

# *The American Horticultural*

**THE AMERICAN**  
**MAGAZINE**





# AMERICAN HORTICULTURAL SOCIETY

*A union of the American Horticultural Society  
and the American Horticultural Council*

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JULY COVER ILLUSTRATION

[LONGWOOD GARDENS]

### ***Longwood Gardens New Reception Center***

The New Reception Center and Parking Lot at Longwood Gardens representing the new approach to handling the public and his transportation. S-shaped central walkway leads visitors through large planters used for landscape plantings within the parking area and to feature ornamental ground covers.

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LONGWOOD GARDENS

*An artificial tree has become an accent in the tropical terrace house. The selection of epiphytic plants growing on this tree produces a series of colorful blooms every day of the year.*



# LONGWOOD GARDENS—A New Approach

R. J. SEIBERT\*

Longwood Gardens may be compared to a jewel with many facets, each with a special interest, color variation and its own aspect—yet, they go together to produce something of lasting interest and beauty for everyone.

Its founder and benefactor, the late Pierre S. du Pont, created Longwood as a horticultural showplace. He welcomed visitors from the community and from the world to peacefully enjoy the gardens and conservatories. Everyday of the year, a prime flower show and displays of seasonal plants are on exhibition. Mr. du Pont's basic desire for this horticultural memorial was that it permanently continue for the benefit, enjoyment and education of the public.

While Mr. du Pont was on a pleasant drive through the countryside, he noticed a magnificent tract of forest about to be lumbered. The beauty of the area and the thought of allowing this destruction, prompted his purchase of the property in 1906. Conservation was his first and continuous objective here.

Through his provision and endowment, Longwood Foundation, Inc., has operated Longwood Gardens since 1946 under its charter as a tax-exempt institution. The public may visit and enjoy the Gardens free of admission charge, a privilege now enjoyed by more than 600,000 individuals per year.

These are the basic principles under which a great garden was wrought and which have proved so satisfying to those who come from all parts of the world to share.

The visitor, whether he comes once every year at a fixed season, or enjoys the Gardens through its weekly progression of flowering, is stimulated through the variations and changes he sees on each successive visit to the Conservatories.

During the years in which Longwood has attracted national attention, there has been a steady increase in the annual

number of visitors. The increase in traffic led, in 1962, to the completion of a new Reception Center and parking lot to accommodate 1,000 cars and 24 buses. The new entrance is located about 3 miles northeast of Kennett Square, Pennsylvania, on U. S. Highway 1, near its intersection with Pennsylvania 52 north, locally known as "The Anvil." A modern interchange, overpass and access ramps lead the visitor directly into the new entrance facilities.\*\*

These conveniences are situated in the geographical center of the Gardens making all of the facets more readily accessible to visitors. An interesting aesthetic treatment of this area utilizes "dish" parking. By means of mass earth movement, depressing the parking area and surrounding the new visitor facilities with mounds of earth, it has been possible to completely screen the Center and parking from within the Gardens.

Access from the parking area to the Gardens is through a covered passageway in the Reception Center which is screened with earth, grass and plantings.

The new entrance includes such essentials as Information Center for the Gardens with appropriate literature, guide maps, post cards, etc. A 142-seat Auditorium is for special meetings, guided tour indoctrination, showing of films and other uses. Our Security Division has its headquarters here as does our staff for the handling of prearranged guided tours. One room houses a scale model of Longwood Gardens with a push button operated tape recording to welcome and familiarize the visitor with Longwood. Ample and pleasant rest rooms are provided as well.

Snacks and beverages are not available at Longwood Gardens, since there are restaurants of varying prices and qualities in the area. Longwood does maintain excellent nearby picnic grounds for

\*Director, Longwood Gardens, Kennett Square, Pennsylvania.

\*\*Visitor hours to the outdoor gardens are from 8 A.M. until sundown. The conservatories may be visited from 11 A.M. until 5 P.M. Daylight Saving Time is observed when in effect.



those who enjoy bringing their own lunch. Information on their locations and conditions of use may be obtained at the Information Center or from a Security Officer.

We suggest that a guide map will be most useful in visiting the Gardens. One may be obtained without charge from the Information Center before proceeding through the passageway on your tour of any or all of the Gardens' facets.

Walking shoes, and in threatening weather, appropriate protective garments will greatly add to your relaxed enjoyment. The Gardens may be seen only by foot or from a wheel chair for those who are unable to walk.

The Longwood Conservatories, Fountain Gardens, Open Air Theatre and Flower Gardens have always been the prime interests. A new main walkway pleasantly extends from the Gardens' passageway to connect with the entranceways of each of these main facets. There are, however, other facets of the Gardens with which many visitors are as yet unfamiliar.

A tour of Longwood can best be made in the form of loop walks. The first might be designated as the "natural walk." Geographically, it includes the eastern half of Longwood Gardens. Take this loop first if you arrive early in the morning prior to the 11 A.M. Conservatory opening hour.

A notebook and pencil would be useful to jot down the names of plants both familiar and new (which have been identified and labeled) if one wishes to grow or study them further.

Turn right as you walk past its entry to see the Open Air Theatre setting and visualize your favorite performance utilizing the two levels of stages and green-sward backdrop flanked with Kentucky coffee trees and clipped arbovitae wings. The stage is unusual in having a water curtain which produces effective screening through the use of back lighting. The performance starts, only after the (water) curtain goes *down*! A colorful fountain display is shown on stage after an evening's theatre performance. The Theatre is a garden setting—one of several green gardens at Longwood. But, for more color, continue east through the Flower Gardens or, if you wish, first wander through Peirce's Park viewing the old 1730 Peirce home, later enlarged by 2 wings and connecting conservatory

in 1914 by Mr. du Pont. The house now serves as Administrative and Business Headquarters for Longwood Gardens. Peirce's Park is noted for several important trees originally planted by the Peirce Brothers in the early 1800's. It was at this time that the estate, an original Penn grant, became well known in the area for its arboretum. Among the most important earliest tree introductions still surviving are ginkgo, cucumber magnolia, white pine, hemlock and bald cypress. Evergreen Glade, the original name for Longwood, is east of the house. It includes a vista, through long-wooded rows of mature trees of mixed species, terminating with the park fountain.

It is possible from here to visit some of the remaining indigenous forest northwest of the house and to see the orchards. However, most of our visitors enjoy staying closer to the flower garden borders and continue eastward along the woodland path to the lake and water garden.

The Flower Gardens and borders exhibit a continuous sequence of bloom from the earliest pansy of spring to the latest chrysanthemum of fall. Within the woodland, east of the Flower Gardens, is a group of new plantings which have helped to remove the scars of the two hurricanes of 1954 and 1955. Azaleas, rhododendrons, and camellias, along with allied broad-leaved evergreens, conifers, ground covers, and a spotting of bamboo present a pleasant setting for the original lake and approach to the Italian Water Garden.

Relatively few visitors to Longwood have seen this water garden which was inspired by the Villa Gamberaia located a short distance out of Florence, Italy. Again, this is a garden of green plants in various shades. Fountains of water refresh the spirits of those who rest here for a while in quiet meditation. In the vicinity south of the water garden, is a woodland setting of azaleas—mostly "Glenn Dales," dogwood and some of the finest old specimens of rhododendron at Longwood.

At the lower end of the original lake, one is in full view of the lake edge planting of daffodils among weeping willows and weeping cherries. The lake is stocked with Golden Orf which lend it an action attraction.





LONGWOOD GARDENS

***Conservatories as seen from the Main Fountain Garden.***

A short walk on the return road continues to an old planting of azalea 'Hinodegiri' located along the lower end of the small lake. The setting for some of the older introduced bald cypress is along the upper end of the small lake, where there is an excellent example of their "knee" development.

The Flower Garden Drive draws one to the beds of early spring bulbs or colorful annuals later through the season.

Enclosed within clipped arborvitae hedges is a series of three secluded gardens along the Flower Garden drive. The center garden leads from the brick shelter to the main flower gardens and features a square pool with a single central fountain jet. It exhibits plantings of a series of colorful bedding plants throughout the season. A brick wall with flanking stairways and simple dripping wall fountain lend a feeling of a "hanging garden" to the setting. The brick stairways lead to the main flower garden with its circular basin and fountain. An enclosed peony garden adjoins on the east, while the maze garden is on the

west side and will take one to the terrace garden south of the Open Air Theatre.

The completion of this first loop returns to the main entrance walkway.

The second loop walk may proceed either directly to the Conservatories or may take fuller advantage of its designation as the "formal walk" by including the more formally landscaped or western half of the Gardens. Special features on the way to the Conservatories are worthy of more than casual observance to both the garden enthusiast and horticultural specialist.

West of the Paulownia Drive and north of the hybrid tea rose garden, there are fine examples of topiary in the yew garden. Specimens of *Taxus* spp. are maintained in various shapes through frequent and careful trimming which add an interesting setting for the Analemmatic Sundial.

The newest of two Italian temples of love is the focus along a grassy vista west of the rose garden, between the yew and main fountain gardens. The finest specimens of *Cedrus atlantica* at Longwood





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*The yew and topiary garden (taken with infrared film) shows some of the clipped specimens which form an interesting setting for the Analemmatic sundial and the main conservatory in the background.*

*One of the finest periods of display at Longwood Gardens is through the chrysanthemum season of November and December. Several hundred varieties are maintained. The exhibits include huge cascade and basket specimens. All blend in a harmony of color.*

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*A Geographic House features ornamental plants from the Asiatic, American, and African tropics. *Ravenala madagascariensis*, the so-called "Travelers Palm," terminates this vista along the stone mosaic walk.*





LONGWOOD GARDENS

*The desert or succulent house is one of two newer steel, bronze, and glass display rooms at Longwood Gardens. The more ornamental species of cacti and succulents are featured here.*

are located along either side of the lower level in front of the Conservatory. Here, also, are the Ghent azaleas and mature specimens of crepe myrtle.

It is well to note that the Conservatories may be entered either from the main fountain garden level Reception Suite, or by the main Conservatory entrance which fronts on the terrace overlooking the fountain garden. From the terrace, may best be seen the setting for the famed colored electric fountains. The fountain garden is outlined by cubed Norway maple avenues. The fountain basins are bordered with varieties of *Ilex crenata*, recently having replaced what was formerly planted with box. The Italian stone sculpture of the fountains along the south side of this garden presents an atmosphere of old world splendor and beauty rarely seen in America. The fountains are refreshing to walk around on a warm summer's day. They operate during most of the visitor hours. A special daytime showing is scheduled on weekends and holidays in addition to the evening displays mentioned elsewhere.

Any day of the year, our visitors may step inside to see the main Conservatory in a full glory of bloom. The experience of coming through the main Conservatory entrance is one which no photograph or description can substitute. The lawns on each side are a cool refreshment in summer and a great relief from the drab winter's brown. A real welcome of spring to many is realized when they see snow being shoveled out of doors and the grass being mowed indoors. Seasonal flowering plants, in mass and in accent, are tastefully arranged in a harmony of colorful displays. Many of our visitors are amazed to find these displays constantly changing.

There is never a complete change of display at any one time—but rather a gradual evolution or transition from week to week and from season to season, yet everyday sees a prime flower show. The seasonal peaks include chrysanthemums from late October to mid-December, followed by poinsettias for Christmas. During January through March, bulbs, acacias and camellias her-





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*A clone of Musa paradisiaca from the Philippines is being grown at Longwood Gardens for potential evaluation as a conservatory ornamental.*



ald the spring flowers through April along with azaleas, lilies, rhododendrons and cymbidiums. Late spring and summer displays in the main Conservatories settle down to the quiet color blending of bedding begonias, cannas, caladium, tuberous begonias, browallia and other summer items.

Among the newer special features are included Tropical Waterlily Pools for the best tropical hybrids and some outstanding species of other aquatic plants. *Victoria amazonica*, *V. cruziana* and *Victoria* 'Longwood Hybrid', a cross between the two species, are featured here for their contrasting interest.

Orchids are emphasized throughout the year as are ferns, and other plant groups. Ornamentals may be seen in their different stages of growth development by going through such growing houses as may be open during your visit.

The collections of tropical ornamentals have been substantially increased in the past few years. Two new connecting conservatories assist circulation of increased visitor traffic. They have made it possible to better display cacti and succulents in the desert house and to utilize the finer of the world's tropics in a terrace garden setting. A number of the more interesting tropical economic plants are included in the banana or economic house, while selected tropics representative of the Asiatic, American and African tropics adjoin the geographic house.

Where they fit the setting, many vines are used throughout the Conservatories. Tubbed specimens and hanging baskets are two specialties of the Longwood Conservatories and augment the range of plant materials.

To favor the growth of plants from different climatic conditions throughout the world, the visitor will experience a wide variation in temperatures and humidity as he proceeds from house to house.

Continuing the outdoor loop walk, a very colorful garden of annuals may be seen along the walkway in front of the Conservatories south of the rose house and west of the main Conservatory entrance. Close by, the Vegetable Gardens feature the better varieties of vegetables to be grown in the area. Included also are dwarfed fruits, berries, herbs, a collection of cutting flowers, dahlias and other newer perennials as well. A

small home type of greenhouse used to propagate herbs and for starting our vegetables, has proved most interesting as a demonstration for home owners interested in a small greenhouse installation. Adjoining, is the garden of All-America Rose Selections which features the newest as well as such older AARS selections as are proving best for this area.

If one continues south along the walk between the Vegetable Garden past the lead drinking fountain and main fountain pumphouse, the Rock Garden will soon beckon for a proportionate part of your visiting time.

The Rock Garden spreads out of a walled slope along with a rocky stream that forms part of the recirculating water system for the main fountains. Here, within a setting of waterfalls, chimes tower and reservoir, is a profusion of colorful rock and alpine plants from around the world.\*

A brisk climb up two terraced levels near the waterfalls will open up vistas across the reservoir and, in summer, will help satisfy one's desire for the sound of rushing water. To the west, a newly developing heather garden will attract many, while to the south and east in a portion of our arboretum, are collections of fine coniferous specimens of *Cedrus*, *Sequoiadendron*, *Abies*, *Pinus*, *Metasequoia*, *Picea*, *Larix* and other genera. The spring flowering trees of this area help furnish a colorful backdrop when looking out from the Conservatory terrace. Among the fine deciduous trees here are dogwood, crab apples, flowering cherries, a cut-leaf beech, chestnuts and an outstanding collection of oak species. Careful pruning, spraying and feeding schedules have produced exceptionally fine maturing oak specimens.

Many visitors enjoy an over-all view of the Conservatories which may best be seen from the rectangular fountain basin on top of the main fountain pumphouse. From here, too, one may see the scope of the fountains which in normal operation, utilize 12,000 gallons of water per minute.

It is only a short distance from here to the hybrid tea rose garden and the main

\*On the hour and quarter hour, the chimes mark the time of day. Carillon music of 15-minute concerts take place shortly after 11 A.M., 2 P.M. and 5 P.M. and may be heard from many parts of the Gardens.





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***A portion of Longwood Gardens rock garden which has been under development for three years, adds immeasurably to the outdoor displays of plants in flower from February through November.***

entrance back to your parked car. In season, this rose garden exhibits, in our opinion, the finest of the rose varieties for this locality. Some are old, "tried and true" such as 'Mrs. P. S. du Pont', and others new, such as 'Hawaii'. Sometimes, a newer one gives way to the more reliables, particularly after a winter such as experienced this year.

