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APRIL, 1941

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Peter Bisset

*Tsuga Mertensiana, Holden Hall Park, San Francisco, California,
April 13, 1934*

Hemlocks

CHARLES F. JENKINS

IT IS appropriate that a citizen of the Keystone State should be asked to prepare an article on the Tsugas, as the Hemlock is the official State Tree of Pennsylvania. As the Act of Assembly passed in 1931 states, it is still today, as of old, the tree most typical of the forests of Pennsylvania. From the first settlement of the Colonies it has been an invaluable source of lumber supply and later its bark was sought for tanning purposes. In 1887 one million two hundred thousand tons of hemlock bark were cut and used for tanning and in many cases the logs were allowed to rot. But in modern times here in the East, at least, other woods have largely taken its place and other chemicals have supplanted it for tanning. So it is as a nursery-grown, horticultural specimen and ornament for the garden, lawn and country estate that it has taken its place as one of the most important and valued features in landscape work.

The first of our great American landscape architects and writers was A. J. Downing, who in 1854, in his book "Rural Essays," recognized the value of the hemlock from the horticultural viewpoint. He then wrote: "We place the hemlock first, as we consider it beyond all question the most graceful tree grown in this Country. There are few who have the least idea of its striking beauty when grown alone in a smooth lawn; its branches extending freely on all sides and sweeping the ground, its loose spray and full feathery foliage floating freely in the air, and its proportions full of the first symmetry and beauty." It was not until after the Hemlock Arboretum was established at "Far Country" on the banks of the Wissahickon Valley near Philadelphia,

that I found this and many other quotations from poets and horticultural writers extolling the beauty of the hemlock.

An old Pennsylvania lumberman, who ran rafts down the Susquehanna River, once said the early Scotch-Irish settlers of Pennsylvania regarded the white pines as "noble" trees and spoke of a forest of them as a "House of Lords," whereas the hemlocks lacked "quality" and he likened them to a "House of Commons." I hold no brief for the hemlock against the white pine, except for gracefulness, but it might be pointed out that in the English form of government the House of Commons is the more important—

The pine is called the "kingly" tree,
It well deserves full royalty.
The hemlock's called the "princely" tree,
This lower rank is not for me.
Right here and now, Oh hemlock tree,
A royal crown is given thee;
Not prince, but equal, "Queenly" tree
In beauty, grace and symmetry.
Full honor his, great honor hers,
The king and queen of conifers.

The botanical name of the genus hemlock, *Tsuga*, comes from Japan, meaning "the mother tree." When our Eastern hemlock, *Tsuga canadensis*, was introduced to Europe it was included with the pines in the genus *Pinus*. Later, the French botanist Michaux grouped it with the firs; still later it was placed with the spruces, until an Austrian used the name *Tsuga* as a section of his genus *Pinus*. Finally the celebrated French botanist, Carriere, classified all hemlocks in a separate group under the generic name *Tsuga*. Thus this important section of our North American conifers bears a

Japanese name given it by an Austrian, confirmed by a Frenchman, and now accepted by botanists generally. When introduced to English people, our native eastern hemlock was considered and called a spruce. Because its leaves and branches resembled the European poison-hemlock, *Conium maculatum*, a weed of the carrot family well known in Europe, it was called hemlock-spruce—that is, the spruce with hemlock-like leaves. When years later the botanists determined it was not a spruce, the name hemlock continued as the common, everyday, name although in many sections it is still called “hemlock-spruce.”

Visitors to the Hemlock Arboretum often ask which part of the hemlock is poisonous, the roots or the leaves, having confused it with the concoction of the poisonous weed that the Athenians used to put criminals to death, some of which they gave Socrates, the Greek philosopher. Plato's description of the symptoms caused by hemlock poisoning is one of the masterpieces of the literature of the world, as he tells of the last hours of his beloved friend. No part of our *Tsuga* is poisonous.

Hemlocks are indigenous to North America and eastern Asia. They are not found native in Europe, Western Asia, Africa or in the Southern Hemisphere. Our botanists and horticulturists describe two recognized species in the eastern United States, two on our Pacific coast, two in Japan, two in China and one each in the Himalayas and the Island of Formosa.

