainly wonders if the rather pale blossoming would warrant its inclusion. (The effect is not much more intense than that of spice bush in the North.) Nor have we discovered any note to suggest how far north it might grow beyond the reported natural range.

From the Midwest Horticultural Society:

Pæonia suffruticosa

While on one of the much-touted garden tours this spring I was pleasantly

surprised to notice some unusual plants in the small park in Holland, Michigan. One of the most interesting parts of this park was a bed of tree peonies, *Pæonia suffruticosa*, in full bloom. While this particular planting seemed to contain only a white and a red there are many other varieties that can be obtained. In the Chicago area at least these beautiful plants need to be retarded so that the capricious spring weather does not cause the buds to blast. Certainly anyone visiting the town of Holland should see this park and observe the tree peonies as well as the other unusual plants in it.

ELDRED E. GREEN

Verbena canadense

One of the relatively newer rock plants in this region is *Verbena canadense*. This verbena is truly perennial and is as near an everbloomer as it possibly can be. While it is native somewhat south of this area it is perfectly hardy and tends to naturalize itself. The color of the round flower clusters is typically reddish-purple but some forms run into a blue and others into cerise. The plant creeps for considerable distance and tends to root at the joints. The flowers are produced from early summer until hard frosts occur. As a spreading border plant or a trailer in a rockery this verbena has many good qualities. Outside of the color, which may be considered as magenta by some, the only objection could be to the spreading habit and tenaciousness of the plant. In some places this might cause crowding of weaker plants in the vicinity.

ELDRED E. GREEN

Larix laricina

One of the causes for wonder in this region is the seeming neglect of worthwhile plants by later generations. In many old plantings especially around farm homes and in small towns a number of beautiful and interesting plants can be seen that are not noticed as young plants in newer plantings. One of these is the common larch or tamarack.

The larch is generally restricted to the sphagnum bogs which are scattered throughout the region. Here the plants occur in a peat soil that is saturated at all times. However, as some of the leading plant ecologists have pointed out this plant is a swamp dweller mainly because most plants will not grow there and it can. In other places it must compete with many other plants and is usually killed out while still a seedling.

When planted in good soil the larch develops into a symmetrical spire with the light green foliage covering the slightly drooping branches. These plants as seen along the country roads never fail to attract much attention. Generally these large specimens are not recognized as being the same plant that is seen in the bogs.

The culture of the larch is not difficult. A good soil that is either moderately moist or wet is suitable. Plants are best handled with a burlapped ball but probably bare root transplanting when the needles have ben shed for the winter would not be unduly risky. Small plants are quite attractive although lacking the droopiness of the old specimens.

Liriodendron tulipifera

One of the less common native trees that has been called to notice during the last few years has been the tulip tree, Liriodendron tulipifera. This has been called magnolia in the several instances that I have heard of. Although of the magnolia family the peculiar two lobes and square end of the leaf readily

distinguish it from the true magnolias with oval leaves.

The flowers of the tulip tree are not very showy and are usually produced only on large trees. As an ornamental lawn tree the globular shape and the beautiful foliage should place this in the foreground as something different and attractive. Being a native of the woodland borders this tree will stand full sun or partial shade. It is indifferent as to soil but does best on a loam. Like other members of the magnolia group this should be transplanted in the spring, preferably burlapped.

ELDRED E. GREEN

Elliottia racemosa [See page 224]

Elliottia racemosa!

Few names among plants conjure up so much interest. To those who have seen it in bloom, it brings to mind visions of entrancing beauty.

It first became known over one hundred and twenty years ago. How difficult it is to understand why it has not been more sought after, why indeed the horticultural world has not been clamoring for it in its gardens these many years.

Elliottia racemosa was found in southern Georgia by Stephen Elliott who included its description in the first volume of his well known and extremely interesting "A Sketch of the Botany of South Carolina and Georgia," which was published in 1821.

Encroachments of civilization in its natural territory wiped out many of the original stands and for many years *Elliottia* was thought to be on the verge of extinction.

In 1933 when Dr. Small published his famous "Manual of the southeastern Flora," he said of *Elliottia*, "One of the rarest of American shrubs, known to have been found at but seven or eight stations, and at some of these now exterminated." This together with the fact that it was believed to be sterile to its own pollen, gave much anxiety as to its future to botanists and lovers of native shrubs. An excellent and interesting article on this phase of *Elliottia's* existence appeared in that splendid botanical magazine, *Bartonia, No. 9,* by H. Trudell.