Paulownia Drive is an important north-south axis in the Gardens. On its south end, a large curved cut stone bench has an antique stone urn accenting each side. One of the most striking sights can be this double row of *Paulownia tomentosa* in full bloom, following a mild winter's season. The opposite end of the drive leads through a rhododendron walk along the old cut of a road long past forbidden to vehicles. This leads to a third loop walk now under development. It may be known as the "forest walk" through the tract of original southeastern Pennsylvania forest preserved by Mr. du Pont for you and future generations of Longwood visitors.

Among the other facets of Longwood Gardens, are those which utilize the facilities during the evening hours.

The Conservatories, to considerable extent, form a focal point around which many functions of cultural and educational nature are held. A series of horticultural lectures in the very early spring takes place in the Conservatory Ballroom. Here, too, are held a limited number of meetings and conference banquets of regional, national and international horticultural scope.

One of the better known features in the Conservatory is the famous 10,010 pipe organ on which lighter classical concerts are played each Sunday afternoon from 3 to 5 P.M. A schedule of more formal evening concerts featuring the Longwood organ is presented each year for the music connoisseur.

The most popular summer evening facet of Longwood Gardens is the display of colored fountains for a half hour just after dark on Wednesday and Sunday evenings. It is at these times that the fountains are displayed to their full capacity. Some go as high as 130 feet, with everchanging colors playing on the varied selection of fountains from the 229-jet, spray and fan nozzles utilized in this system. "Liquid fireworks" is an





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*Experimental greenhouses provide facilities to test, evaluate, and improve ornamental plants for display at Longwood Gardens.*

*Tropical waterlilies are an important part of the summer displays at the main conservatories. Planted out in early June, their display extends into October.*

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expression frequently used to emphasize their description. During a portion of the fountain displays, the Carillon chimes appropriate music to further augment the evening's enjoyment.

The Open Air Theatre comes to real life on the nights of a performance. Each season, a limited number of non-profit, sponsoring organizations from the area is selected from among the applicants to present benefit performances. The net proceeds are donated to worthy charities of each sponsoring organization. Longwood Foundation donates the use of these facilities to the sponsoring organizations. Some sponsors have become traditional, while others, change each year or so. Performances may range from Gilbert & Sullivan through Shakespeare, ballet, choral and band as well as musical comedy to classical opera. Each Open Air Theatre season at Longwood, traditionally ends with the U. S. Marine Band's first concert of its tour season. This concert is sponsored by the Longwood Volunteer Fire Company. The underground dressing rooms for the theatre are air-conditioned and can accommodate a cast of 125. Excellent modern equipment make this setting a live, "Son et Lumiere" experience, as each performance is followed by an illuminated display of the stage fountains throughout their full color range.

Longwood's research and educational facets include financial support for bringing new ornamental plants into the United States through occasional grants to the USDA, Agricultural Research Service's Plant Introduction Program. Many valuable plant introductions into American Horticulture are resulting from these trips which, thus far, have gone to Europe, Japan, Brazil, Australia and Nepal. From these collections, Longwood features unique plants from afar.

From other sources as well, plants are tried and some added to the display collections in our ever present work of "upgrading" and attempting to maintain a balance among the countless, beautiful and interesting plants from around the world. It is in our Experimental Greenhouses and Nursery that the new and different plants from many parts of the world are given trial, evaluation and selection prior to being added to the display collections.

A plant improvement program is under way for bettering future Longwood displays. This program concentrates on pioneer plants which, we feel, have much greater potential for the Longwood displays than currently exist.

For those who visit during the weekdays and who may wish to know more about a particular plant growing at Longwood, we suggest a visit to our educational program headquarters located at the southwest corner of the Conservatories adjoining the desert house. Here, besides horticultural information, is the headquarters for our "short course" program aimed at instructing, through formal classes, those who are interested in learning factual information in many of the phases of horticulture and gardening.

Through the University of Delaware, Longwood conducts a horticultural trainee program for selected students majoring in the field of Horticulture. The applicants chosen come from throughout the USA for this 10-week course, for which they receive credit and invaluable practical training in their chosen field.

Prearrangement of guided tours is necessary and encouraged for interested groups who wish to learn more about Longwood Gardens and its facets from our trained guides. The guided tours are not available on holidays or weekends.

A working horticultural library is maintained as a tool for the 200 employees in their many responsibilities from gardening through technical botany and the allied specialties. The herbarium, though confined to Longwood-grown plants, provides the permanent plant voucher for our plant records. Research results in the authenticated identification of the labeled plants for the education of interested visitors.

Maintenance craftsmen keep the Longwood facilities in an excellent state of repair for the visitors' safety and discerning taste.

Trained horticulturists and gardeners produce the finest selection of display plants available. Every effort is made to grow those plants to perfection. When the plant is viewed either as a specimen or as a part of a display, it is our aim that it be a tribute to those who have grown and displayed it as well as to the





LONGWOOD GARDENS

*The round basin with its central jet fountain accents the Flower Garden walk with the Woodland Garden in the back. (Taken with infrared film)*

viewer. Those who visit Longwood reward themselves by seeing some of the finest of God's plant kingdom nurtured by the hand of man.

Each January, a schedule of public events for the year is published and made available without charge to those who request it. This schedule lists the evening functions of interest to our

visitors. These events include scheduled organ concerts, horticultural lectures, Open Air Theatre performances and the famed illuminated fountain displays which, in season, are shown on both Wednesday and Sunday evenings for one half hour just after dark. On evenings of scheduled fountain displays, the conservatories are open from 7:30 P.M. until an hour after the scheduled event. Conservatories are not open on evenings of Open Air Theatre performances.



# The Spuria Iris

MARY REDFORD

The beautiful, durable spuria iris fulfills a long list of useful garden roles, but it is unique in a way all its own: it grows and blooms vigorously in difficult climates such as the Deep South and the extremely hot desert areas where bearded and most other irises bloom temperamentally or not at all. In other regions all across America, spurias extend the iris bloom season, following after the tall bearded and preceding the Japanese. A judicious selection of varieties, from the early old *Iris orchroleuca* (white) and *I. monnieri* (yellow) to late 'Blue Acres' or its still later modern descendant, Walker Ferguson's 'Banners of Blue', can extend the spuria season itself to six or seven weeks.

Spurias are undemanding garden subjects. They take one to two years to establish, but after that they may be left undisturbed for years without loss in increase or bloom. They develop into big clumps, not noticeably open in the centers, which are good foils and background for shorter iris or perennials. In blooming season, the clumps are covered with clouds of floral butterflies of white, yellow, blue, tan, bronze or deep brown to grey. Fertilizing improves the flowers in size and number, but they seem to bloom quite well when neglected. Rate of increase varies, but some of the vigorous growers if left undivided for too many years will have to be attacked with a pick to separate the deeply entangled rhizomes.

The rot, leaf spot, and borers which plague tall bearded iris are almost unknown among spurias, although there is some difficulty with soft brown rot and mustard seed fungus (*Sclerotium rolfsii*) in areas of great humidity. Even there, good drainage and a fungicide such as Terraclor almost insure healthy plants. The spurias are subject to virus, possibly from insect or aphid borne infection, but the hybridizers work with virus resistant strains and the carefully selected new varieties and the time-tested old ones can be assumed to be quite virus resistant. A virus cure may be due to

follow on the scientific research on virus pathology, but thus far no answer has been offered. But even the virus affected plants, unless the trouble is very great, increase and bloom and may even put by their symptoms (light striations in the leaves, flecking or transparent spots on the flowers, general unthriftness) if they are specially tended and fertilized. Such plants should not be divided, but they probably do little further harm since the virus is fairly well localized, and many gardeners prefer to keep a good, blooming clump which is not in close proximity to other spurias even though it has shown some symptoms.

Where spurias are available to the florist trade, they are highly regarded for the keeping and shipping qualities of their beautiful tough green foliage and their delicate appearing but bruise resistant buds. They make handsome tall arrangements, and are unequalled for corsages, especially in the subtly colored slate gray, electric blue or velvety brown spurias. Only the ubiquitous orchid can outlast a spuria corsage made with fresh flowers and kept refrigerated between wearings.

The color range is less than that of the tall bearded, and the blooms are smaller. Even so, spurias may be had in every degree of yellow, in palest tans to deep browns, in pale blue to near purples, in whites with signals varying from orange through lemon yellow to inconspicuous pale signals so small the overall effect is of pure white. A red spuria may soon appear, with both Marion Walker and Walker Ferguson, California's leading spuria hybridizers, producing almost maroon spurias within the last few seasons. The late Eric Nies, writing in 1945, said, "As to pinks and reds, the idea is not hopeless, but they are not yet in sight. But as with the browns, no one can tell what unexpected things may happen. The browns were totally unexpected and resulted from an effort toward blues." Genetics and luck being what they are (witness Dave Hall's sensational color



break in pink tall bearded iris a number of years ago), Eric Nies' dream colors may be imminent.

Only those fortunate enough to own some of the newest Walker and Ferguson hybrids, or able to visit gardens or flower shows where these may be seen, realize how much size these two hybridizers are adding to spurias. Walker Ferguson's 'Wakerobin' ('Color Guard'  $\times$  'Wadi Zem Zem') was the sensation of the Houston Spuria Test Garden when it was first grown there as a seedling back in 1957, the same year that Marion Walker's 'Driftwood' ('Grace Perry Nies'  $\times$  Walker seedling)  $\times$  ('Color Guard'  $\times$  'Cherokee Chief') in the same garden was described as "just about the largest and most unusual spuria ever seen around here. Registered as chocolate brown, with 'yellow glow radiating from a central deep yellow stripe on falls,' this iris seemed much more fiery than its color description, with a distinct orange effect where yellow blended with reddish brown."

In 1954 Marion Walker described spurias as being "still lamentably close to the species," which in general is truer of spurias even now than of their longer pedigreed cousins, the tall bearded irises. Yet in January, 1962, Peg Dabagh reported on the new Walker seedlings in *The American Iris Society Bulletin* and gave measurements of standards  $2'' \times 4''$  and falls  $2\frac{1}{2}'' \times 4''$ , with very short broad, almost square style arms measuring between  $\frac{3}{4}''$  and  $1''$  each way. Compare these measurements with those of a good sized tall bearded iris, or grow the huge yellow 'Inflation' (Ferguson), if you can get it, alongside your other irises and see how its huge blooms dwarf everything around it.

Along with increase in size, the newer spurias have more ruffling and fluting, are showing marked tendencies to branching and consequent better flower placement, greater variation in form—some flattened like the Japanese, some held partially closed by the spathe valve, some tailored, and all beautiful. Small spurias are being bred also, the spuria counterpart of the median bearded irises. For these there is a definite place in compact gardens where space is rationed, and as a change of pace from the tall growing spurias which average forty inches in height in most areas but which

in California may grow right on up to five or six feet.

Spurias set seed easily, self-pollenizing themselves in most instances if allowed to do so and thereafter self-seeding themselves with an abandon which can create confusion in a carefully organized spuria planting. These unsought seedlings are seldom of any value. Valid spuria crosses should be secured by emasculating the tightly rolled bud and bagging it in cellophane. Not all hybridizers are willing to take this much trouble and feel that they get true crosses in such a large percentage of cases that the timesaving justifies the risk. Pollen should be gathered early, before insect contamination, and dried somewhat before using. Another advantage of bagging is that the bags may be left in place to avert loss of seeds from good crosses, should the grower not be on hand when the pods burst open.

The seeds should be planted in cans, pots or directly in the ground where they can be watched for more than one season, since spurias have a way of germinating over a period of two, three, or even more, seasons. In mild climates the seed may be sowed when the pods split and will give a high germination, but fall is the preferred planting time in most areas. The little plants will winter well in cold areas if mulched. Transplanting is done when the plants are a few inches high, with good spacing between the transplants. They should bloom the second year, and the ones to be saved should be set about 4' apart to allow for expansion and to prevent the clumps growing into each other.

Fall is spuria transplanting time, although they may be safely moved in spring if they are not out of the ground too long and the roots are kept damp. But fall, just as the white feeder roots begin to show, is the ideal time. Spurias demand that their roots not dry out after digging, and great care to keep roots damp in moss is required when shipping. First and second year growth will be slow and bloom will be atypical, but after that increase and bloom are good. The clumps need little care for several years and much prefer to be left alone, with only the usual fertilizing. It is wise not to move an entire clump at one time, interrupting the bloom, but to remove rhizomes from the edge of the clump which can be establishing them-





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*Spuria Iris 'Sunny Day'*  
*Winner of the second Eric Nies Award*



selves while the mother plant continues to produce as usual.

Spuria foliage goes brown and dormant in hot climates, and may be braided, tied with raffia or a spuria leaf, or trimmed. But in milder, moister climates, the green, erect spuria foliage is a garden asset most of the garden year.

Sun and good drainage are important. Spurias seem to thrive on a good drying out after bloom season, but in my garden in the Yuma Valley where the entire area is irrigated weekly almost the year long, the spurias thrive most satisfactorily. They are an adaptable iris in that respect, as in so many others.

The spuria species are found in Africa, Asia and Europe, and collectors have supplied the Continental herbaria with preserved specimens and living plants. Both Dr. L. F. Randolph of Cornell University and Dr. Lee W. Lenz, Director of Rancho Santa Ana Botanic Garden, Claremont, California, have collected the spuria wildlings from the Near East across Europe into the Iron Curtain countries. Dr. Randolph, former president of The American Iris Society, has reported in the Bulletins of that organization. Dr. Lenz, Director of its Scientific Committee, has been engaged on a spuria research project for the past four years, the report on which was published in The American Iris Society's Bulletin and *Aliso*, the Claremont periodical, in early summer, 1963.

The Lenz report has been awaited with a great deal of interest for the chromosome counts on the species and cultivars, and reports on some highly interesting hybridizations involving wide crosses from which seed was obtained and embryo-cultured. It opens many interesting new avenues and clarifies the ancestries of some of today's standard commercial varieties. The scientific ramifications of the Lenz report are many, but the spuria grower is chiefly interested in two things: Whence did they come? Whither are they going?

Not too many of the spuria species are good garden subjects, but the charming, fragrant, rapidly increasing little *I. graminea* is ornamental enough to deserve mention. If you do not like hunting under the leaves for violets, you may not like it, for the blooms are hidden by the foliage; but it is worth seeking out. Falls are cream veined purple, stem is flattened. It is native to southern and

central Europe and the Caucasus region of Asia.

*Iris ochroleuca* is one of the very best species, and grows like a weed in thousands of gardens, putting up great clumps of white and yellow blooms which grace church altars at Easter and have afforded the hybridizing pioneers with sturdy qualities still reflected in today's newest hybrids. A native of western Asia Minor, it seems an unlikely candidate for withstanding Midwest and New England winters. But it does, and while it may often go unrecognized as a spuria and be called "Japanese" or "Dutch" in those areas, it thrives and blooms in regions where the newer hybrids succumb to the sub-zero winters. It is one of the most satisfactory species.

*Iris aurea* (*I. crocea*) is probably native to Kashmir, is similar in habit to the tall *I. ochroleuca*, but its flowers are a sunshine yellow.

*Iris spuria*, distributed through eastern Europe and northern Africa, has flowers varying through the blue-purple shades.

*Iris monnieri* and its relations may be determined by the Lenz report. It resembles *I. ochroleuca* but is uniform yellow in the falls.