Of the foreign species, *Tsuga dumosa*, coming from the Himalaya Mountains in Sikkim and Nepal, a most distinctive hemlock, is not hardy in the neighborhood of Philadelphia. It comes from high in the mountains where the rainfall averages 120 inches or more in a year. Likewise *Tsuga Yunnanensis*,

from the Chinese province of that name, “the land below the clouds,” will not stand our climate and more severe winters at the Hemlock Arboretum. The little plants of *Tsuga formosana*, grown from seed kindly obtained for me by the editor of *The National Horticulturist* will not survive the winter. All of these we grow in pots and take them to the friendly shelter of the greenhouses of the Morris Arboretum for their winter sojourn. But during the growing season they are here available for study and comparison with other sister species. The remaining foreigners are perfectly hardy. *Tsuga chinensis* from the province of Szechuan in western China, is growing successfully as far north as Boston, in the Arnold Arboretum and last season the plants at “Far Country” made a growth of twenty inches. We have two specimens growing side by side. A seedling which W. H. Judd of the Arnold Arboretum grew from seed obtained from the Sun Yet Sen Park, in Nanking, China, and a plant grafted on *Tsuga canadensis* stock. They are of identically the same age but the seedling is outstripping the grafted plant in growth and symmetry.

The two species from Japan are also hardy. *Tsuga diversifolia* is one of the best of the hemlocks for ornamental purposes. It is dwarf and slow growing, of unusual beauty and distinction. The under side of its leaves, when a branch is turned up, are greyish white and on this account the Japanese call it the “rice tree.” It was introduced in the United States in 1861.

Tsuga Sieboldi, the larger Japanese species, is a more rapidly growing tree. It was introduced in the United States in 1850 and both species are grown and sold by nurserymen specializing in the rare plants. No variations of these foreign species have so far been obtainable,



Tsuga Sieboldii, Arboretum Vilmorin, Verrier le Buission, France,
August, 1935

The two hemlocks from the Pacific Coast, *Tsuga heterophylla* and *Tsuga Mertensiana*, are important trees in their locality. The former is one of the valued timber trees in the Northwest. The forestry authorities of British Columbia told me, on a recent visit, they were growing it "by the millions" for reforestation purposes. But on the western coast its use as an ornamental is very restricted. A visit to one of the larger nurseries near Seattle disclosed but a bare dozen specimens awaiting purchasers. Josiah Hoopes, who wrote the first book in America on Conifers, while extolling the beauty of our eastern hemlock said the only tree which could compare with it for beauty was the Deodar—*Cedrus deodara*. In lower California we found the latter used for ornamental purposes exclusively, as against the western hemlock, which compares most favorably in beauty and symmetry with our eastern hemlock. A native of the Pacific Northwest, it gets plenty of moisture; for this reason it does not do well in the Hemlock Arboretum. It grows, but it looks unhappy and the fateful day in February of 1934, with the temperature fourteen degrees below zero, killed the leader back and damaged the tree considerably. On the other hand the Mountain Hemlock, *Tsuga Mertensiana*, coming from the high Sierras, is a contented, although slow growing inhabitant of the Arboretum. Our stock came from the mountains back of Juneau, Alaska, and numerous specimens now ten years old are beginning to make a good showing. It is this tree in its natural habitat which has aroused the enthusiasm of western poets and naturalists. Readers who are familiar with the writings of John Muir will come across many allusions to its grace and beauty. Of this species we have but one variation, a glaucous plant as yet too small to determine what it will do.

It was back in 1856 that Dr. Lewis R. Gibbes of South Carolina had an epistolary controversy with Dr. Asa Gray over what the former thought was a new species of hemlock. It was a small tree, "twenty to twenty-five feet high, branches thickly set on the trunk and the foliage is a very deep green, blackish looking at a distance. The tree is rare and but few in a group." In 1881 it was officially named *Tsuga carolinia*. Its native habitat is the mountains of southwestern Virginia to northern Georgia. It is hardy as far north as New England and in every way a desirable ornamental. There are two variations in the Hemlock Arboretum, a denser round-top form, *Tsuga carolinia compacta*, and an immature fastigiata. A dwarf form is growing in a well known New England Nursery and it is said there is a weeping variety in existence. Visitors to the group of this species in the Arnold Arboretum come away filled with enthusiasm for its distinction.