In recent years Dr. E. T. Wherry has found new stations of *Elliottia* and now we realize that although far from plentiful, it is not quite so rare a shrub as it was supposed to be. However, its range is a very restricted one and its habitat should be preserved before it is too late, else this fine plant may be lost forever.

Elliottia racemosa is a deciduous shrub, rarely a small tree. In habit of growth it greatly resembles other members of the ericaceous tribe, such as vacciniums and azaleas. Recently in the Bulletin of Popular Information sent out by the Arnold Arboretum, there appeared an interesting and enlightening article by W. A. Knight describing *Elliottia* in its Georgia home. He mentions an Elliottia tree, "more than 30 feet tall with a trunk measuring 5 inches in diameter three feet from the ground." This one grew in moist soil. Sometimes, however, it makes its home in dry, sandy ground and then reaches only the dimensions of a shrub. Coming from Southeastern Georgia, it is of course a coastal plain shrub and so requires the soil conditions demanded by coastal plain plants.

Strangely enough for a member of this family the flowers of *Elliottia* have petals instead of the usual corolla. Botanists say that this marks it as a very primitive heath. The extremely lovely racemes of flowers are of a most unusual appearance and stand up well above the foliage forming a bush of conspicuous beauty. The pure white blossoms are composed of narrow petals, the showy stamens tipped with yel-

Josephine de N. Henry

[See page 223]

Elliottia racemosa at Gladwyne

Josephine de N. Henry

Elliottia racemosa, in fruit at Gladwyne. It has been considered sterile to its own pollen but no other Elliottia was growing near this plant.

low pollen protrude far beyond the petals and so does the style which curves in graceful fashion. The handsome flowers last long in bloom. The oblong deep green leaves are usually about three to five inches long and form a fine background for the handsome pure white flowers. In autumn the foliage remains on the plants for a longer period than is usual for deciduous shrubs and turns to splendid shades of crimson before it falls.

In 1936 a few living specimens of *Elliottia* were sent to me to add to my collection of American plants at Gladwyne. After several years of observation I believe this beautiful shrub may be tried with hope of success from Long Island and Philadelphia southward. In specially favorable situations it may succeed still farther north of its native habitat. At Gladwyne they were planted in several situations and they are doing well except for disasters caused by depredations, underground by mice, and above ground by rabbits. These precious shrubs are now safeguarded with wire.

On many days during the past years I have seen the thermometer hovering around zero, sometimes just above and occasionally just below, but these temperatures caused no winter killing of *Elliottia*, even the young shoots came through unscathed. A few pine boughs were thrown over the ground the first season to protect the roots, and that is all the protection they have ever had.

Elliottia racemosa has been called a difficult shrub to grow, but I do not think it deserves quite such a reputation. However, all members of the ericaceous family do have fine, hair-like roots and must be planted with care in congenial soil. Even if it is a bit fussy and rather slow to become established, it is well worth while expending considerable effort in an endeavor to grow this fine plant. In all probability the safest way to propagate this rare shrub would be by "stumping," the method used by the late Dr. Coville for increasing *Vaccinium corymbosum*.

My largest *Elliottia* is only about three feet tall but it has bloomed annually since the second year it was planted. It flowers here in June about the same time as *Itea virginica*. Dr. Wherry has seen it here in Gladwyne both in flower and in seed.

It is nice of course to have some foreign shrubs in our gardens. One can hardly do without at least a few "outsiders." A home can scarcely be called a home without its lilac bush. Few, too, would willingly do without one of the large flowering hybrid mock-oranges. *Viburnum Carlesii* is a jewel in any planting. However, our native shrubs, many alas almost unknown to gardeners, are so fine, so gloriously beautiful and so entirely suited to the strange vagaries of their own American climate, that the day is bound to come when they will be appreciated in our gardens. When those shrubs which now bloom almost unseen in our swamps and on our mountainside will be welcomed for their beauty, and must we blush to say it, their rarity in our gardens!

MARY G. HENRY

Gladwyne, Pa.

Lilium Barry Hybrids [See page 227]

Of the various and sundry lily bulbs which we have planted, seeing in the mind's eye great marvels to come therefrom, some, due no doubt to beginner's luck, have come up to expectations; others blooming once have not reappeared, and some few have never come up at all.