*Iris halophila*, the salt-loving iris, grows in the Persian salt marshes and in Turkestan, Afghanistan, and other parts of Asia. It is adaptable to gardens; the small, abundant flowers occur in shades of pale blue, purple, dull yellow or white veined with yellow. It is free seedling and capable of crowding out other iris in a garden bed.

*Iris humilis* is common in Hungary and the Caucasus; it is an inconspicuous little plant, with purple veined flowers on a cream ground.

*Iris sintenisii* has white flowers with purple veins and deep purple standards.

*Iris kerneriana* produces rich yellow flowers on stems 6" to 12" tall. It is native of Asia Minor.

*Iris songarica* resembles the spuria and tenuifolia groups. Stems 15" tall bear the flowers with blue falls dotted with purple, standards white with a net of red purple veins and splashes.

Several men pioneered with the beginnings of spuria hybridizing around the turn of the century: Dykes, Foster, Perry, Barr, Branin and others. So few spuria hybrids have appeared recently that the early pioneer introductions are





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### *Spuria Iris in Test Garden, Houston, Texas*

*Shown in the front bed are 'Lark Song', 'Wadi Zem Zem', and 'Canary Island'. In the rear bed are 'Morningtide', 'Fairy Lantern', and 'Azure Dawn'.*

still listed in catalogues. Among the older of these are the glowing violet 'A. J. Balfour' introduced by Barr in 1889 and his 'Lord Wolsely', introduced in 1899, with deep electric-blue purple standards and white falls strikingly overlaid with purple veining, which looks almost like the twin brother of Mrs. Nesmith's 'Royal Toga', introduced in 1955; Sir Michael Foster's 'Monaurea' and 'Monspur', introduced in the 1890's; Farr's 'Mrs. Tait', a soft porcelain blue, introduced in 1912; Barr's electric blue 'Premier', introduced in 1899; and Foster's cream-yellow 'Shelford Giant', introduced in 1913.

Three outstanding early spuria hybridizers who followed the original pioneers are T. A. Washington from the Tennessee mountains, Erie Nies and Carl Milliken of Southern California.

The T. A. Washington spurias orig-

inated in a cold country and they and their descendants are still the standbys in cold climate gardens. 'Euphrosyne', 'Hazy Hills', and 'Fairy Wand' were introduced in 1931; 'Indian Summer' in 1932; 'Harpeth Hills' and 'Ben Lomond' in 1935; 'Skyline', 'Bathsheba', 'Lumiere', and 'Monteagle' in 1936. Mrs. Elizabeth Nesmith of Lowell, Massachusetts was instrumental in getting Mr. Washington to introduce his spurias and has kept New England gardens supplied with them since. She says that Mr. Washington was the first man to breed spurias extensively in the United States, beginning about 1924. Unfortunately he kept no records of his crosses, but Mrs. Nesmith says he had the following growing in his garden and that they undoubtedly represent the ancestry of his spuria lines: *Iris halophila*, *I. monnieri*, *I. ochroleuca*, *I. aurea*, 'Mrs. A. W. Tait'



and a blue 'Monspur' that was either ('Monspur') 'A. J. Balfour' or ('Monspur') 'Cambridge Blue'. The parentage of 'Monspur' was *I. monnieri* × *I. spuria*. The possibility that *I. graminea* entered into the Washington crosses is suggested by the lack of success in crossing the Washington spurias with those of Nies and Milliken, who worked from the larger species forms which do not cross readily with *I. graminea*.

Carl Milliken's records were very sketchy, only fourteen crosses being entered in his breeding books, according to Ben Hager, former president of The Spuria Iris Society. 'Mt. Whitney', the first registered Milliken spuria, is not entered on the breeding books. The magnificent 'White Heron' is thought to be a seedling of 'Mt. Whitney'. 'Wadi Zem Zem', another all-time great spuria in clear cream, almost chartreuse yellow, might have come from any of three 1941 crosses.

Eric Nies hybridized more extensively than either Washington or Milliken, and kept careful records which at his death were passed on to Marion Walker of Ventura, California, along with the Nies spurias. Mr. Walker selected and introduced Nies spurias for several years after Mr. Nies's death, and has carried on the hybridizing program himself to become the dean of today's spuria hybridizers. The first Nies cross was *I. ochroleuca* × 'Monspur', followed by strict line breeding. The Nies and Nies-Walker introductions include:

'Azure Dawn', a slightly ruffled pale blue with good climate adaptability and profuse flowering.

'Blue Display', medium blue.

'Bronzspur', a warmly colored gold and tan.

'Cherokee Chief', still one of the best dark velvet browns.

'Color Guard', a heavily substantiated blue with yellow signal.

'Dutch Defiance', violet blue with light gold patch, large and frilled.

'Fifth Symphony', deep yellow with over all brown veining.

'Golden Agate', brown-bronze and yellow.

'Lark Song', soft creamy white standards and styles, rich yellow flaring falls banded in cream.

'Michigan State', amber gold, bronzed by light veining.

'Pastoral', lavender and gold.

'Perky Maid', brown and yellow.

'Russet Flame', rich russet blend, fair performer.

'Ruth Nies Cabeen', frilled medium blue, small yellow signal.

'Saugatuck', lavender, bronze and yellow blend.

'Sunlit Sea', light violet blue, wide frilled standards and falls, banded blue around bright yellow on falls.

'Two Opals', opalescent lavender buff, very ruffled.

'Yellow Swallowtail', low growing creamy white.

'Zephroso', large honey bicolor with rosy overlay, which increases slowly and blooms irregularly.

'Kathy Cabeen', greenish yellow standards, falls deep yellow veined greenish yellow, with a chartreuse effect.

'Fairy Lantern', blend of pale blue heavily overlaid yellow.

'Katrina Nies', violet and orange.

'Morgenstraal', blue.

'Blackpoint', chocolate brown with huge cigar-like buds.

Marion Walker has carried on from the propitious beginnings of the Nies spurias and stands out in the present restricted field of spuria hybridizers for his determined effort to produce virus-free spurias with greater garden value, all-climate adaptability, profuse flowering, improved color and form. His introductions are valued, since he conscientiously evaluates all seedlings for several seasons before introducing even a fraction of the best. Meanwhile, his seedlings are on trial in private and public test gardens across the country, to determine hardiness in varying climates. His refusal to make hasty introductions has put a hallmark of excellence on Walker spurias. Walker feels that spuria selections are still lamentably close to the species, but he has brought spurias a long way and brought almost an entirely new look to this group. Spurias viewed in his garden or those entered non-competitively each spring at the exhibits of the Southern California Iris Society, show what this skilled hybridizer has accomplished. Such shows give encouragement to others who aspire to improve the versatile spuria iris.

Among the Walker introductions are 'Blue Nightshade', a blue purple; 'Canary Island', canary yellow and cream; 'Driftwood', a great iris of deep velvety brown with excellent garden value; 'El



Camino', yellow; 'Gay Lark', deep yellow; 'Morningtide', huge blue-white; 'Autumn Glow', tan and brown; 'El Camino', deep orange yellow self from Nies's 'Grace Perry Nies'  $\times$  Milliken's 'Wadi Zem Zem'; 'Violet Veil', standards light yellow heavily veined violet.

Mrs. Frances Combs' 'Golden Lady' is a huge ruffled pale yellow self from 'Wadi Zem Zem'  $\times$  'White Heron'. It is in great demand.

Tom Craig gave up spuria hybridizing after being discouraged by a series of misfortunes; it is hoped that some day he will resume hybridizing. His introductions widely sold include: 'White Crane', an unregistered white, similar to 'White Heron' and Ferguson's 'Wake-robin'; 'Big Cloud', white with yellow influence; 'Blue Valentine', pale blue and yellow blend with heart-shaped falls; 'Blue Pinafore', pale blue; 'Sunnyside', white and yellow bicolor; and 'Sweet Butter', creamy yellow.

Walker Ferguson of Escondido, California, is a discriminating breeder whose output of fine spurias includes: 'Banners of Blue', a very late 'Thrush Song'  $\times$  'Blue Acres' cross in strong blue; 'Counterpoint', violet standards and light yellow falls with violet lines, very unusual; 'Dark Silk', medium sized flowers in dark purple, small gold signal; 'Good Nature', lemon yellow self; 'Thrush Song', outstanding with blue-purple standards and blue-purple falls with small gold signal; 'Wakerobin', large white probably destined to become a spuria classic; 'Windfall', white with yellow signal.

Tell Muhlestein of Provo, Utah, a longtime tall bearded iris hybridizer, has recently entered the spuria field and his entries are being very well received and awarded. They include 'Big Golden', 'Fluted Opals', 'Fluted Buttercup', yellow bicolor; and 'Laced Butterfly', pale blue-violet. Cold climate gardeners are watching the Provo, Utah, spurias with interest for winter hardiness.

Other hybridizers have introduced spurias of variable quality, in small or large numbers. Among those time proven ones still to be located in catalogues and gardens are H. P. Sass's yellow 'Sunny Day', a fairly good spuria which

blooms freely in all climates; Edward Brennan's 'Bronze Butterfly', inexpensive and still one of the good bronzes; and Foster's creamy 'Shelford Giant'. Even the 1882 introduction of Borbas, 'Lilacina', is to be found at Rancho Santa Ana Botanic Garden and presumably in other gardens in the area. It is very narrow in all its parts, but has a charming orchid lavender flower.

All too many of the early introductions of the century have disappeared, or bloom anonymously in old gardens. Their historic value is something like that of old automobiles, and the nine Spuria Display Gardens across the United States would be happy to obtain these floral relics.

The Spuria Display Gardens, launched by the Spuria Iris Society about three years ago, are beginning to draw many spring visitors where they are locally publicized. Spuria blooming season varies from area to area, but everywhere follows the tall bearded iris. Gardeners are urged to visit the following Spuria Display Gardens:

Los Angeles State and County Arboretum, Arcadia, California.

Raleigh Hills Iris Gardens, Portland, Oregon.

Botanical Gardens, Denver, Colorado.

Will Rogers Gardens, Oklahoma City Park, Oklahoma City, Oklahoma.

Clemson College Varietal Trial Gardens, Clemson, South Carolina.

Presby Memorial Gardens, Montclair, New Jersey.

El Paso Spuria Display Garden, El Paso Parks, El Paso, Texas.

Wade Palmer Garden, 1218 Los Arboles Road, Albuquerque, New Mexico.

Ketchum Memorial Iris Gardens, Memphis, Tennessee.

Spurias are difficult to locate in nurseries or catalogs. The best sources of supply, varietal and cultural information, are to be had through the publications of the Spuria Iris Society, Mrs. Mac W. Holloway, Secretary-Treasurer, 673 Acacia Avenue, North Sacramento, California; dues \$1.00; and the American Iris Society, Clifford W. Benson, Secretary, 2237 Tower Grove Avenue, St. Louis 10, Missouri, dues \$5.00.





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*Figure 1. *Pyrus calleryana* 'Bradford' selected from a lot of seed introduced from Nanking, China, in 1919.*



# A New Flowering Shade Tree— The 'Bradford' Pear

W. E. WHITEHOUSE,\* J. L. CREECH,\* and G. A. SEATON\*\*

With the changes in landscape planning to meet the needs of modern homes and the desire of community planning groups to express individuality as well as to avoid some of the problems associated with certain of our shade trees, new guide-lines have been established in the selection of varieties to comply with these and other requirements.

Most of us are aware that many splendid shade trees, native to China, Japan, and Europe, maintained in our leading botanical gardens and arboretums have never been selected as street trees. Eighty-five percent of the trees for street planting are propagated by seed. The limited use of varietal selections of tree species introduced into the United States may be partly due to imperfect data on variation within the species because of limited sampling by collectors.

While it may never be possible to find or develop the perfect shade tree for highways, parks, or residential use, varieties which have resulted from the evaluation of woody ornamental introductions or as by-products of fruit and nut evaluation provide ample proof of the soundness of making plant collections throughout the range of species distribution as a means of developing better ornamental selections. For example, the 'Bradford' ornamental pear, a non-spiny selection of a Chinese pear species, *Pyrus calleryana* Decne., is being used in new landscape planning in the vicinity of Washington, D. C. This ornamental pear honors the late F. C. Bradford, formerly horticulturist in charge of the U. S. Plant Introduction Station, Glenn Dale, Maryland, and was released recently by the Crops Research Division for trial as a shade tree.

In 1918, the Department's Office of Foreign Plant Introduction, in cooperation with other agencies, conducted a search for improved root-stocks for our commercial pear varieties. One of the

last important pieces of exploration work of the late Frank N. Meyer was the collection of more than 100 pounds of seed of *Pyrus calleryana* in the mountains in and around Ichang, China. At the Glenn Dale station, large seedling populations of pear species native to the Orient were tested for vigor and uniformity of growth, stock-scion compatibility, resistance to leaf blight (*Fabraea maculata* Atk.), fire blight (*Erwinia amylovora* (Burr.) Winslow et al), woolly pear aphid (*Eriosoma pyricola* Baker & Davidson), and other troublesome diseases and insects.

A vigorous non-spiny seedling, found among the normally spiny *Pyrus calleryana* seedlings under test, was transplanted to a permanent site on the station grounds. This tree, now 44 years old, has an approximate height of 50 feet and its broad ovate form has developed a spread of 30 feet (Figure 1). During the past decade, it twice experienced winds of hurricane violence with only minor damage to tree form. Propagated on its own seedlings and given good culture, growth of young 'Bradford' trees is vigorous (Figure 2). An occasional young tree has suffered minor damage from winds of lesser magnitude. Tree performance under these conditions is a tribute to the strength of its strong scaffold branch-trunk framework and the soil-anchorage quality of its capable deep root system. The roots of the older tree at Glenn Dale have not surfaced about ground—a characteristic which eliminates some species as candidates for planting near sidewalks and in plaza areas.

*Pyrus calleryana* is widely distributed in China and is not uncommonly found on mountains at an elevation of 3,000 to 4,500 feet. In the eastern United States it is growing well as far north as Boston, Massachusetts, and as far south as Brooksville, Florida.

Unlike some shade trees, the Callery pear has been singularly free of diseases and insects. Because of these qualities,

U. S. Department of Agriculture, Agriculture Research Service, Crops Research Division, Beltsville\* and Glenn Dale,\*\* Maryland.





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*Figure 2. A single tree of 'Bradford' pear trained with a high head typifies the characteristic growth of this shade tree when properly pruned.*





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*Figure 3. Dwarf growth of drought-resistant *Pyrus calleryana* growing on decomposed porphyritic rock of a severely eroded mountain top at an elevation of 2,000 feet, in China.*

*Figure 4. *Pyrus calleryana* seedling in China, part of its roots submerged in water and part anchored in the earth bank.*

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*Figure 5. The character of 'Bradford' is due to the dense clusters of white flowers and the tiny fruits as shown here.*



horticulturists became interested in testing it as a rootstock for commercial pear varieties in the early 1930's. In the wild and during trials in the United States Callery pear seedlings have prospered under most trying conditions.

The late Frank N. Meyer first called attention to its capacity to thrive under a wide range of soil environment (Figures 3 and 4). A decade later the southern Oregon substation testing *P. calleryana* as a rootstock for 'Bartlett' and other pear varieties found Callery seedlings well adapted to local heavy and light soil. Several vigorous and desirable strains were isolated and propagated. The South Haven, Michigan, substation reported variable growth of commercial pear varieties grown on *P. calleryana* seedlings. These and other reports suggest the desirability of propagating 'Bradford' on its own seedlings until more is known about *P. calleryana* seedling variability.