It is to our Eastern Hemlock, *Tsuga canadensis*, which is native to the Atlantic Seaboard from Canada to northern Georgia, that we turn for the many variations which have added interest and zest to the collectors' task. John C. Swartley, a young man who had graduated from the University of Pennsylvania and went from there to do practical work at the nearby Morris Arboretum, took the Hemlock Arboretum as a laboratory for advanced study. Starting in the spring of 1938 he has devoted a large part of his time to studying the mutations of *Tsuga canadensis*. The result of his labors appeared in a Thesis presented to Cornell University, where he had been taking an advanced course in Ornamental Horticulture. In the preparation of this work Mr. Swartley visited many of the nurseries, arboreta and private estates



Dr. A. B. Stout

Group of Sargent's Weeping Hemlock in Fairmount Park, Philadelphia, which were shown at the Centennial Exposition in 1876



Dr. A. B. Stout

Sargent's Weeping Hemlocks at Inver House, near Philadelphia

in New England and the Middle States. He found sixty-one variants of *Tsuga canadensis*, all of which had been named, many of which, however, were similar to plants bearing other names. There was confusion and duplication. A nurseryman or botanist or plant lover would find an unusual hemlock growing in his nursery rows or in the wild, proceed to propagate it, give it or have it given a name, without knowing that an identical plant bore some other name.

Using the Hemlock Arboretum as a laboratory Mr. Swartley proceeded to try to bring order out of chaos. Co-operating with the Committee which is now at work on the new edition of "Standardized Plant Names" the natural seed variations were reduced to twenty classes as follows:

Broadleaf	Pygmy
Bushy Globe	Prostrate
Cinnamon	Pyramidal
Dense	Dwarf Pyramidal
Denseleaf	Sparseleaf
Fastigiata	Spreading
Globe	Twiggy
Golden	Weeping
Largeleaf	Whitetip
Littleleaf	Yewlike

Specimens of all of these are growing in the Hemlock Arboretum.

In the above classification it will be noted that some are differentiated by their form or manner of growth, as bushy, fastigiata, pyramidal, weeping, spreading, prostrate, etc. Others are specialized by their color, golden, white tip and cinnamon, while the third class are those whose description depends on their leaves as to size, color, manner of growth and shape. It will not be possible in the limited space of a magazine article to describe all these mutations of *Tsuga caroliniana*. Perhaps the best known and most popular are the weeping, pendulous trees and head

ing this list is Sargent's Weeping Hemlock. This variety is important in the distinguished discoverer and the manner of its original propagation and dissemination, aside from its natural beauty. General Joseph Howland sometime before 1870 found four seedlings in the mountains back of Beacon, N. Y. He gave one to his good neighbor Henry W. Sargent, another to the famous Hunnewell Arboretum at Wellesley, Mass., another to Dr. Charles S. Sargent of the Arnold Arboretum, retaining one for himself. Of these, the latter two are still growing and flourishing. From some of these original plants grafts were taken and plants were shown in the horticultural display at the Centennial Exposition in Philadelphia in 1876. They created a great sensation among horticulturists and nature lovers and as a result there are growing today around Philadelphia in the older gardens many of these early specimens. They were all grafted on *Tsuga canadensis* stock and in most cases this has influenced the plant so that the clones are never quite as low growing as their ancestor.

If you have room for only one hemlock plant a Sargent, picking one from the nursery row that is most pendulous. The plant at the Hemlock Arboretum is now thirty years old and we call it "A vernal fountain of perpetual joy."

Of twelve specimens of Sargent's Weeping Hemlock planted in the Centennial gardens, four still survive and form a most striking and beautiful group on the lawn near Horticultural Hall. At Inver House, a country estate some twelve miles from Philadelphia, are a dozen of these graceful and unusual trees which must be at least sixty years old. Just before the crash in 1929, ten of them had been sold to a gentleman on Long Island for \$1,600 apiece, delivered and planted. It took



*A dwarf, globose form of Tsuga canadensis, 30 years old,
at Hemlock Arboretum*

a little time to arrange for their transportation. They were too large to go through the Holland Tunnel or on the ferry boats in New York harbor, so a barge was secured to float them down the Delaware, and around by sea. But the stock market collapsed, the purchaser cancelled his order and the trees are still growing, in all their glory, in their old home.

One of the latest additions to the Hemlock Arboretum is a prostrate variety which crawls over the ground. Another miniature one is *Tsuga canadensis minuta*, a little plant which grows about one half inch a year and is now six inches in height.