None, however, have been more successful, or given us more garden pleasure, than a group of Barry hybrid lilies, seedlings from hybrids of *Lilium* × T. A. Havemeyer.

Hampton Hayes

[See page 226]

Lilium, Barry Hybrids

Ten bulbs, from two to three years old, were planted where the ground slopes toward the north and stays frozen late into the Spring; several of which grew up to six feet in height the first summer (1940) without any very elaborate preparation of the soil.

The variation among the flowers produced an informal artistic effect; from cream blended with palest apricot or buff, deeper apricot, golden-orange to deep salmon-orange; the last being almost a tiger lily color, but the flower, widely expanded without spots, measured seven inches in diameter. Next to it was one which resembled somewhat a Henry lily — an improved Henry, having a larger, more golden colored flower. And while I do not think anyone would wish to see *L. Henryi* and *L. tigrinum* growing in such close proximity, these hybrids are quite harmonious, and by using them one can have a greater variety in a small garden. The orange lily made a cluster of bulblets on the stem near the ground.

The bright colored flowers seem to have little or no perfume; the pale ones are very sweet, and one of their most appealing features is the color in the heart of the flower. The little hollows leading down into the nectaries are a beautiful viridian, the deep glowing green of emeralds, not the light color which is usually spoken of as emerald green. The delicate shades of the perianth are enhanced by this dark note.

With these lilies we planted lavender-blue sage, orange tagetes, blue verbenas, white verbenas, and light blue nierembergia; making a picture which was very nice and much admired by garden visitors.

In an ancient volume of Flora's Lexicon the splendid lilies are described as having the power to restore the mournful to a state of happiness; and the white lilies are an insurance against disease according to an old Roumanian saying. The evidence of this is born out by the fact that our Slovak neighbor came to beg petals to preserve in alcohol to make, what he called, a magic medicine.

However efficacious for good this may be, the best tonic for gardeners seems to be a new plant to fall in love with.

E. Freedley Price

New Hope, Pa.

Cratægus cordata

I have been congratulating myself that the birds have not stripped all the fruits from the hawthorn tree this fall, but looking out just now, I saw two fat robins greatly enjoying themselves. Still, two cannot eat as much as a dozen.

This Washington Thorn, *Cratægus cordata,* is a very satisfactory small tree. The leaves are attractive all the season, shining green until fall, when they turn to most beautiful shades of red and yellow. The flowers are small individually, but as there are many of them in a cluster, they are showy enough. They bloom here in late June, after most of the early shrubs are past. The drooping clusters of scarlet fruit hang on the trees all winter, unless birds and squirrels decree otherwise. In the spring, we are apt to hear the first whisperings of the cedar waxwings from this tree, as they finish the fruit. A tree twenty feet high and wide, thickly covered with scarlet fruit, is a heartening sight against the snow.

The tree is native from Virginia to Alabama, and from Illinois to Missouri, and is perfectly hardy here in New England. It will grow to forty feet in height. The leaves are somewhat heart-shaped at the base, with three to five acute lobes, and a serrated edge; two to three inches long, and nearly as wide

at the base, with slender petioles. The flowers are hardly half-an-inch across, five-petalled, white, about twenty in a corymb. The individual fruits, barely one-fourth inch in diameter, are flattened globose, shining, scarlet, with persistent black calyx bases. There are up to five bony seeds, which require two years to germinate. The fruits have very litle pulp,—are mostly skin drawn over the seeds,—but what there is has rather a sweet, pleasant flavor.

The leaves are sometimes troubled by aphis, but seldom seriously. The branches sometimes break in ice-storms, but oddly enough the only hurricane damage was the blowing off of a few leaves and small twigs. Some of them landed in unsuspected places, as we discovered to our sorrow when cleaning the garden in the spring, for the tree is armed with vicious spines often more than two inches long. However, they make excellent phonograph points.

RACHAEL CAUGHEY

Antrim, N. H.

Chionanthus—The Fringe Tree

Chionanthus retusa, Chionanthus virginica—both these small trees, the one native to China, the other to our own United States, are, in the Spring, the most beautiful small trees imaginable. Yet they are rarely seen.

Some years ago, we were suddenly called upon to supplement the decorations to be made at Strawberry Mansion, one of the old houses in Fairmont Park, Philadelphia, for the first afternoon meeting of the Garden Club of America week.