### Street and Lawn Tree Evaluation

'Bradford' is one of the earliest trees to bloom. Flowering about the same time as *Prunus subhirtella* Miq. in the vicinity of Washington, D. C., it ranks favorably with early spring flowering trees. When in full flower, in late March or early April, the medium sized densely headed tree with its myriad of spur-borne dense flower clusters, consisting of ten to twelve non-fragrant slightly off-white flowers peppered with darker stamens, is quite attractive (Figure 5). The blossoms appear to be a solid block of white different from the loose, filmy aspect of *P. subhirtella* and serve as a wonderful contrast to the yellow and purple colors of early blooming bulbs.

During the spring and summer the thick glossy-green, broad, ovate leaves of the 'Bradford' pear tree present a pleasing picture, particularly as they stir in the breeze and their wavy edges catch and reflect the sun's rays. In the fall the tree is at its best in areas where early-fall frosts favor leaf-color change and the leaves take on color hues varying from attractive yellow to bronzy red. Leaves color well in New Jersey, Maryland, Iowa, New York, and at Pullman, Washington, but did not take on fall color at Medford, Oregon. The leaves remain on the trees until early winter long after those of elm, maple, sycamore, and others have fallen and they finally fall

over a short period. The numerous, small, inedible, russet-colored fruits remain on the tree until they are eaten by wild life or disintegrate. The non-littering characteristic of this ornamental pear tree is a particularly valuable asset. The small pear fruits lend character to the interesting winter form of the tree.

As the 'Bradford' tree at Glenn Dale reached maturity, its potential as an ornamental shade tree became more and more apparent. In 1954, J. L. Creech in cooperation with home owners in a nearby treeless subdivision, arranged for an evaluation of this variety as a street tree.

The University Park, Maryland test site was selected because an earlier soil survey had shown it to contain considerable soil variability and above-average soil moisture content during the growing season because of numerous underground springs. The narrow grass strips between curb and sidewalk, typical of most modern subdivisions, were planted to some 180 trees spaced 50 feet apart (Figure 6). At planting the trees consisted of one year variety whips 3 to 5 feet long budded on 2 year 'Bradford' seedling roots. Planting was supervised by an experienced nurseryman.

### Transplanting and Training

Transplanting and establishment of trees was successful largely because the 2-year old 'Bradford' seedling root systems are well developed and planting was done by experienced workers. During the season after planting tree functions were largely devoted to root development. Except for removal of growth at the base of the trunk and slight heading back of any strong lateral branches, no pruning was necessary. As much leaf surface as possible was left for manufacture of food needed for vigorous root and top development during the second season. Some movement of manufactured foods from twigs into heavier wood and to the roots took place immediately after leaf fall. Before growth started in the spring, stored food moved from the roots into areas of active growth. Pruning was done just before the sap started moving in the spring. Delaying pruning until growth starts results in loss of food and trees that are pruned in the late spring may only partially heal pruning wounds before cold weather. The inherent capacity of this





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*Figure 6. A street lined with 'Bradford' ornamental pear trees shows the dense upright habit and uniformity of growth attained by the use of vegetatively propagated trees and careful pruning.*



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*Figure 7. The 'Bradford' ornamental pear trees in full bloom in April. Of particular merit is the rather complete distribution of flowers over the entire tree.*



pear for development of vigorous top growth during the first two growing seasons after planting is shown in the photograph of a tree which received a high-nitrogen fertilizer and application of frequent water during this period. Development of sucker growth along the trunk continued until the tree reached 6 years of age; suckers were removed either by rubbing off during early spring or summer or by pruning off the following spring. Training of the trees started after the second season's growth.

A modified leader system, readily adapted to the vigorous dense growth habit of the 'Bradford' pear, was used. Objectives were pedestrian and vehicular clearance, attractive tree form at all times, strong tree framework, and minimum maintenance pruning after the sixth year. During the spring of 1955, the majority of the lateral branches were removed close to the trunk and those left for one more season for manufacture of food were headed back. The leader was left untouched. This type of pruning was repeated each year, until it was possible to select the first of the whorl of four wide-angled scaffold framework branches at a point 7 feet from the ground; this branch growing parallel to the sidewalk. Upon completion of the whorl the other three scaffolds are equally spaced around the trunk approximately 10 inches apart. The unshaded trunk was protected from sunscald injury during the first 6 years through the use of a

good tree wrap and from cat claw injury with a 1/4-inch mesh hardware cloth guard at least 3 feet high.

At the end of the fourth season's growth, it is possible to complete the development of a second whorl of scaffold branches spaced a foot above the first scaffold framework. All growth arising along the trunk between the two whorls is removed. This type of pruning serves two purposes: (1) It thins out the dense growth in this area and (2) it provides for removal of lower scaffold branches later as needed for traffic clearance without destroying tree form. The vigorous dense growth habit makes possible intelligent pruning of the top for clearance of overhead utility wires. Training was complete at the end of the fifth season's growth. At 8 years of age the trees have been unpruned for 3 years and are large enough to put on an effective display of spring flowering (Figure 7). Some variation in tree size is observed at this stage, but on the whole the trees in this planting are quite uniform in size and form. Characteristics needed in a good street, park, or lawn tree are described in various magazines and books. The 'Bradford' ornamental pear has most of these qualifications and should prove to be a worthwhile addition to the current shade tree list. In 1962, the New Jersey Federation of Shade Tree Commissioners included this variety in a list of 81 shade tree species and clones recommended for New Jersey streets.





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*Joseph F. Rock in Chaulmoogra Plantation in Hawaii*



# Joseph F. Rock, 1884-1962\*

ALVIN K. CHOCK\*\*

Almost sixty years ago a young Austrian left his homeland to see the world and regain his health. His trip around the world was to be postponed for a decade, for he made a prolonged stop-over in Hawaii. During his lifetime he made his home in Hawaii and China. This energetic, versatile, and legendary scientist became recognized throughout the world first as a botanist, then as plant collector, naturalist, and explorer. His explorations and his remarkable linguistic ability led him to become a geographer, orientalist, philologist, and anthropologist. His contributions were legion and they enlightened, increased, and diffused mankind's knowledge about the flora of the Hawaiian Islands and the natural history of Western China and Eastern Tibet.

Dr. Joseph Francis Charles Rock (Josef Franz Karl Rock) was born to Franz and Francisca (Hofer) Rock on January 13, 1884, in Vienna, Austria. His mother died when he was only six years old and his older sister and father cared for him. His family felt that his destiny lay in the Church and directed his early training toward the priesthood. His own inclinations, however, did not point in this direction. Even as a young child he developed a lively curiosity about strange lands and their strange tongues, triggered by a visit to Egypt with his father at age 10. In Egypt he learned to speak Arabic so fluently that at age 16 he taught the language at the University. At home he taught himself Chinese, studying it by candle light after the household had retired. This conflict between his father's and sister's plan for his life and his own interests in the

world about him led him to leave home as soon as his formal education at the Vienna Schoten Gymnasium and Vienna University was completed.

He wandered about Europe and was in Antwerp when he decided to spend the summer in England. However, he missed the channel steamer and on impulse bought passage for the United States, leaving Antwerp on board the SS Zeeland and arriving in New York on September 9, 1905. After a short stay in New York, his health forced him to seek a warmer and drier climate and he went to Texas where he attended the University to gain greater proficiency in English. This set the linguistic pattern for the rest of his life, for from that time on all of his writing was done in English. Forsaking the land of his birth, he became a naturalized citizen in May 1913. His health did not improve appreciably and he was advised to go to Arizona. However, he had always had a longing to see the tropics, so against the doctor's advice that he had but three months to live unless he sought dry desert air, he set off for Hawaii. An interesting fact is that Dr. William Hillebrand, who preceded him as resident botanist, was also afflicted with tuberculosis. Like his predecessor, Rock recovered in Hawaii's salubrious climate and regained his health.

His first position upon his arrival in Honolulu in 1907 was as one of the three full-time teachers at Mills School. The following year the school became known as Mid-Pacific Institute. In September 1908 Rock resigned for reasons of health in order to be out-of-doors, and was placed on official leave of absence by the school. That same month he went on a botany trip with Charles N. Forbes, Assistant in Botany at the B. P. Bishop Museum, who had arrived in June. Rock showed him a tree which he had seen two months before. In Forbes' first publication of new Hawaiian plants, he named that tree *Euphorbia rockii* in honor of Rock.

\*Reprinted, with permission, from *Newsletter of the Hawaiian Botanical Society*, Vol. 2, No. 1, Jan. 1963 and *Taxon*, Vol. 12, No. 3, April 1963. (Both containing Dr. Rock's bibliography.)

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In October 1908 he joined the Division of Forestry, Board of Commissioners of Agriculture and Forestry, Territory of Hawaii (now Forestry Division, Department of Land and Natural Resources, State of Hawaii), first as Botanical Collector, and later as Botanical Assistant. His assignment as the first and only Botanist of the Board consisted of collecting seeds of rare Hawaiian trees and shrubs for exchange purposes and of establishing a herbarium. His botanical knowledge was largely self-taught, but his tremendous capability made the task easy. He applied himself by studying the available botanical literature and quickly became thoroughly familiar with the native flora by spending most of his time in the field on the different islands pursuing his studies. His interest in botany was not limited to the woody plants. He made a complete fern collection and at Waikiki Beach collected *limu* (algae), utilizing what was perhaps the first glass bottomed boat in Hawaii which Alexander Hume Ford built for him. The herbarium he developed from his own Hawaiian plant collections and from exchanges with mainland U. S. and European herbaria. Such specialists as O. Beccari, E. B. Copeland, C. de Candolle, A. Heimerl, F. L. Lewton, U. Martelli, L. Radlkofer, and A. Zahlbruckner, collaborated with him in the identification of Hawaiian plants and published many new species from his collections. The forestry and botany exhibit which he prepared for the Alaska-Yukon-Pacific Exposition in 1909 won a gold medal. He wrote many reports in the Board's *Biennial Reports* and *The Hawaiian Forester and Agriculturist*. His early scientific publications comprise the entire *Botanical Bulletin* series of the Board.

On September 1, 1911, he was transferred to the College of Hawaii as Botanist since the Board of Agriculture & Forestry's funds for botanical purposes were limited. Arrangements for the transfer of the herbarium to the College on an indefinite loan basis were completed the following summer when the College's first permanent building was constructed. Despite the changeover, he continued his relationship with the Board in an honorary capacity as Consulting Botanist until 1921. At the four year old College, which had that year changed its name from the College of

Agriculture and Mechanic Arts to the College of Hawaii, Rock was placed in charge of the herbarium.

In June 1913 with a Bishop Museum Expedition he made a trip to Palmyra Island which produced the Flora of Palmyra. During the 1913-14 school year he made a trip around the world at his own expense, but his trip was not a selfish one. He collected seeds and plants for the reforestation of Mauna Kea and Haleakala for the Board of Agriculture and Forestry; bamboos from the Himalayan area for planting in the Panama Canal Zone at the request of the Bureau of Plant Industry, U. S. Department of Agriculture (which association was to continue in a Collaborator status until 1944); and examined Hawaiian herbarium specimens in European and American institutions for the College. While at the Botanisches Museum at Berlin-Dahlem, Rock obtained permission to take 1,000 sheets of fragments and duplicates from the type collections of William Hillebrand, M.D., which were made during his residence in the islands in 1851-71. This was fortunate since the museum's herbarium was destroyed on March 1, 1943, during World War II. Portions of the type specimens of Hawaiian plants described by Dr. Asa Gray were also obtained from the Gray Herbarium at Harvard University, and photographs of Hawaiian specimens were made at the Harvard, Berlin, Vienna, and Paris museums. He developed the herbarium further by securing Hawaiian plant collections and specimens from Australia, Ceylon, Cuba, Central and South America, Java, Mauritius, New Zealand, and the Philippines through exchanges with other institutions. He subsequently made several other plant introduction trips, all at his own expense: in 1916 to the Philippines, Java, and Singapore; in 1917 to southern California; and in 1919 to Siam, Malaya, and Java.

After 1914 he was listed in the college's catalog as the only instructor of the Systematic Botany Division's courses: "Botany 10. Systematic Botany for Advanced Students" (first and second semesters, three credits) and "Botany II. Advanced Research Work in Phaenogamic Botany" (credits arranged). In 1919 he was officially appointed Professor of Systematic Botany. One of his former students, Edwin H. Bryan, Jr.



(now Curator of Collections, and Manager, Pacific Scientific Information Center, B. P. Bishop Museum), who was then a part-time Assistant in Entomology at the Museum, recalls that he was the only student in Rock's systematic botany class in 1919-20. Rock would lecture informally in Latin or English, and Bryan transcribed these notes. Bryan was secretary, laboratory assistant, and mounter for several hours each day during these informal "class" sessions, and assisted in the descriptions and bibliographic data for *Pritchardia*, *Plantago*, and other plant groups. Rock's memory was phenomenal—there were piles of books and specimens all over his small work room since there were few shelves and cabinets, but he knew where everything was in spite of the apparent disorder. Before Rock left Hawaii, he and Bryan arranged and cataloged the herbarium.

In 1914 Rock was appointed to the Buildings and Grounds Faculty Committee, and placed in charge of the plantings for the twenty acres allotted for the campus as a botanical garden. According to the President's Report for 1915-17, "In order properly to develop these plantings we have prepared a permanent plan for placing the buildings and drives so that no valuable plants need be planted in situations which will later be needed for other purposes." By 1918 Rock had planted 500 different species on the campus. These plants were from Asia, Indonesia, America, and Hawaii. All of the native plants were grown from seeds, and many of them were from Rock's type collections of new species.

During his residence in Hawaii, this thorough and dynamic plant collector explored all the major islands, staying at each for weeks and months. He took with him his botanical equipment and a view camera with glass plates. He enlisted local residents as collecting assistants and as subscribers to publish his books. His botanizing resulted in the publication, by patronage, of *The Indigenous Trees of the Hawaiian Islands* in 1913. In the preface he apologizes for his construction of sentences, since English was not his native language, and thereby committed what is perhaps the only grammatical error. Another tome followed four years later, *The Ornamental Trees of Hawaii*. Both volumes were

profusely illustrated with his photographs. He made a list of plants located in Mrs. Mary E. Foster's estate in Nuuanu Valley, Honolulu. This was significant because most of the plants were introduced by Hillebrand whose home this once was. The site later became Foster Botanical Garden under the jurisdiction of the Department of Parks and Recreation, City and County of Honolulu.

Dr. Rock was a member of the Advisory Committee, Experiment Station of the Hawaiian Sugar Planters' Association. Because of the need for water to irrigate the sugar cane fields, he cooperated with them on water development since the watersheds are contained in the forest reserves. They in turn published his treatise, *The Leguminous Plants of Hawaii*.

Regarding his affiliation with the Bernice P. Bishop Museum during these years, both Rock and the Museum several times contemplated a more permanent relationship although none was consummated until 1955. There was, nevertheless, beginning in 1908 a co-operative relationship between the two. In 1908 Forbes and Rock collected in several localities on Oahu. In 1913 Dr. C. Montague Cooke, Jr., and Rock went to Palmyra Island to collect shells and plants for 16 days. The Museum published two of his monographs in the *Memoirs* series. The first, on the Lobelioids in 1919, was one in which the Director, Dr. W. T. Brigham had expressed a keen interest 11 years before. On the day the monograph was issued, Rock told the Museum that it was his hope "that every family would eventually be worked up in a similar style, the whole forming an Illustrated Flora of the Hawaiian Islands." Two years later a monograph on *Pritchardia* was published with Odoardo Beccari as co-author. As in his earlier works, both of these illustrated the various taxa. Shortly after Rock left Hawaii he donated to the Museum his photographs and the manuscript of Hillebrand's *Flora of the Hawaiian Islands* (1888) which he had obtained in Washington, D. C. from Hillebrand's son.