The white tip variety *Tsuga canadensis albo spicata* comes from a plant some ten feet high growing at the Morris Arboretum which is thought to be over fifty years old. *Tsuga canadensis Jenkinsii* (Bailey) is a quick growing,

small leaved variety with rather sparse pendant branches. Of particular interest is a globose bushy form with at least a hundred stems, its only drawback being its inability to stand up under a heavy weight of snow. But it would be impossible to describe all the many variations of form, size, growth and color. Mr. Swartley's monumental book on the "Mutations of *Tsuga canadensis*" alone contains 382 pages of typewritten material with 245 illustrations. When Cornell University publishes it in book form, as I understand they hope to do, the wealth and beauty and interest of *Tsuga canadensis* and its variations will be a distinct surprise to the horticultural world as well as an important addition to our botanical knowledge.

How old and large do hemlocks grow? In 1932 observing the two hundred and fiftieth anniversary of the coming of William Penn to Pennsyl-

vania, a census was made of the trees which in all probability were growing when Penn sailed up the Delaware. The list of trees of different species numbered 250, and included nine hemlocks. Of these the largest grew in our Wissahickon Valley, about one half mile from the Arboretum. At four and one half feet from the ground it measured thirteen feet five inches in circumference and it was one hundred and twenty-five feet in height. The smallest of the group of nine which were listed was nine feet, eight inches in circumference. As to age, a stump is or was standing in the Tionesta National Forest in Warren County, Penna., that was fifty inches in diameter and had five hundred and sixty annual rings of growth. From Sullivan County, New

York, a reliable observer years ago counted eight hundred rings on a fallen monarch of the forest. The log had been stripped of its bark and allowed to rot.

This article should not close without reference to one of the publications of the Laboratoire Forestier de Toulouse (France) entitled "Revision Du Genre *Tsuga*." It was written by Mlle. F. Flous and is a most painstaking and scientific work. Mlle. Flous lists and describes eighteen species of hemlocks including the nine generally catalogued by the botanist and horticulturists of this country. The new species she describes come mostly from eastern Asia. If and when this old world returns to normal ways there are plenty of virgin fields for the collector and botanist.

LILACS

JOHN C. WISTER

A good many years ago (in January, 1927), I submitted to the readers of THE NATIONAL HORTICULTURAL MAGAZINE a check list of lilac varieties, which the editor was kind enough to publish, and by it to place before his readers a kind of chronological history of lilac varieties. I have often hoped that the publication of such a list would discourage some gardeners from using the word new for a lilac which had been in existence for half a century or a century, but certainly I was too optimistic to think that this might happen, for within a week of writing the present article I have received a catalogue from one of our best nurseries listing for the first time—or so the catalogue said—certain varieties of lilacs, which a glance at the above check list would show to have been in existence since 1900 or 1910.

So it seems worth while to reiterate once in a while that the word new in a nursery catalogue means one of three things: either that it is new and listed for the first time, or that it is old and been listed for one hundred years, or that it falls into the period between the two!

Since I last wrote about lilacs for THE NATIONAL HORTICULTURAL MAGAZINE it has been my good fortune to have the opportunity to establish a great collection of named varieties of lilacs under the auspices of the Scott Foundation at Swarthmore College. The opportunity was unique because the land available made it necessary to discriminate not between the new and the old, but between the best and the second best, and because I had available, to place in this collection, plants from several private gardens where

only very fine kinds had been grown. It has been interesting, therefore, to see how this collection, which now comprises about 100 varieties, has worked out in terms of years of introduction, that is how many new varieties and how many old ones seem to fall into the really top grade. It has been interesting also to notice the breeders from whom these varieties have come.

It seems to me always that when we begin to consider lilacs that we should think first of the varieties that Lemoine did not originate, because by doing so we call attention to the fact that there are very few of them, and his place as the leader is more firmly established than ever.

Our oldest variety at Swarthmore is *Macrostachia*. It was introduced in 1844, and its originator is not known. This is a very pale pink, fading to white, is one of the most charming of lilacs, and has never as far as I know, been surpassed by any more modern variety. *Marie Legraye* was introduced in 1879 and its originator also apparently is not known, although several names have been suggested. This is a good white with tiny yellowish center, and still remains a favorite with many people, although I personally doubt whether it is worth having when we have such fine modern whites as *Mont Blanc* and *Vestale*. Next, in 1883, came *Ludwig Spaeth*, from the nursery firm of the same name in Berlin. This was for many years accepted as the finest dark purple lilac, and for that reason many people still cling to it, but as in the case of *Marie Legraye* it is doubtful if it is needed when there are so many newer purples with larger flowers. In 1888 the *Baltet Nursery* of

Troyes, France, introduced what is still the pinkest of all varieties, Lucie Baltet. Then in 1892 came perhaps the greatest of all varieties, Mme. F. Morel, from the firm of F. Morel, Lyons, France, and this covers all the varieties of the last century which we have considered worth growing.