We were to go in early with any branches of shrubs and any extra tulips and other spring flowers that were available. The summons came quite late in the day before and on going out to the garden to see what was in condition, I was struck with the exquisite snowy effect of the Fringe tree in the early moonlight of the approaching night. "Should one risk a branch or more?" "How does it keep in water?" for so often a discouraging wilt takes place after the thirty mile drive to the metropolis, while the near-by suburbanite comes in gaily with huge branches of weigelia, mock-orange and so forth.

To be daring is not my forte, still the shears clipped several of the flat spreading boughs laden with their shimmering long white fllaments and they were dumped into laundry tubs overnight. Next morning they were shifted to the back of the car, and the journey made. Arranged in one corner of the great long drawing room, they created quite a stir and even knowledgeable ladies from afar queried "what is that marvellous and most unusual flowering shrub?"

The best placed *Chionanthus* I have is along a stream and some *Clematis virginica* has of late years seeded beneath and clambered up its main trunk. So that in September it repeats its beauty of the preceding May and one recalls that delicious season all over again, and often if truth be told, in better weather, for September is not threatened with those sudden cold wet showers that turn May into a sad mess often with one's best laid plans for tea and garden views all upset.

Another use for the Chionanthus is as a potted dwarf tree, to be brought in-doors from a cool house and thus enjoy for a week or so, at close quarters what one sometimes has but a brief glimpse of during the changeable Spring days. This horticultural feat I have never encompassed — it remains in mind from a picture in an English gardening paper in those happy leisurely days before this terrible catastrophe overtook us. Now alas! the pages of this gardening Weekly are filled with "Dig for Victory" articles, and now and

then a sad word of shrubbery and lawns turned under for potatoes.

FRANCES EDGE MCILVAINE
Downingtown, Pa.

Some Notes on Oregon Irises

During the season of 1941, after an exceptionally mild winter, the Oregon irises in the garden began blooming before the first of March, and were not quite gone on the tenth of June. This means from the opening of the first bright yellow *innominata* on its four-inch stem, the last day of February, till the fading of the last few blooms of a buff-yellow *douglasiana* hybrid two feet tall.

Though I have not kept a careful record in previous years, I believe this is an extraordinarily long season of bloom, due partly to the early start, and partly to the cool May weather, which prolonged the life of the flowers.

Innominata is usually an April flower here. The colors now that seedlings have begun blooming, range from a deep glowing, but not harsh golden orange, to creamy yellow, and this year I acquired a collected white one, which may or may not survive. Height in this species varies with individual plants and in different soils, from five or six inches to fifteen. The tall ones are delightful as cut flowers, but the short type is the one for the rock gardener.

From seed of *innominata* gathered in the garden, we have raised several hybrids, mostly showing *douglasiana* parentage in the broad foliage. These show the *innominata* yellow mostly in the throat, so it is more apparent in the bud than in the open flower, for the sepals are washed with blue, lavender or old rose, and the petals are white or very pale orchid.

However, a few have been found which have carried the yellow in the throat, with yellow petals and sepals shading from yellow to a splotch of deeper color, rose, lavender, tawny. This yellow is not the clear yellow of the innominata parent, but a soft peach shade.

Tenax, usually a May flower along all the roadsides, lasted all through April in the garden this year. It too has crossed by means of the benevolent interference of insects, (high time they did something benevolent in this garden) and now, what with choosy collecting and garden intermarriages, we have many variations on the purple theme. There are blue lavenders and pink lavenders, short stocky ones and taller ones with long stems and velvety purple flowers. There were white ones, but something always happens to the white ones. This year, light and dark old rose ones of unremembered origin, which we have diligently increased by division, made a fair showing.

According to the latest Oregon botany, Manual of the Higher Plants of Oregon, by Morton E. Peck, *Iris gormani* is reduced from specific rank to a variety of *tenax*. Here it blooms two weeks later than the purple *tenax*, and differs from it in having grayer foliage and creamy yellow flowers. Among the seed grown *tenax*, appear many hybrids, apparently crosses with *douglasiana* and *thompsoni*, a lavender to purple iris from southwest Oregon considered by botanists at first as a color form of *innominata*, which it much resembles on all but color. Most of these hybrids have a longer throat, or as the botanies call it, perianth tube, than *tenax*, and this gives the flowers a more graceful poise than its somewhat stiff-necked flowers.