In 1920, at the time of the transition of the College of Hawaii to University status, a reciprocity agreement between the University and the Museum was made and, by legislation, the Museum became the Territory's depository for





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***Mrs. Marston, the lone white person (American Lady) in Ching tung, photographed in her mission compound on the day of Dr. Rock's departure, April 4, 1922.***

systematic collections. The museum was to maintain the collections with the University assisting in the actual collecting. In 1922, the herbarium of 28,000 specimens which Rock had amassed for the herbaria of the Board of Agriculture and Forestry and the University of Hawaii was transferred to the Bishop Museum, which at that time had only 53,000 specimens. In 1941 the remainder of the Board's herbarium of 529 specimens, of which 315 were Rock's, and in 1958 the Hawaiian Sugar Planters' Association Herbarium of 3,000 specimens (about 10% having been collected by Rock) were given to the Museum. Rock himself was to deposit the specimens he collected after 1953 in the Museum.

On May 25, 1920, Rock left Hawaii to spend the next three decades in active exploration and research in Asia. During this period he was to collect thousands of botanical, ornithological, and zoological specimens; to introduce thousands of Asiatic plants to the United States; to map and photograph heretofore unknown regions; to translate volumes of native literature; to do research on the peoples, culture, folklore, religion, and geography of western China

and eastern Tibet memorialized through innumerable books, articles in scientific journals, and in the *National Geographic Magazine*.

Rock had always had a desire to travel in the Orient and the Office of Foreign Seed and Plant Introduction, Bureau of Plant Industry, U. S. Department of Agriculture first provided this opportunity for him. In 1920 he was sent to Indo-China, Siam, Burma, and India to find seeds of the chaulmoogra (*Hydnocarpus kurzii* (King) Warberg). In 1918 Dr. A. L. Dean, President of the College of Hawaii, had prepared constituents of the chaulmoogra oil in large quantities for clinical use and established them as the first usable cure for Hansen's disease. Due to the success of Rock's exploration, a plantation of 2,980 trees of this and related species were planted in the Waiahole Forest Reserve on Oahu in 1921-22.

In 1922 Rock took up his residence in Li-chiang, the heart of the Na-khi country. His interest in these aboriginal people and their unique culture led him to make, a decade later, his life work the study of the Na-khi tribe of northwest Yün-nan Province, China.



Using Li-chiang as a base, Rock explored and collected plants on the nearby Snow Range to the 17,000 foot level, in the Kingdom of Mu-li, and along the Burma-China border. By 1923 he was far into Yün-nan Province in southwest China, and the National Geographic Society took over the sponsorship of his explorations for more than a year. He continued his work in the mountain ranges in the vicinity of the Mekong and Yangtze Rivers, searching for new plant material. During this period he collected over 80,000 plant specimens, as well as seeds of many Asiatic ornamentals as yet not introduced into the Western World. He also collected 1,600 skins of birds which were presented to the U. S. National Museum.

In 1924 Rock returned to Washington, D. C., visiting the Arnold Arboretum that summer. Professor C. S. Sargent, Director, expressed his interest in sending a botanist to collect seeds of woody plants from two little known mountain ranges (Amnye Ma-chhen and Richthofen) near the Yellow River. As a result of this conference, Rock was selected to do this under the sponsorship of Harvard University. In addition to collecting for the Arnold Arboretum, the Museum of Comparative Zoology directed the collecting of ornithological specimens from northwest China and Tibet. Rock returned to Yün-nan Province and secured the help of his former Na-khi assistants. In spite of bouts with flu and bronchitis, and with his expedition repeatedly threatened with brigand attacks, the Arboretum received the first packet of seeds one year after he left San Francisco. More were sent later. These were distributed to all principal botanical and horticultural institutions in the northern parts of North America and Europe. Rock explored the Yangtze River country, along the Kansu-Szechuan border, the Tebbu region in southwestern Kansu, and the Koko Nor Lake at 10,700 ft. elevation in northeast Tibet. He searched for plant material in the Richthofen Range, only to discover that it was almost bare of vegetation. Nevertheless, he collected as much seed as he could. In later years it was discovered that the conifer seeds which he collected proved to be important in the reforestation of areas with a severe climate. He spent the winter of 1925-26 in the Lamasary of Cho-ni on the Kansu Steppes.

There he observed the Butter Festival and the Mystery Plays of this almost unknown tribe. In the spring he made a reconnaissance of the Amnye Ma-chhen Range, hurried because of hostile Golock tribesmen, followed by several months exploring the Tebbu country, an area rich in wild mountain scenery and beautiful flora where no Caucasian had ever before set foot. He wintered in Cho-ni again. In the spring of 1927 he left in a southwesterly direction to Kuan-hsien, crossed the plain to Cheng-tu, and took the overland route to Chungking before proceeding by steamer to Shanghai, arriving there in May 1927. On this botanical and zoological expedition, he collected 20,000 herbarium specimens in addition to the many packets of propagative material, and 1,000 skins of birds, although the latter collection was a secondary task.

In 1927 after a short rest in the United States the National Geographic Society appointed him to direct their Southwest China Expedition, a three year task. By May 1928 he was in Yungning, home of the Hli-khin (Mo-so) tribe, and then in Mu-li, Szechuan Province, before exploring and collecting on the 14,000 and 17,000 ft. levels of the Konka Risumgongba Range. The winter was spent in Nv-lv-k'ö, Yün-nan, where he explored the eastern slopes of the Li-chiang Snow Range. In the spring he returned to Mu-li to explore and map the Minya Konka Range. During the late summer and fall he was in the valleys and ranges of the great river trenches of Asia: the Yalung, Mekong, Salwin and Yangtze Rivers. There some of the canyon walls were over two miles above the rivers. He returned to Nv-lv-k'ö for the winter of 1929-30, continuing the survey of the eastern slopes of the Li-chiang Snow Range. Along with the thousands of plant specimens and seeds collected, he sent 1,700 birds to the U. S. National Museum.

In 1930 Rock returned to the United States for a short visit and was sent back to China for two years, this time by the Harvard Museum of Comparative Zoology. During this period he faced many difficulties for the country was filled with bandits. Again with his Na-khi assistants, he explored the Mekong and Salwin valleys and the Irrawaddy headwaters, collecting 1,800 skins of birds. The University of California Botanical





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### **J. F. Rock Expedition**

#### ***Caravan camping under *Ficus religiosa* of the Wat Luang of Muang Hai, Yün-nan.***

Garden undertook Rock's research in 1932-33. Again he collected thousands of seeds and herbarium specimens from western China, including species of *Rhododendron*, *Potentilla*, *Berberis*, *Meconopsis*, and *Primula*, which were distributed by the University to many other botanical gardens, including the Royal Botanic Garden at Edinburgh.

Many times during these different expeditions Rock was thought to be "lost." As Honorary Collaborator for the U. S. National Museum, his research encompassed ethnology, botany, and zoology. He was also Collaborator with the Harvard-Yenching Institute and Agricultural Advisor to the Provincial Government of Yün-nan. This portion of his life is vividly depicted in a series of ten highly pictorial articles which he contributed to the *National Geographic Magazine* (1922-35).

On his way to Europe in 1933, he told Honolulu newspaper reporters that he now considered himself "too old" for exploration and living in the wilds, for it was a month's journey to the nearest physician. However, after spending the holidays in Vienna, he went back to China in 1934 via the United States and Hawaii. The exploration portion of his life was now behind him and he con-

tinued, on his own, his studies of the Na-khi peoples which he had begun two years before. For nearly 12 years he studied and translated religious texts of the Na-khi tribe of northeast Yün-nan Province. He had agents scouring China for rare classics and texts. In 1935 because of the conflict between the Chinese Nationalists and Communists he evacuated his library to Indo-China, returned it to Kunming, and had to repeat this the following year for the same reasons. Many times during this period at the urging of his friends he thought of returning to Hawaii because of the political unrest in China. During 1938-40 he held the position of Research Professor in Chinese Culture at the University of Hawaii. In 1938 the Japanese bombed Kunming and for the third time he sent his library to Indo-China. Except for a brief period in Europe, he was almost continuously in Dalat, South Annam from 1938 until 1940, when he directed the U. S. National Museum's ornithological expedition to Annam and Cambodia. In 1941, the Japanese bombing of Shanghai destroyed the plates of a four volume work in the process of printing. By this time he had published six articles and two books about the Na-khi people.





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### *J. F. Rock Expedition*

#### *Another view of the caravan camping at Wat Luang of Muang Hai, Yün-nan.*

His research was further interrupted by World War II. In 1944 he was evacuated by plane to the United States, becoming Expert Consultant and Geographic Specialist and later, until 1945, Research Analyst for the U. S. Army Map Service in Washington, D. C. As the only authority of that region, he prepared maps of western China for military use. The Minya Konka Range which he had mapped and explored for the National Geographic Society in 1929 was the route which American pilots flew between India and Chungking, China.

The culmination of twelve years of research was lost when the ship carrying his manuscripts from Calcutta to the United States was sunk by Japanese torpedoes in the Arabian Sea. All that was left were three photostated volumes which Walter Swingle of the U.S.D.A. had insisted be deposited in the Library of Congress in 1934. At this time he was offered a Research Associate position at the University of Hawaii but chose instead to return to China to continue his research.

As Research Fellow of the Harvard-Yenching Institute from 1945 to 1950, he was finally able to return to China at the end of 1946. He again resided in

Li-chiang to continue his translations of the pictographic and syllabic scripts of the Na-khi tribe. In 1948 he was forced to go to Boston for a brief period because of illness. In May 1949 a band of 4,000 bandits threatened to capture Li-chiang and he was forced to flee to Kunming and the Na-khi Dto-mba, who was assisting Rock with his translations, fled to his home. When the bandits were defeated a month later, he returned to Li-chiang by plane and was greeted by an army with machine guns leveled at him. There he found that the day before his arrival, the town had been taken over by Communists. After they searched his possessions for arms, they left. He was told by the villagers that Americans were no longer wanted in China. The Na-khi Dto-mba did not return for fear of reprisals. Rock remained in Li-chiang for a month. After being proclaimed as one of the public enemies by the Communists, he was finally forced to leave his beloved China forever.

He went to Rome to confer with Professor Giuseppe Tucci, President of the Italian Institute of the Middle and Far East about continuing his work. The Institute undertook publication of several of his volumes in their *Oriental Series*. He spent the next two years be-



tween England and India, still with the hope of being able to return to China.

During and after his residence in China, he collected and translated key volumes of over 8,000 books of the original literature of the Na-khi tribe, wrote many articles and books about the Na-khi, and took the first natural color photographs of the Tibetan borderland regions. He introduced into the Western World 493 species of *Rhododendron*, more than had been previously known in America. Plants were distributed by his sponsoring institutions and planted in the Golden Gate State Park in San Francisco, the University of California Botanical Garden, the Puget Sound Area, the eastern coast of the United States, Canada, the Arnold Arboretum, Kew Gardens, and the Royal Botanic Gardens at Edinburgh. He also introduced blight-resistant chestnuts from China which were widely distributed by the USDA in the hopes of restoring this plant to the American forests. During one trip he collected 6,000 chestnut plants. He also brought back many conifer seeds, including spruce, fir, hemlock, pine, and juniper, as well as hundreds of flowering plants. His thousands of herbarium specimens and birds and scores of mammals were deposited in the U. S. National Museum, Arnold Arboretum, and the Harvard Museum of Comparative Zoology. Portions of his plant collections were sent to European herbaria for determinations and duplicates are to be found there and in other American institutions.

His valuable Oriental library, once at the University of Hawaii, and at different times in storage or in transit, was eventually purchased by the University of Washington for \$25,000. Because of his outstanding contributions to the knowledge of western China through his numerous publications, he was appointed permanent Honorary Research Associate at the University of Washington's Far East & Russian Institute in 1954.

Increased interest in the establishment of a botanical garden in Hawaii eventually returned him to his beloved Hawaiian Islands. For a time he made his headquarters with his contemporary, Dr. Harold L. Lyon, Director Emeritus of the HSPA Experiment Station. During his visit in 1953, he had prints made of Hillebrand's types of Hawaiian plants. The following year he spent most of his

time on the island of Maui. In 1955-56 he botanized on Kauai and Hawaii, and 1956-57 on Hawaii.

In December 1955 Dr. Rock was appointed Honorary Associate in Botany at the Bernice P. Bishop Museum and later published four papers on new species discovered, mainly in the *Lobeliaceae*. All of the Hawaiian specimens which he collected were deposited in the Bishop Museum, as well as his Hawaiian collection note books, photographs, and glass plates which he made 40 years ago. He, in turn, was given a copy of his own out-of-print book, *The Indigenous Trees of the Hawaiian Islands*, for he had none at this time.

During these later years he confined most of his botanizing to the "roadside" category, taking advantage of the jeep roads built during World War II. He found that it was now easy to visit areas formerly inaccessible. He discovered that many of the species with which he was familiar over 35 years ago had vanished to extinction, remaining only as "dried corpses in the herbaria." Even though he had been absent for a long period from Hawaii, he still knew the plants and where they grew.

Rock was considered by many to be the "Father of Hawaiian Botany," whereas his predecessor, Hillebrand, was the "Grandfather." His plant collections were prolific, for he collected everywhere and extensively in the Hawaiian native forests. Duplicate specimens are at Arnold Arboretum, Gray Herbarium, New York Botanical Garden, U. S. National Museum, and other herbaria. He described hundreds of new species and varieties in his 56 publications resulting from his Hawaiian residence. He was considered the specialist of Hawaiian *Pritchardia*, *Lobeliaceae*, and other native plant groups. To his Hawaiian intimates he was known as *Pohaku*, the Hawaiian word for Rock.

His linguistic ability was outstanding. German was his native language, but as a youth he had learned Hungarian from his grandmother, and Chinese at the age of 15 by self-study. He had taught Arabic at the age of 16 at the Vienna University. He was fluent in Italian, French, Spanish, Tibetan, Latin, Greek, and the various languages of the aboriginal peoples of West China. He had a reading knowledge and comprehension of Japanese, Hindi, and Sanskrit. When he vis-



ited countries such as Iceland, he was able to quickly comprehend the language and converse with the people. He spoke English without a Germanic accent.