Of 20th century varieties from other growers, we have: Mme. Florent Stepman and Reine Elizabeth, introduced in 1908 by Stepman-de Messemaeker, of Brussels; Jan Van Tol, introduced in 1916 by the firm of the same name of Boskoop, Holland, and Ruhm von Horstenstein from Rudolf Wilke, of Berlin, Germany. I mention these only because some one would be unhappy if I left them out, for I am not at all convinced that they are needed in a collection as limited as ours, fine though they are.

Now let us come to the Lemoine varieties, of which we have no less than 74, introduced between the years 1876 and 1939 inclusive. Out of this number but nine were originated in the last century. Let me comment on these first. The oldest Jacques Callot, was introduced in 1876. Most people have passed it by. On several occasions I have seen it so magnificent that I continue it. The next oldest, President Grevy, 1886, is better known and still one of the best double blues. Virginité, 1888, continues unique, it is a rather dwarf grower, extremely bushy, and its double white flowers have tinges of pink which make it most charming. I would not want to be without it and it seems to me it is particularly important for the small garden. Belle de Nancy, 1891, is a double pink which has held its own through the years, although as with many others it is a question just how many in that color range one would want. Congo, 1897, is one of the most magnificent in bud,

but fades out badly so that at the end of the lilac season it is quite ordinary. But for its beauty at the beginning of the season it certainly deserves its place. Volcan and William Robinson, introduced in 1899, and Georges Bellair and President Viger introduced in 1900, are a little doubtful. All are handsome plants and good flowers, but may not be needed with the great numbers which are to follow.

Let me now consider the first decade of the century, in which in our collection there are 18 varieties, of which I will name only the most important. De Miribel, introduced in 1903, is distinct in color and unsurpassed to this day. It is a slaty blue totally unlike any other lilac, and although in commerce for 38 years it strangely enough has not made much impression, and is not often seen in collections. For its distinct color I believe it belongs in every collection, even the smallest. In the same year a double white was introduced which Lemoine named for Miss Ellen Willmott, the great English horticulturist. Many people consider this the finest of all double whites and that no other are needed with it. It is certain that any other variety which would take its place will have to be very fine.

Waldeck Rousseau was introduced in 1904 and is valuable chiefly for its lateness, and that is true also of Duc de Massa, which was introduced the next year. They extend the lilac season and are valuable for that reason. In 1905 also there were two other outstanding varieties: Reaumur, a single purple, and Rene Jarry Desloges, the largest and handsomest of the doubles. In 1906 came the variety named for the head of the firm, Victor Lemoine, and that must have been a proud year for him. It is a double, as evidently all his favorites were, and is as late as Waldeck Rousseau and Duc de Massa.

and valuable for that reason. In 1907 came Leon Gambetta, long a favorite in this country. I include it for that reason, because I personally have never liked it very much. People tell me it is prejudice on my part, and that I am overly fond of the large single varieties and to apt to criticize the doubles. Montaigne was introduced the same year. 1909 saw the introduction of three important varieties: Hippolyte Maringer, Mme. Anton Buchner, a pale double pink, and Olivier de Serres, perhaps the best of the double blues.

To wind up the decade in 1910 came three more top notchers: Cavour, a variety with some of the dingy slate coloring of De Miribel, but totally distinct from it and useful to plant with it. Vestale, one of the two or three finest single whites, and Marechal Lannes, which when well grown gives perhaps the largest flowers of any lilac in cultivation. This group introduced in the first decade of the present century, is of supreme importance in the garden today, and it is amazing how many people still consider them novelties.

The second decade of the century, 1911 to 1920 inclusive, gives us even more fine varieties, 19 in all, of which I will again mention the most outstanding. Gilbert was introduced in 1911. Because its color is much that of the common lilac, and because if not well grown it does not differ much from it, it has not had the attention it deserves, for under good conditions it sends up most magnificent spikes. Much more popular, however, is President Fallieres, which I don't like nearly as well, and which certainly is not needed in any collection which contains Montaigne. In 1912 came Henri Martin, one of our most magnificent doubles, and in 1913 Monge, which all things considered is perhaps the most satisfactory deep single purple. I know

that such a statement will bring much raising of eyebrows, as other people may like other varieties, and there are many other purples to be considered of course. In 1915 came the second of the magnificent single whites, Mont Blanc, which makes such a splendid companion to Vestale but it is later blooming. Any new single white in the future must measure up to these two and it is a hard task. The same year Paul Thirion was introduced, a double exceedingly red in bud and still retaining a good deal of color when the flower is open, finally fading to the color of the common lilacs. Also in 1915 there was introduced Thunberg, an other late variety to add to those mentioned above.