In the Siskiyou mountains there is an iris, growing mainly in shade, which is commonly known as the "little white iris." *Iris chrysophylla* is not completely white, however. The sepals are conspicuously veined with yellow or pur-

Left, Iris Thompsoni; center (below) I. Chrysophylla; center (above) I. tenuis; upper right, I. macrosiphon; right, I. innominata, yellow form.

plish lines, and the tips washed with light color, sometimes blue, sometimes yellow. The throat is very long and serves it as a stem, like that of the crocus. The seed capsule is borne just at the surface of the ground like crocus. In size of flower and particularly of sepals, it is quite variable, but the stigma crests are always remarkably long. The flower is much overtopped by the long blue green leaves.

Iris missouriensis is less at home here than the other kinds, for it is from the hot summer, cold winter section of this state and Washington. It likes a moist place a good part of the year, and is at home in heavier soils than the western Oregon kinds. It grows sometimes three feet tall in cultivation. The color is mainly light blue, and whites are not infrequently found. Because of its greater hardiness, it should be used by the few people who are seriously trying to breed new forms of these Oregon irises.

On the watersheds of just two Oregon rivers, the Clackamas and the Molalla, grows the small woodland *Iris tenuis*. Its slim five or six inch stems stand primly among the light green, rather broad leaves. The little flowers are exquisite, white, picked out with purple and gold. The leaves disappear in winter. We have found it bloomed more abundantly after we set it partial shade than it does in the thickly shaded forests of fir where it naturally grows.

Most of these irises are too large for small rockgardens, though *innominata, thompsoni,* and *chrysophylla* are good rock garden subjects. They are particularly suited with a well drained hillside, having some shade during part of the day. *Iris douglasiana* grows near the sea, in sun or shade, but seems to do better here in the garden, with a little shade from distant trees. This flower, especially in the hybrid forms such as those which Fred deForest, of Monroe, Oregon, has originated, are fine cutting material. Sent in the bud stage, they have carried well from here to Massachusetts, opening out a half hour or more after they were taken from the airmail package and put in water. Some of these hybrids carried several flowers on a stalk, and their season of bloom varies somewhat, so I find a row of the different kinds furnishes flowers a month or more.

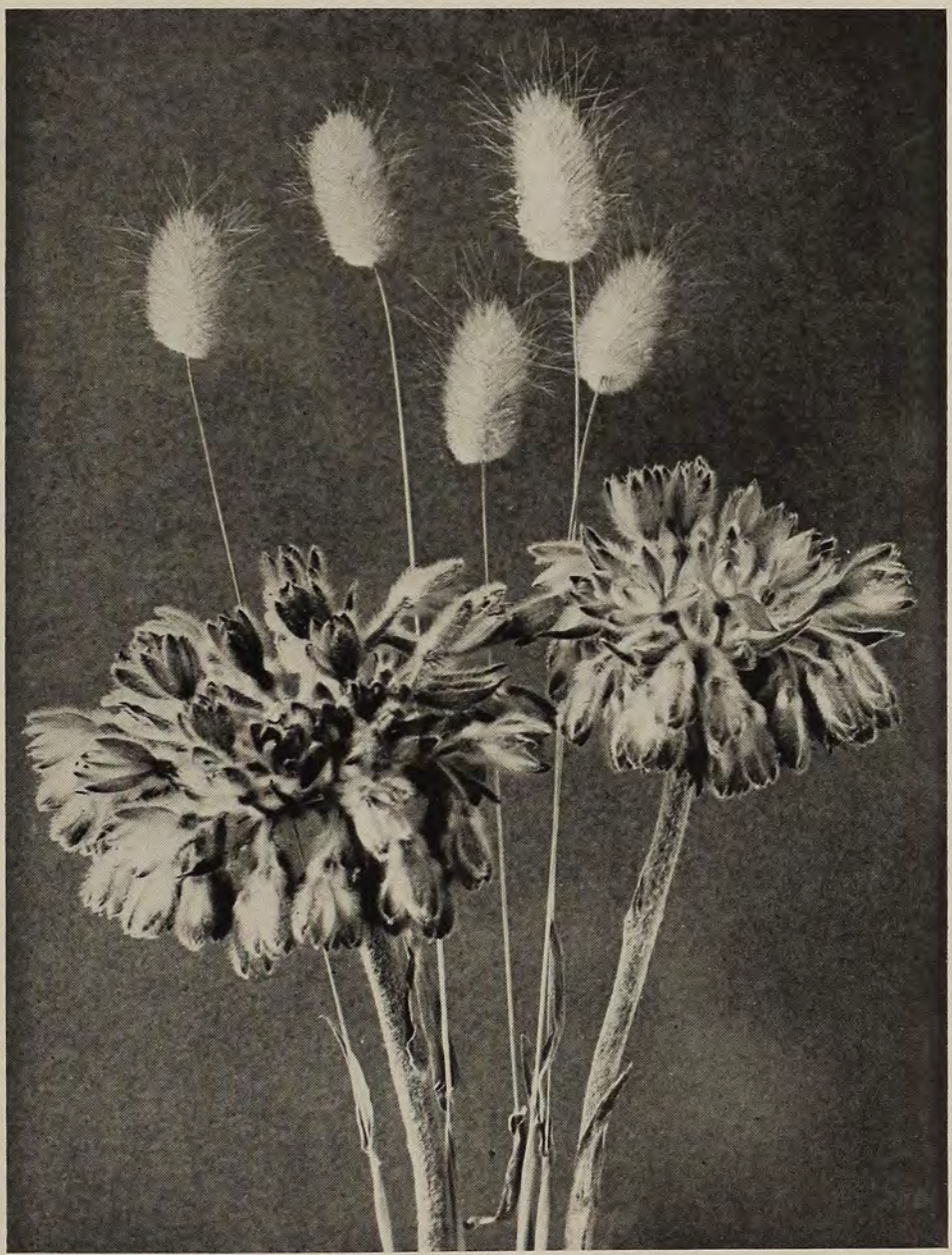
Irises often mix in the wild stands, and it is quite possible to see the intermediates, as one leaves, for instance, the *douglasiana* territory and approaches that of *bracteata*. Between localities in which I knew *innominata* and *chrysophylla* were found, I came upon a CCC crew blasting a bridge approach out of a rocky canyon wall. Some of the irises that I rescued after the blast went off, have turned out to be an intermediate strain, taller than *chrysophylla* or *innominata,* but with many characters of both. They are different shades of yellow, with attractive veining, and the flowers are large and graceful.