Dr. Rock was a member of many organizations and received many awards. In 1930 Vienna University in Austria and Baylor University in Waco, Texas, awarded him Doctor of Laws degrees, and in April 1962 the University of Hawaii honored him with a Doctor of Science degree, *honoris causa*. He was awarded the Gold Medal by the Royal Horticultural Society at the 200th anniversary celebration at Kew Gardens; the Stanislaus Julien Award of the Institut des Belles Lettres by the Academie Francaise, Paris, in 1948; and the Gold Medal by the American Rhododendron Society in 1954. He was honorary life member of the National Geographic Society (1925), Harvard Travellers Club, Rhododendron Association (London), and the North American Lily Society; fellow of the American Geographical Society, Royal Geographical Society (London), and Royal Asiatic Society of Bengal; corresponding member of the Ecole Francaise d'Extreme Orient, Hanoi (1938); member of the Royal Asiatic Society of North China, Botanical Society of America, Torrey Botanical Club, West China Border Research Society, Washington Biological Society, American Primrose Society, California Horticultural Society, Seattle Rhododendron Society, and the Alpine Garden Society. In Hawaii he was honorary member of the Hawaiian Botanical Society, Friends of Foster Garden, and Hawaiian Botanical Gardens Foundation, Inc., and Honorary Chairman of the University of Hawaii's Campus Beautification and Landscaping Faculty Committee (1962-63). One of the University's campus drives is named *Rock Road*. He was listed in *Who's Who in America* for thirty years and in the *American Men of Science*. In 1909 Forbes was the first to name a new species in Rock's honor, and today many hundreds of plants and birds bear the specific name of *Rockii*. In 1913 Anton Heimerl established the genus *Rockia*, with one species, *R. sandwicensis* (Family Nyctaginaceae). This was done to distinguish Rock as a collector and because he collected the first, best, and

sometimes the only specimen of the newly described taxon.

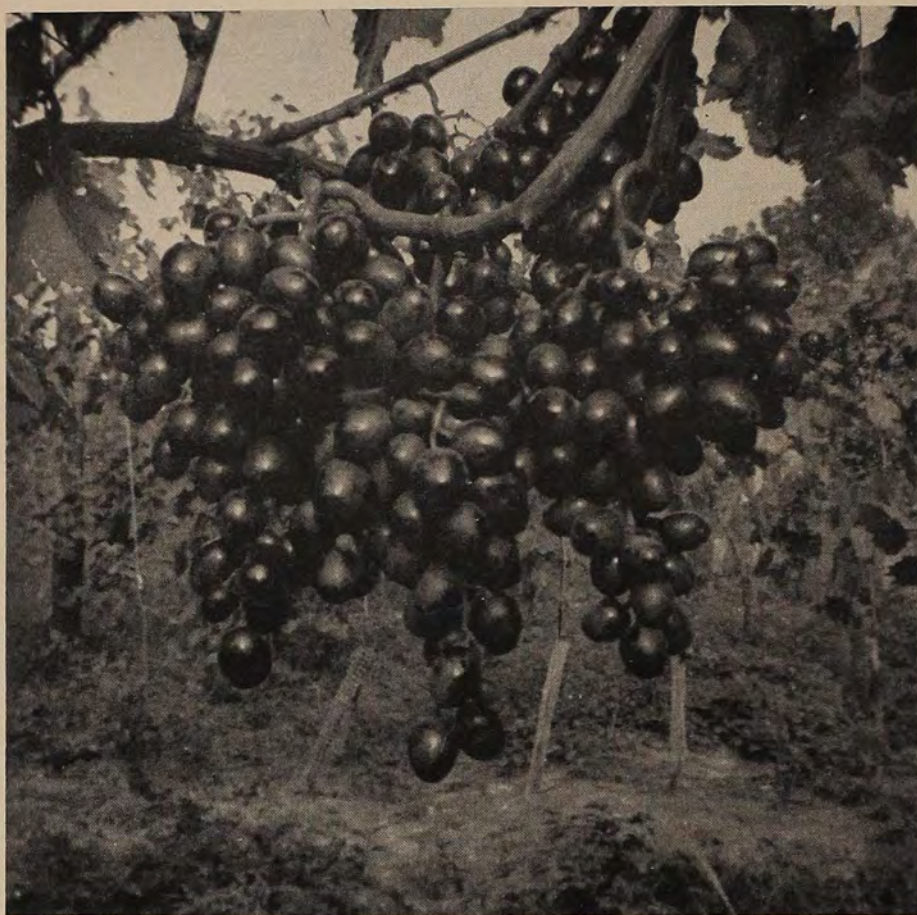
Shortly before his death he was in Europe classifying Na-khi manuscripts. His two volume dictionary of the language is now in press, finally completed, in spite of years of difficulties caused by forced evacuations, bandits and communists, war, bombing, inflation, cholera and other illnesses, and the loss of his manuscripts. This dictionary is the culmination of his long years of exhaustive and painstaking research of a culture almost entirely vanished from the rapidly changing scene of Asia.

He had suffered a heart ailment for several years and moved to Hawaii for health reasons once more. He was stricken with a heart attack shortly after arising on December 5, 1962, at the home of Mr. and Mrs. A. Lester Marks in upper Nuuanu Valley, Honolulu. He had made his home with them since 1957. His greenhouses there were filled with native and exotic plants, including Hawaiian Lobelioids which he had grown from seed. Some of the Hawaiian plants are for future planting on the Bishop Museum grounds. This year he donated 80 species of plants to the University of Hawaii, adding further to the original campus tropical botanical garden which he founded 50 years ago.

Although for 40 years his interests lay mainly in western China, he confessed to the writer last year that he would be delighted if anyone brought him a Hawaiian Lobelioid. This was indicated by the last botanical paper published before his death, entitled *Hawaiian Lobelioids* (B. P. Bishop Museum Occasional Papers XXIII (5): 64-75, August 17, 1962). That his heart still lay in Botany was confirmed by his presence at the Hawaiian Botanical Society lecture (co-sponsored with the Friends of Foster Garden, Hawaiian Academy of Science, and Hawaiian Botanical Gardens Foundation, Inc.), "Plant Collecting in the Andes," just two days before his death. This expert on plant collecting in Hawaii and China had planned to make a botany trip to the island of Hawaii two weeks later.

*Pohaku* was laid to rest with the plants he loved on December 10th, one week after his last public appearance, in Nuuanu Valley's Oahu Cemetery.





*A seedling of 'Blackrose' × 'Dunstan 56'. The pollen parent originated from a cross of 'Chaouch', a pure vinifera, and 'Seyve-Villard 12-375', a Franco-American hybrid.*



# New Grapes For Old: California Moves East

ROBERT T. DUNSTAN\*

Nature, the poets say, abhors monotony and moves by silent magic in her microcosm, unhurried, to evolve the different and the new, and thus is beauty ever fresh enhanced upon our earth.

The gardener, attuned to beauty as he is, falls easy prey to the fascination of the new or the exotic, the appeal of either one being well-nigh irresistible. And thereby hangs a tale, a chapter in our viticulture as colorful as it is old and filled with dismal failure.

For generations lovers of the vine in the eastern United States have dreamed of gathering from their trellises such table grapes as those whose loveliness the ancient poet Virgil sang, or other sorts the like of which bold Joshua and Caleb brought to lure the tribes of Israel from their wanderings in the wilderness, the Old World grapes, *Vitis vinifera* in the books of Botany. Malaga from Mother Spain, dainty seedless Black Monukka and regal Muscat from the arid East, pure ambrosia fit to grace a sultan's feast—these are names to call forth visions of delight straight out of Eden's bounty.

*V. vinifera* is a magnificent species, vast and ancient. From the dry and sunny land of its origin somewhere near the Caspian Sea it has now found its way to all the temperate regions of the world. So immensely numerous and diverse are its forms—some thousands of varieties are known—that certain taxonomists divide it into five distinct species. As would be natural within such great diversity of type, there is wide variation in response to environment; yet broadly speaking, the vinifera is most at home where winters are moist and mild and harvest time sun-drenched and dry.

Now the amateur gardener is a patient and persistent soul, not easily dismayed. And so, impelled by an ardent yearning, and all undaunted by two hundred years

and more of failure, he cherishes still his dream of seeing a Tokay or Dattier come to fruit; and season in and season out, with envy in his heart, he orders a few more vines from California.

This he does for the simple reason that *V. vinifera*, commonly and erroneously called "California" grapes, can indeed be grown in the East, though only at a price. Not the price of a king's ransom quite, but that of endless coddling; so much, in fact, that all early attempts to establish commercial vineyards here ended in abysmal failure. Nor will it grow just anywhere, even for the doting amateur, because the species as a whole is sensitive to cold. It can endure the winter in the milder parts of the Middle Atlantic States, it survives a little farther to the North with some protection, and suffers least throughout the Upper South. Yet cold is not its highest hurdle. In our hot and humid summers the vinifera, if left alone, is soon laid low by enemies of leaf and cane, by fungus diseases and insect pests, the latter seeming to find it tastier than their native fare. If these are foiled by deadly spray and dust, still other foes are there, all but unseen beneath the soil to bring it swiftly down: phylloxera, the louse, to foul its roots, and nematodes and rots galore. But these latter threats, though fatal if ignored, are easily circumvented with grafting knife and congenial root-stock at home in local soil. From this stratagem of grafting other gains as well accrue. Hardiness to cold may be increased and maturity of fruit be hastened. (Current tests may prove the culture of certain classic wine varieties on proper stocks to be profitable even in New York.)

If we speak thus far mainly of amateur grape growers, it is that early in the story of our grapes there were few professionals. It was they, the dreamers and the doers, the prophets and the lovers of the vine—Rogers, Campbell, Wylie,

\*Greensboro College, Greensboro, North Carolina.





*A second generation backcross hybrid of bunch grape × muscadine,  
in its third season from seed.*



and lastly Munson, genius and scholar that he was, towering high above them all—whose patient labors and whose skill brought forth the new and worthy vines for our vineyards of a later day. All sought out the choicest of our native species and these they mated to the Old World's best to bring each new generation closer to the "dream."

Nor were the new creations of these amateurs the total of their gifts; assiduous men and filled with splendid zeal, they inspired others. Thus around the beginning of this century, with Dr. Munson's special aid and urging, our public institutions took up the task, and several State and Federal Stations have brought it forward to our time.

From these stations have been released scores of handsome fruits to swell the early list, and each has doubtless proved its greater worth. Some, indeed—the Munson best, as well as those of later date—in eye-appeal and pleasure in the eating are fair approximations of the "dream." Let doubters taste the nectar of a lilac 'Ellen Scott' or spicy 'Seneca', amber, crisp, and cool! Yet even these, despite the solid virtues of their fruit, have one "Achilles' heel": low resistance to disease.

The breeder's boon is here his bane, for the genes transmitting vinifera's elegance of fruit have seemed too closely linked with those imparting high susceptibility to the mildews and the rots. Poor amateur, he still must pet and pamper most those hybrid vines whose fruits resemble most in excellence the paragon itself!

But let him not despair! In recent years our breeders of the grape have received a treasure "above the price of rubies," interest, as it were, upon a debt of gratitude, or "bread upon the waters," of Dr. Munson's casting, come back home: the best of France's breeding work of generations. Illustrious names they bear, these Franco-American hybrids, the names of the men whose labors made them: Seibel and Seyve-Villard, Couderc and Vidal, Galibert, Ravaz, Landot—seekers all of the same bright dream.

Among the hundreds chosen from the millions of seedlings bred are vines of amazing health and beauty and enormous economic worth. Having revitalized France's viticulture, they come now to add *their* strength to ours, both as

"direct producers" and as a pool of new genetic material. For these are the progeny, through generations refined, of matings of the classic French vinifera with our native best, collected and sent by Dr. Munson. (It was these wild species—*V. aestivalis*, *riparia*, *lincecumii*, and more—whose robust roots as grafting-stocks resistant to phylloxera had saved the Old World's vineyards from the scourge.)

Now a cardinal virtue of some of these new aristocrats, *nouvelle noblesse de la vigne*, will not be lost upon the astute breeder. Somewhere in their vast complexity, in the subtle mingling of their genes, Nature allowed a fairer balance in the "crossing over"; and thus it is that here and there among these vines there are individuals which to a high degree combine the exuberant vigor and resplendent health of their wildling mothers with the fabled fruit of their pollen sires.

What then of our early prophets' elating dream? May Nature yet be cozened or wheedled into haste to let this thing of beauty be, this perfect marriage of the vine our breeders long have sought to make?

The day seems nearer than once it did, for now the fruits, quite literally, after years of breeding are hanging in the testing plots, the promise of fulfillment close at hand (Figures 1 and 2). These are the fruits of lines uniting Munson daughters with the sons of Seyve-Villard and Seibel, Geneva Station beauties with a proud Landot, and *their* offspring to a Turkish maiden, say, or such a swain as Fresno Station's newborn star 'Blackrose'. These are fruits, moreover, which in berry size and form, in texture of the flesh and skin, in succulence and savor are fair rivals to no lesser lights than true 'Blackrose' or a "lady finger" 'Olivette'.

Among these vines our long-gone dreamers' spirits walk, we hope, content; for what they see and taste, if spirits can, is dream transmuted into living leaf and fruit, the near-ideal, upon a single vine, yet not one vine alone. And seeing what these spirits see the Thomases no longer doubt.

Faith, it is said, removes mountains. Faith and the laws Fra Gregor Mendel once traced out, working long together, are moving, as it were, California to the East.



# A Book or Two

## **Wild Plants for Survival in South Florida**

Julia F. Morton. Hurricane House, 3744 Stewart Avenue, Coconut Grove, Miami, Florida. 1962. 76 pages. Illustrated. (Library)

South Florida (that part of the peninsula lying south of a line drawn between Sarasota and Palm Beach) is a unique area since it is a meeting ground of tropical and temperate plant species. Many of the former are not found elsewhere in the United States, hence the value of this slim volume as a popular source of information on over 125 native edible (and poisonous) plants. These are grouped according to primary habitat (seashore, inland waterways and swamps, woods and fields) and then listed alphabetically by scientific name. Family and common names are also given plus distribution, a concise description of each species, and a paragraph of uses. Some 89 excellent black and white photographs illustrate the more photogenic species. Visitors to South Florida will be happy to hear that if lost "in the bush" they can find plants for all purposes from fruits to nuts, pot herbs to beverages, plus seasonings, masticatories and even tooth brush and soap substitutes. The only critical comment one might make is very minor—namely that the format of this volume is not conducive to fitting it in a hip pocket; certainly a handy pocket size would have made it a required companion for a South Florida wilderness outing.

W. H. HODGE

## **Atlas of the British Flora**

Edited by F. H. Perring and S. M. Walters. Published for the Botanical Society of the British Isles by Thomas Nelson and Sons, Ltd. 1962. \$22.50 (Library)

This Atlas contains distribution maps of nearly all the flowering plants and ferns native or naturalized in the British Isles, including Ireland. There are over 400 pages of maps, four maps to a page, showing the distribution of about 1,700 species. The data were collected voluntarily by British botanists, both amateur and professional, who sent in lists from every corner of the British Isles between 1954 and 1960. This work is a model of cooperation between the professional and amateur botanist to create a work useful to both. Horticulturists who grow some kinds of European plants will find this work not unuseful.

F. G. M.

## **Outdoor Lighting for Your Home**

Stanley Schuler. D. Van Nostrand. New York. 1962. 192 pages, 183 black and white illustrations. \$5.95 (Library)

If you can afford extensive outdoor lighting (and it is apparent that many people can) a book like this is a handy reference. The aim is to show how to make the best use of lights around the home and how to select, place, and direct lights to achieve one's desires. Night lighting is not new; it has been skillfully employed by the Japanese for centuries and the objective is not necessarily to merely flood a garden with light but to create glamor, enchantment, and pictorial associations in gardens not observed in daylight. With us it is a surprisingly new idea, scarcely pre-dating World War II, except for Christmas tree lighting.

In short, the author feels light contributes to the comfort, safety, and appearance of the home and is enjoyable. If you want to participate in increased enjoyment of the plants around your home, you might consider night lighting and this book will help you get the most for your effort.