DREW SHERRARD

Oswego, Ore.

Dilatris corymbosa Berg. [See page 233]

A pretty flower frequent on plateaux and mountain slopes in the Cape Province of South Africa, found occasionally also on the Cape Flats. The species long known by this name is now the subject of an article in "The Journal of South African Botany," vol. vi, October, 1940, by W. F. Barker, who in studying specimens of the mauve-flowered species finds differences in them which, she considers, entitles them to be separated. The photograph shown here would indicate that it is a true *Dilatris corymbosa,* for two stamens are slightly prominent in the flowers as they are in the illustrations in Miss Barker's article. *Dilatris Pil-*



South African Railways and Harbours

[See pages 232 and 234]

Lagurus ovatus (upper); Dilatris corymbosus (lower)

lansii (Barker) the new species described, has stamens much shorter than the perianth segments. This species, Miss Barker says, is the one illustrated in Marloth's "Flora of South Africa," vol. iv, t. 31(1915) and in "A Second Book of South African Flowers," by Barclay, Bolus & Steer, page 131 under *Dilatris corymbosa* Berg.

The third species of mauve-flowered ones is *Dilatris ixioides* Lam. which has the stamens well exserted, the third anther very large. The picture called *Dilatris corymbosa* or Broad-petalled *Dilatris* in "Exotic Botany" by James Edward Smith, President of the Linnæan Society, (1804-5) vol. i, page 29, t. 16 would seem to be this species, judging by the very long prominent stamens. This species is not found, according to definite records, on the Cape Peninsula. Flowers of another species, *Dilatris viscosa* Linn. f, are dull orange or mauve-yellow.

Dilatris corymbosa has a flat, umbellike head of numerous, somewhat bell-shaped flowers of an attractive purplish-lilac or mauve color. The flower segments persist and keep their color in withering. The head is 2-3 inches broad or a little more. Two of the three stamens are longer than the third, this third one having a large anther differing in color. The perianth segments are ovate-lanceolate, sub-acute, up to about ½ inch long and ¼ inch broad. The whole inflorescence is hairy or downy. The stem is rather long, with a few short leaves. The basal leaves are numerous, linear-oblong, about 6-15 inches long and ¼ inch broad. The root-stock is reddish, woody and the rigid basal leaves are arranged in two ranks. The plant blooms in South Africa from August to January.

Dilatris belongs to the Haemodoraceæ of the Monocotyledons. Lt-Col. Grey in "Hardy Bulbs" vol. ii (1938) page 151, says that it is an easy subject to grow. He says that he has often raised it from seed and that in Great Britain it blooms as a rule in July.

A specimen found by this writer near Cape Town in December, 1934, which is listed in the Herbarium of the New York Botanical Garden as *Dilatris corymbosa* is, in conformity with Miss Barker's division of the species, probably *Dilatris Pillansii*, as the stamens appear to be short. The color of *Dilatris* is very lovely.

SARAH V. COOMBS

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Lagurus ovatus Linn. Gramineiæ. [See page 233.]

Hare's Tail Grass Rabbit-tail Grass.

This hardy annual grass grows in many parts of the world, being found, native or naturalized, in the Mediterranean Region, west coast of Europe, the Channel Islands and California. The Kew Index credits it originally to northern Africa and southern Europe.

Hortus says that "it is grown for ornament in flower gardens and pots and for dry bouquets." It grows about 6 inches to a foot or more high, with 1-flowered spikelets in a close panicle, forming an ovid head. There are two dry, persistent, chaffy glumes or outer scales covered with fine woolly hairs and ending in feathery points. The outer paleæ or bracts of the flower terminate in two long bristles and have a longer dorsal twisted and knee-bent appendage. The inner bracts have no such appendage but the pointed tips are slightly cloven. The stems are smooth and slender and the soft, almost silky spike of a pale whitish hue, may attain a length of about 1½ inches, with a diameter of nearly an inch at the base. The leaves, 4-5 in number are linear-lanceolate, with long inflated sheaths which almost cover the stem. These sheaths are densely covered

Walter B. Wilder

[See page 236]

Helenium tenuifolium

with downy hairs. The silky appearance of the flower head is due to the numerous soft hairs which fringe the glumes from top to bottom. The stem is upright, smooth, circular, with three or four joints. The root is annual, composed of seven or eight woolly fibres.

The genus, long considered monotypic, now has a couple of species added in supplements of the Kew Index, one found in Sicily and one in Ceylon.

Rabbit-tail Grass is cultivated in gardens and flowers in June, ripening its seed in July. Charles Johnson in "The Grasses of Great Britain," (1861) says that it is "an elegant little grass but of no economical value." E. J. Lowe in "A Natural History of British Grasses," (1858) sets it a little higher, saying that it is "one of the rarest and most beautiful of our English grasses, growing in sandy exposed situations in the north and west of Guernsey, one of the Channel Islands, abundant near the sea-shore. Serves to decorate flower pots in winter, like *Stipa pennata* and the foreign *Briza maxima.*"

The name is derived from the Greek, *lagos,* a hare; *oura,* a tail. It is said by Nicholson in the Dictionary of Gardening to thrive best when grown in pots during August and September, wintered in a cold frame or greenhouse and planted out in the open the following spring.

There is a great difference in the size of the flower heads and in the height of the plant. The tiny ones seem to be found mostly on the sea-shore and the taller ones inland. The little sea-shore ones look as if crouching to avoid the fierce winds from the ocean. The plant is an excellent addition to winter bouquets for people who like those dust-attracting combinations.

Sarah V. Coombs

Scarsdale, New York.

Helenium tenuifolium. [See page 235]

Many annuals are short-lived in the neighborhood of Westchester County, New York; the heat of summer with frequent droughts is undoubtedly the cause. Watering with cold alkaline water is not much help. Whether the seeds are sown in the greenhouse, and the seedlings transplanted twice to encourage root growth before being planted out or whether the seeds are sown in the beds where they are to flower, with far too few exceptions, the life of the annuals is short. They soon grow leggy and in time produce fewer flowers and gradually fade away.

A notable exception is an American plant, *Helenium tenuifolium.* It is found from Virginia south to Florida and westward to Texas, is pretty, flowers with abundance all summer long. As the season advances the plants become bushy and about two feet high. The stalks are much branched and bear numerous long linear leaves. The leaves are so graceful they constitute the principal beauty of the plant. The flowers measure about one inch across, are borne singly at the tips of the branches and have yellow rays and yellow "light cadmium yellow" disk flowers.

The plant is charming with *Nierembergia frutescens,* for the linear character of the foliage on both plants harmonize and the yellow of the Helenium goes well with the violet of the Nierembergia.

Helen M. Fox.

Peekskill, N. Y.

The American Horticultural Society

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

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

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, Washington, D. C.