J. L. C.

## **Roses. Pleasures and Treasures**

Peter Coates. G. P. Putnam's Sons. New York. 1962. 106 pages, 117 plates in color and b/w. \$3.95 (Library)

This is not a text on roses in the ordinary sense but rather a remarkable collection of short discussions on the rose as it figures in history, medicine, literature, and art. Chapters are also devoted to origin of the rose, rose gardens of early times, and some notes on varieties and cultivation.

It certainly is a book to be enjoyed by rosarians and the horticulturally inclined who have a fascination for history. This is beautifully done—one finds the origin of such phrases as *sub rosa*, the significance of the rose in medieval times, and heraldry up to the founding of Queen Alexandra's Rose Day (1912). One finds also, the rose in cookery—a recipe for candied rose petals—literature, even to include the part played in Carroll's "Alice" books and Oscar Wilde.

Origin is in relation to the basic roses of the Far East-Western Europe, the moss and tea roses, and related species fundamental to rose development.

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



The photography is excellent throughout and the color reproduction is brilliant. Manufacture of the book is Italian. The endpapers are reproductions of rose ornamented wallpaper from Queen Victoria's bedroom in Kensington Palace.

J. L. C.

## Die Rose

Gergely Márk. Verlag der Ungarischen Akademie der Wissenschaften, Budapest. 1962. 366 pages, 8vo, 48 black and white plates plus 7 in color.

Called the Queen of Flowers by rosarians and others, the rose stands at the pinnacle of popularity among garden flowers.

The book begins with a taxonomic classification of the genus *Rosa* according to Rehder. Seventy-two species of wild rose are described under the appropriate Class. This part of the work is highly useful, since for reference purposes the origins of some garden hybrids are indicated along with the appropriate wild parental species. Much of the book is devoted to modern garden roses under the various classes, i.e., hybrid tea, tea, remontant, polyantha, polyantha hybrid, floribunda, rugosa, rugosa hybrid, multiflora, sempervirens, and rambler. For each variety the date of introduction and the parentage is given as well as a full description of the plant.

At the end of the book, cultural methods are covered as they obviously must apply under continental European conditions. There is a section on rose culture under glass. A tabulation of rose varieties by class and by color also is given. Some genealogies of rose hybrids are given and there is a glossary and a short bibliography, plus a good index. Rose cultivar or variety names are cited with single quotation marks in accordance with the current International Code of Nomenclature for Cultivated Plants, thus in this respect the book is up-to-date. Technically, the book has been beautifully produced. The black and white photographs and the colored plates of garden roses are superb. The text is in German.

FREDERICK G. MEYER

## A Sense of Nature

John Hay and Arline Strong. Doubleday & Co. New York. 128 plates with descriptive captions. (Library)

(Basically a photographic record of children and nature.)

## The Savory Wild Mushroom, A Pacific Northwest Guide

Margaret McKenny. University of Washington Press, Seattle. 1962. 133 pages, paperback, illustrated 48 color, 33 black-and-white. \$3.95. (Library)

Written by an intrepid field naturalist whose real forte is birds and nature photography, Miss McKenny is only slightly less talented as an author in botanical subjects. This, her second work on mushrooms is a paperback guidebook of 133 pages written expressly for amateur and non-trained agaricologists living in the Pacific Northwest. The book, however, will be almost as useful far beyond that area since few species of mushrooms are confined geographically to an area as limited as the Pacific Northwest.

Bound in a convenient pocket size of 7 $\frac{3}{4}$  inches by 5 inches, the book is divided into six chapters: Edible Mushrooms (63 species); Poisonous Mushrooms (14 species); Non-poisonous Mushrooms to be Avoided (7 species); Cookery. A chapter on poisonous mushrooms is contributed by Varro E. Tyler, professor of pharmacognosy at the University of Washington. Photographs, 48 in color plus 33 in black and white, illustrate all but three of the mushrooms discussed.

In the author's own words "this book is for the mushroom hunter, an answer to the ever recurring question, 'Is it good to eat?'" and the book clearly answers another question, 'What is the difference between a mushroom and a toadstool?'

As a field guide this book is a must. More books of this kind are needed to help crystallize native instincts of untrained persons yearning to understand the great out-of-doors. The book has only one fault, all of the illustrations should have been in color, for without color accurate identification of mushrooms is impossible. In general the color is excellent. In this book the University of Washington Press has scored another success in the field of natural history publications.

FREDERICK G. MEYER

## American Wildlife and Plants

*A guide to wildlife food habits: the use of trees, shrubs, weeds, and herbs by birds and mammals of the United States*

Alexander C. Martin, Herbert S. Zim, and Arnold L. Nelson. Dover Publications, Inc., 180 Varick Street, New York 14, New York. 1951 (Dover Paperbound Edition, 1961). 500 pages. Illustrated. \$2.00. (Library)

A new edition of a book originally published about ten years ago. It discusses native animals and birds and their food. Plants, native and a few cultivated kinds, are published to interest bird lovers in the problem of wildlife food habitat and the plants that provide food for them.



# The Gardeners' Pocketbook



*Pistillate cones of Metasequoia glyptostroboides*

## ***Metasequoia glyptostroboides*** **'National'**

The most notable plant to be called a "living fossil" is *Ginkgo biloba*—the Ginkgo, or Maidenhair Tree. In 1941, with the naming of the fossil genus *Metasequoia* and the discovery four years later of living trees in China, another "living fossil" was "born." The metasequoia story, however, had its beginning nearly a hundred years ago.

In mid-1800, a fossil plant that was to be later named *Sequoia langsdorffii* was discovered in deposits laid down during the Eocene, a geological period dating back 70 million years. During this period the plant was wide spread in the middle latitudes of North America and Asia. Similar fossil plants were discovered and were also assigned as species of the genus *Sequoia* because they were

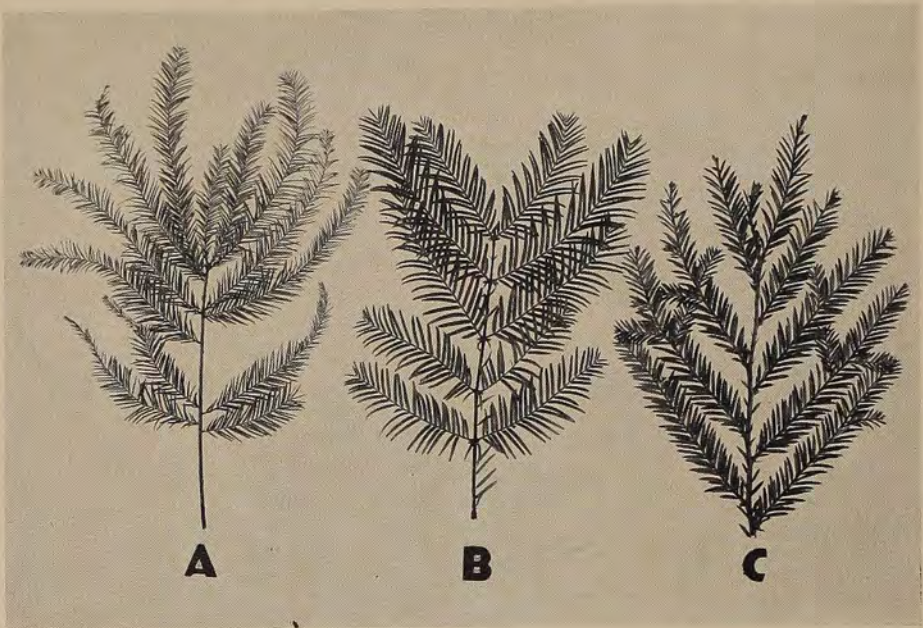
thought to represent ancestral forms, or to be closely related to the Redwood, *Sequoia sempervirens*, and the California Big Tree, *Sequoiadendron giganteum*. Others were considered to be more closely related to the Bald Cypress, *Taxodium distichum*, of southeastern United States. It remained for a Japanese botanist named Miki to discover that many of the fossils previously described as belonging to, or being closely related to, the modern genera, *Sequoia*, *Sequoiadendron* and *Taxodium*, were different in a number of respects. The most striking difference noted was the opposite arrangement of the leaves in the fossil, as opposed to the alternate arrangement in the other genera. For this and other reasons, Miki, in 1941, established the new genus *Metasequoia*. This was four years before it was definitely known that living plants of this species existed in China.





*Metasequoia glyptostroboides* 'National', a selection of the Dawn Redwood made at the U. S. National Arboretum for its well-shaped upright habit. This tree is ten years old.





Leaf characteristics of (A) *Taxodium distichum*, (B) *Metasequoia glyptostroboides*, and (C) *Sequoia sempervirens*.

*Metasequoia* was found to occur naturally in Hupeh and Szechuan provinces in Western China at approximately 30 degrees north latitude. Its range is limited to an area of approximately 300 square miles. It occurs at altitudes of from 2100 to 4000 feet and in sandy, slightly acid soils. It apparently grows best along streams and in seepage areas which probably accounts for its native name Shui-sha meaning water fir or spruce. The largest tree measured was about 105 feet in height and 7 feet in diameter.

It is to the credit of the late Dr. E. D. Merrill of the Arnold Arboretum that

the *Metasequoia* is now so widely found in cultivation. In 1947 the Arnold Arboretum provided funds for a collecting trip to procure seeds from China; and, in 1948 the National Arboretum received some of the seeds collected on that expedition. Approximately 300 seedlings were raised and planted in the heavy clay acid soils at the National Arboretum and in sites having different light and moisture conditions (average annual rainfall in Washington, D. C., is 41 inches).

The following chart shows the 1958 height of these seedlings after ten growing seasons:

Site Characteristics	Number of Trees	Average Height (Feet)	Range in Height (Feet)
Moist—full sun	21	18.8	15.5 to 35
Moderately dry—high shade of oaks and poplars	123	5.6	3 to 9.2
Moderately moist—full sun	46	12.6	6 to 18.5
Seasonally moist—full sun	44	14.1	8.4 to 20.5
Dry slope—full sun	39	12.9	5.9 to 25.0





*The lower trunk of Metasequoia glyptostroboides becomes distinctly a buttress type as the tree ages.*

In addition to differences in growth rate, there are also variables in growth habit from narrow pyramidal to nearly globose forms. Globose, or spreading forms, seemed to arise from pyramidal specimens that, after a few years, showed a sharp decrease in the annual terminal growth of the main axis, probably the result of damage to the terminal bud.

In 1958 a fast-growing, narrow-pyramidal seedling was selected at the National Arboretum, and it was given the name 'National'. In all other respects this selection is similar to other *Metasequoia* seedlings that have been observed. It attained a height of 35 feet in ten growing seasons from seed while growing in a moist site in full sunlight. Cuttings from this selection grew 11 feet in five years in a nursery row. Like many other seedlings of *Metasequoia*, most of this height was attained in the first five years of growth. And like the species, 'National' is a deciduous conifer with leaves that turn an attractive copper red in the fall. The summer foliage is a bright green and growth is about continuous throughout the summer. The lower trunk becomes attractively buttressed after about ten years of growth. No winter injury was evidenced after exposure to two degrees below zero, and it

is quite likely that 'National' can be safely grown in Zone 6 (*U. S. Department of Agriculture Hardiness Zone Map*, temperatures ranging from ten below zero to zero). 'National' started producing pistillate cones (female seed bearing cones) when nine years old, but no seeds have been produced. No staminate cones (male) have ever been observed.

No serious insect or disease problems have been noted. Grass and flowering shrubs should grow well under its light shade.

'National' has been distributed to a number of arboreta and botanical gardens throughout the country. Plants should be available in the commercial nursery trade within two or three years.

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### Something About Crinums

*Crinum* is a bulbous, lily-like plant of the Amaryllis Family grown most satisfactorily where zero temperatures seldom, if ever, occur. There are perhaps a hundred species and a host of hybrids—some natural and some induced by man. For our use, only a few are well known. Once planted, crinums are permanent; they are highly showy and flower from early spring until the last buds are caught by the first killing frost.

To move a fully grown clump is a day's work, since the bulbs of some grow as large as footballs and they must be dug carefully so as not to injure the fleshy feeding roots. Another reason they are seldom moved is that they resent being transplanted, often remaining flowerless for years in a new location. We had one that took six years to recover and to bloom.

In general the names of crinums are in great confusion, even the "authorities" behind their paper curtain seldom agree. When it comes to the plants in gardens, catalog names are cheek-by-jowl with Latin and near neighbors of "common" names. In this paper we are using the names under which plants came to us.

Most crinums, if not all, bloom at dusk, staying fresh until the heat of the next noon then drooping only to freshen again in the cool of the day. All are fragrant, but in varying degrees.

All crinums form clumps by offsets; some more slowly than others, but given time all will form picturesque groups which are striking features of the landscape. Some set seed and these placed upon damp sand will soon send out a tiny bulb which, upon entering the soil, will send up a single leaf at first, soon followed by others. We have grown seedlings, but as of this writing, none have flowered.

The scapes are tall and heavy, and unless staked, are apt to fall over. Crinums do best in a deep fertile loam with humus and manure added. Water should be given while the plants are in active growth, since rains seldom are sufficient. The color of the flowers is deeper in cloudy showery weather.

*C. bulbispermum* and its hybrids will flourish in colder climates if given a thick winter mulch, but they are the least attractive of the genus.

*C. americanum*, the swamp lily of southeast United States, will grow in drier ground, since often natural populations are found growing half in the water and half on the dry bank. The flowers are fragile assemblages of narrow snow-white tepals which are brightened by rose-colored stamens. They are held just above the mound of dark green, strap-shaped leaves. If we were as poetic as the Japanese, we might call this crinum "White Crane Serenely Standing."

*C. latifolia* from India is another white-flowered species among the more robust growing sorts. Its five-foot leaves clasping at the base form a stout trunk-like stem which holds them well above the ground. The flower stalk rises to six feet and supports twelve or more trumpet-shaped flowers reminding one of Easter lilies. In an old clump a new stalk rises as the flowers on the old one fades and the clump is seldom without color for a long season.

*C. amoenum* from Burma came to us via a dealer in Michigan; it has prospered here giving on the average two blooms a bulb each July. The small flowers in a large umbel look like a lady's flower-bedecked hat since they all open at the same time. This is a good plant near patios as it opens at sundown, and the white flowers are easily seen at night.

There are several nameless white-flowered hybrids found in old gardens which are well worth growing, one often called May or August lily from its habit of flowering either month depending upon the amount of rainfall. Moisture triggers its blooming mechanism more than does the season of the year. This has the largest flowers of any crinum we know.

Two other cultivars with drooping white flowers are similar to the May or August lily, one known as 'The Seven Sisters' blooms a bit before the other which is called 'Martha Washington'.

One other white crinum merits mention here. It is a third generation hybrid called 'Gordan Wayne'. This is low growing with large round flowers in mid-summer. It has the vigor which often is associated with hybrids and freely sets seed.

### Milk and Wine Lilies

The crinums most often seen are called Milk and Wine lilies from tropi-





IVAN N. ANDERSON

*One of the better "Milk and Wine" Crinum*

cal Africa and exotic Zanzibar, in allusion to the white petals with stripes down the center in varying shades of wine red. The lush bright green foliage of these plants looks strange where frosts and ice cut them to the ground each year.

*C. scabrum* is the earliest to flower. Although its foliage completely disappears in winter, growth comes back quickly and the short stalk rises in June. The flowers resemble fat white tulips with crimson or maroon lines on the reverse. This is a fast multiplier forming thick clumps and definitely a choice garden subject.

*C. campanulatum* is the pastel member of this group, having nicely formed nodding bell-shaped flowers of very pale pink with soft flesh-colored stripes. This in a sizable clump can be the highlight of any June garden.

The Milk and Wine crinums most often seen are *C. fimbriatum* and *C. kirkii*. These flower in August and September with flowers sometimes as large as magnolia blossoms. The wine color is a deeper shade in these species than in some others.

Remaining are only the pink and red species to mention. *C. moorei* is a most

beautiful species which has been used in hybridizing over and over again. This species is a midseason bloomer with shell pink flowers of excellent form and substance. It is one crinum which demands to be grown in shade; in full sun the leaves burn badly, often to the point of defoliating the plant. The plant is medium in size and the leaves are borne on a stem-like neck, ten to twelve inches tall. This makes an accent plant of great charm.

*C. 'Cecil Houdyshel'* is often regarded as the most beautiful of all crinums. It has soft rose-pink flowers, white at base of the tube, of medium size produced above six foot leaves of bright green. It takes several years to establish and to produce fully sized flowers with the depth of coloring for which it is famous.

*C. 'Louis Bousanquet'* is similar in color although not quite so spectacular, but it makes a large clump quickly and the flowers appear over a long season.

Another pink is *C. 'H. J. Elwes'* with bright pink flowers on wine-colored stalks which hold the blossoms just above the short leaves. The relatively small size of the plant makes this a good subject for growing in pots farther north.



The hybrid called 'The Twelve Apostles' is one of the first to bloom in spring. The pale flesh pink flowers stand far above the long bright green foliage.

C. 'Ellen Bousanquet' has rose-red flowers of great size and might be taken for a fine *Hippeastrum*. The plant makes a clump of dark green leaves which, on an average, are six feet in length and make a fine accent subject for growing in a border of azaleas. Since this crinum dies to the ground in winter and is just beginning to grow at azalea time there is no competition.

All crinums are of the easiest culture when grown in soil to which humus has been incorporated and moisture is provided in the growing season. They will reward the gardener with beautiful and unusual flowers from spring until autumn frost, almost.

—W. O. FREELAND, *Columbia, S. C.*

### *Tritelia uniflora*

Among the numerous plants that have been known in gardens for many, many years, and yet do not seem to have made a fixed place for themselves, is the small Argentinian bulb that may be listed in catalogues as *Tritelia uniflora*, *Milla uniflora*, or *Brodiaea uniflora*, depending on the authority consulted by the catalogue maker.

For the gardener in the Deep South, it is a sure thing. It appears to mind neither heat nor cold, drought or wetness, when these are phases of "the weather." It will provide sheets of bloom for long periods in early spring and a mass of winter greenery from its leaves produced in autumn, that seem not to mind even the lows of the last season, 8° and 10°F. nor fairly extended periods of near freezing weather. In the garden here, it has been largely planted in a variety of sites, some that are in full sun and usually dry in summer, some in partial shade and some that have fairly deep shade in summer. There is little difference in response.

There are several other virtues. First of all, it is cheap so that one may indulge in it by the hundred without a

qualm. It is patient of delays in planting, so that the bag of bulbs can be pushed aside until all the other hurry-up jobs have been done. It has been planted here in January and given good results. It does not appear to mind whether one is careful or not in the depth of planting.

The leaves begin to appear in autumn, depending on the date of planting, but usually within two weeks. They make mats of grass-like foliage, with the somewhat glaucous leaves lying flat on the ground until the mass is large. Through this, the flowers on scapes about six to ten inches tall, depending on shade, rise and open their six pointed star-shaped blooms, basically an off white but variously tinted with bluish lavenders, to deeper almost purple lines particularly on the reverse. There is no appreciable scent to the blooms, but the leaves if crushed will give off an odor of garlic. The blooming often lasts a month or more.

Some seed is produced and seedlings have appeared here, but the more common increase comes from the tiny offsets that appear about the base of the bulbs, sometimes with a short extension resembling the cormlets of gladiolus or montbretia. Once planted, it is difficult to remove, and if one wants to move it, he must start digging his plants before the foliage dies off—here in May.

At times, varieties are offered, with some distinction in the color range, and one may, if he wishes make his own isolations of nearly colorless individuals. Actually, in the experience of the writer, the color forms are not well marked as they come from dealers, but as yet no flower has bloomed that is poor. There is some variation, however, in the size and shape of the individual segments of the corolla, some very narrow and strap-like, some almost rounded.

For those of us, who for lack of sufficient winter cold, cannot plant sheets of crocus, the smaller scillas, chionodoxas, and snowdrops, this is a welcome sight. Of course, no substitute is ever as fine as the plant desired, but *Tritelia*, the name most common to the writer, is fine in its own right.—B. Y. MORRISON, *Pass Christian, Mississippi.*





P. H. BRYDON

*Pileostegia viburnoides* in the garden of Mrs. Hillyer Brown,  
Burlingame, California.



J. OHWI

Habitat of *Crinum asiaticum* var. *japonicum* (foreground) under  
*Pinus thunbergii* on shore of Osezaki in Idzu Province, Japan.



### *Pileostegia viburnoides*

The accompanying illustration of *Pileostegia viburnoides* was taken on September 13, 1962 in the garden of Mrs. Hillyer Brown, Burlingame, California. The plant is growing in an enclosed courtyard where it has become an attractive loose-flowing shrub about eight feet wide and five feet high. It is about ten years old and is supported on a heavy wire suspended between two upright iron pipes. The vigorous growth is restrained by pruning in October, just after flowering. Mrs. Brown has successfully transplanted rooted layers from the lower shoots; and, by planting them in hanging baskets, has obtained an unusual effect, particularly since the layers flowered the year following planting.

Plants of *P. viburnoides* in the Strybing Arboretum were obtained from the U. S. Department of Agriculture in 1937 and they have now attained a height of forty feet by adhering to the trunks of Monterey Cypress, *Cupressus macrocarpa*. Apparently the aerial roots require a rough surface on which to cling since the plants readily ascend the Cypress trunks. If planted against a wall, however, it may take some time for the roots to take hold, possibly because of the lime in the masonry and the smoothness of the surface.

*Pileostegia viburnoides*, P.I. 78375, from Foxhill Hardy Plant Farm, Keston, Kent, England, is a handsome evergreen climber native to N.E. India, China, and Formosa. Seed was sent to the Arnold Arboretum in 1908 by E. H. Wilson and plants were subsequently introduced to cultivation by the U.S.D.A.'s Office of Plant Introduction in 1934, 1935, 1936 and 1937. Only one species of the genus has been described and it is reported as hardy in gardens along the Pacific Coast from San Francisco to Seattle. The dull green leathery leaves are oblanceolate from 3 to 5 inches long and  $\frac{3}{4}$  to  $1\frac{1}{2}$  inches wide. In San Francisco the flowers open in early September and are borne on terminal panicles which clothe the green column of handsome leaves with a covering of creamy white. Actually, it is the stamens which produce the effect rather than the corolla since the small petals are quite inconspicuous. A light porous soil to which has been added a liberal dressing of peat moss and well decayed manure is a suit-

able medium for its growth, and if planted on a north facing wall, or in a similar exposure where the plant has some respite from hot summer sun, the foliage retains its rich green texture. The writer has yet to see seed set on our plants in the Strybing Arboretum. Cuttings of the current year's growth, taken in October, root easily in sand under intermittent mist.—P. H. BRYDON, Director, Strybing Arboretum, Golden Gate Park, San Francisco, California.

### *A Japanese Crinum*

*Crinum asiaticum* var. *japonicum* is the one member of the genus *Crinum* native to Japan. Apropos of Mr. Freeland's discussion on crinums, elsewhere in this issue, a note on the Japanese member of the group may be of interest as a logical plant for trial in localities with a climate analogous to that discussed here. This variety of crinum is a maritime plant found in Japan on the beaches of the southern coasts facing the Pacific Ocean. These are the areas of Japan frequented by highly salt-tolerant plants. The writer has seen this variety growing on beaches where the plants must be regularly inundated with sea water. *C. asiaticum* var. *japonicum* is not grown as an ornamental in Japan except in those areas where it has become naturalized. The Japanese on the small island of Oshima at the end of Kii Peninsula, occasionally cultivate crinum as a garden plant on open, dry hillsides where it flowers from July to September; introduced as P.I. 235,504.

The local name of *C. asiaticum* var. *japonicum* is *Hama-omoto*. The scapes are 18 to 24 inches tall; the flowers are white with strap-like segments. The curious, large, white, and fleshy seeds, about 1 inch in diameter, resemble a bulb. According to the Japanese, the seeds float in the sea and when finally washed ashore, germinate to produce a new stand. Among the plants found associated with this crinum variety in Japan are the Japanese black pine, shore juniper, eurya, pittosporum, and alpinia.

It should be noted that although the plant discussed is subjected to occasional light frosts, the coastal regions are within a broad arc of southern Japan influenced by warm currents that flow from tropical regions and a subtropical environment is evidenced by the plant life.—JOHN L. CREECH, U. S. Department





J. OHW1

*Crinum asiaticum* var. *japonicum* in its native habitat in Japan.



of Agriculture, Agricultural Research Service, Crops Research Division, Beltsville, Maryland.

### **Possible New Hollies For The South**

The severe winter of 1961-1962, followed by a summer of long periods of drought, made a first trial for the species of holly to be noted later. That season was followed by another winter with even more extremes of low temperatures, and the growing season began with another long drought, broken only in late June.

In the planting there are two groups of three each of *Ilex liukiuensis*. Each showed some leaf damage in the 1961-1962 winter and very slow recovery in summer. In the winter of 1962-1963, there was almost complete defoliation; but, spring has brought an excellent recovery of shoot growth and a reasonably fine mass of leaves. There is little difference in the two groups; although the three planted where they get a little more afternoon sun, show less height. The trees are now 4½, 6, and 8 feet tall, as compared to the other group with one at 5 and two at 10 feet. If the present development is normal, they will all make small trees, fairly open in habit with ascending branches, well clothed, with the rather smallish leaves, that do not suggest the traditional holly. The bark of the new growths is definitely reddish, as are the petioles of the leaves. (P.I. 237,877 and 237,880)

Closest to this species in general appearance is *Ilex rotunda* (P.I. 237,879). The three trees here are 8 to 10 feet tall, well branched, with ascending branches, and good masses of evergreen leaves—again of the less-familiar holly type. The new shoots are not reddish as in *I. liukiuensis*; nor do the petioles show any reddish color. These three trees have the possible advantage of a little more overhead shade from young pines. There was some defoliation, however, and a little winter killing of the weaker twig growths. As yet, there is nothing to suggest the name *rotunda*.

Less impressive, after the winter ordeals, is *Ilex muchigara* (P.I. 235,574) represented by three trees, that now give the appearance of large shrubs in the making rather than trees. There is little suggestion of a good leader; and the general habit, as compared to those of the preceding species, and during the winter assumed a somewhat bronzed coloration that was not unpleasant and that one hoped would suggest an adaptation to cold. There was little loss of foliage in either winter, but there was great loss of small twigs and in one case of the branch that approximated a leader. Growth in the spring of 1963, was the last to appear among these four species and has been far from robust.

The one species that comes closest to appearing like a holly one might have seen somewhere is *Ilex integra* (P.I. 235,508) of which there are three specimens. There was no leaf damage in either winter, but one tree lost a leader that had developed as a new growth in the late summer of 1962 and was not properly ripened. This was replaced in 1963. The foliage is dark green and very handsome. As these specimens have held their branches all the way to the base of the trunks, it would appear that this is a choice thing for planting as a specimen.

None of these trees has flowered or fruited, and one looks forward to such a happening, even if the fruits of *I. muchigara* are described as black. The others are said to be all red.

The only other holly species here, that competes with them at all is *Ilex oldhamii* which is as evergreen as *I. integra* but carries its leaves in a more drooping fashion, as if almost wilted.—B. Y. MORRISON, *Pass Christian, Mississippi*.

### ***Tritelia's New Name***

In the last issue of *Plant Life*, there is, among many other interesting things, a brief discussion of the Genus *Tristagma* established by Poeppig in 1833. It is in this newly established grouping that our old *Tritelia uniflora* Lindl. must now be found. Its new name will be *Tristagma uniflorum* (Lindl) Traub. Ed.



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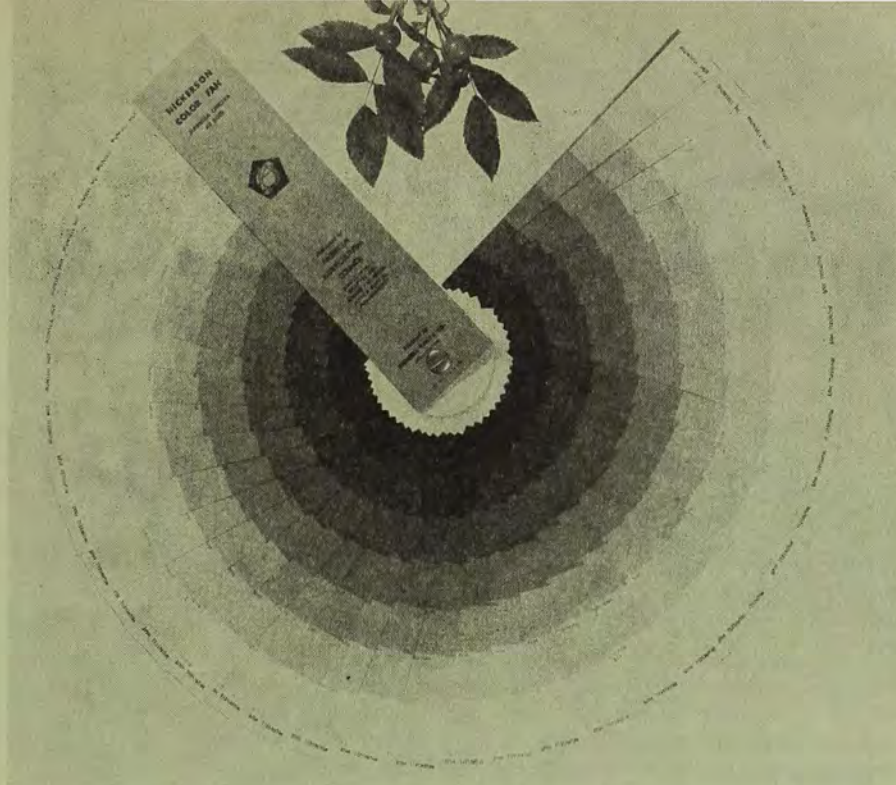
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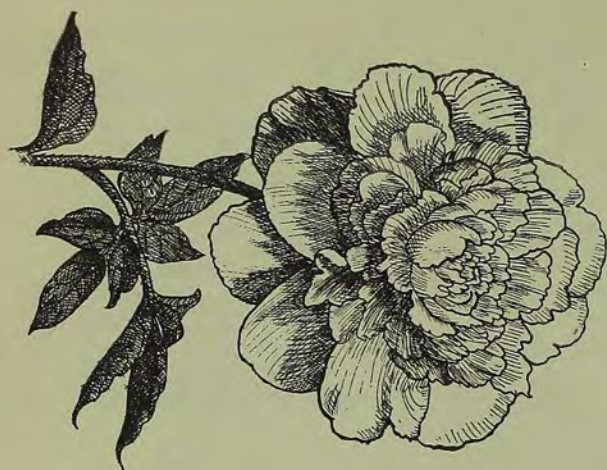
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