In 1916 came perhaps the darkest of all the varieties, Vesuve, and one which attracts great attention in the garden. I have always been undecided as to its value because it is often such a weak grower. I have quite old plants that are not over 5 feet high, while plants of the same age of other varieties are 10 or more feet tall and across. For those who must have only the most vigorous and do not want to be troubled with varieties at all finicky, this should be omitted, but its omission is a loss because its color is so fine. Emil Gentil was introduced the same year and is one of the best of the double blues, not duplicating those varieties in this color already mentioned. More famous (possibly on account of the name) than either of these, however, is Edith Cavell, a double white. It has a rather creamy tinge distinguishing it from Miss Ellen Willmott, and at its best is one of the most magnificent of all lilacs. In a good many gardens, however, it has a tendency to rather straggly growth and often loses its foliage in late midsummer, and then produces a new crop of leaves with

some flowers in October. It attracts a good deal of attention at this time of year on this account, although of course it cannot be depended upon to do this regularly.

The war year of 1917 saw the introduction of but one variety, Maurice Barres, and this has steadily held its own. After the Armistice, in 1919, M. Lemoine had ready for the public three varieties, which strangely enough are little known: Boule Azuree, Capt. Baltet and Decaisne. In every collection where I have seen them they have been outstanding and have amazed visitors. Yet they are not offered in many catalogues and I do not know of more than half a dozen or a dozen places where they may be seen in this country.

The varieties of the decade 1921 to 1930, ought by now to be well known in this country. There should be many mature plants. Yet comparatively few people know them, and of only one of them as far as I know, are there really large plants to be seen in this country. That one was the first to be introduced in 1922. M. Lemoine had been much impressed with the work that Mr. T. A. Havemeyer was doing in this country and had wished to name the variety for him. Mr. Havemeyer in his modesty declined the honor, but suggested that it might be named for his wife, and so today it bears the name Katherine Havemeyer. They are large 12 or 15 feet plants of this variety at Mr. Havemeyer's place on Long Island, and on account of the name I have always wished that I liked it better, but like Leon Gambetta, President Fallieres and Montaigne, etc., I cannot get excited over another double of this type.

In 1923 came another single white, Marie Finon, and after 18 years it is still impossible for me to say whether it is as good or better than Vestale and Mont Blanc. The largest plants I have

seen are only 5 feet or so in height, and have been very fine, and when it gets bigger and older and has been tried in more places, it will be time enough to decide about its ultimate value.

That same year there was introduced Massena, which has large flowers on an enormous spike, but like all the varieties I have still to describe, I have never seen very large plants of it nor do I know any one who has grown it long enough to be perfectly sure that it is as fine as it seems to be.

In 1924 Lemoine named his best variety for Marechal Foch, the French war hero. It is a flower of distinctly different type from most of those previously described. The spike is large and more open, the flowers themselves not nearly as large as in the case of Massena, Marechal Lannes and many others. A companion variety introduced the same year is Marengo, which also holds great promise. In the following years there are some varieties which I care to mention at present only by name, and which I certainly can not yet recommend to anyone because it is too soon to tell whether they are first rate or second rate. These are General Pershing, Paul Deshanel, Capt. Perreault, Etna, Archeveque, Crepuscule and Champlain.

I can, however, be more specific about Prodiges introduced in 1928, which is magnificent in every way, and Ambassadeur and Diplomate introduced in 1930. These certainly have already won an important place on their behavior in their first ten years in this country.

The varieties of the decade 1931 to 1939 inclusive, are of course novelties in the real sense of the word. Even abroad their real value is probably not yet known, and certainly in this country with a long period of acclimatization, there is little that can be said about

them except to give the following names to complete the record: Candeur, Firmament, Mrs. Edw. Harding, Rosace, Ami Schott, Monument, Madeleine Lemaire, Georges Claude, Savanarole, Henri Robert, Souv. d'Alice Harding, Gismonda, Monique Lemoine.

From the above lists it can be seen how much the two Lemoinés, father and son, have done for the lilac. There are, however, some breeders in this country to be considered, and as their work is comparatively new it is again difficult to know just what to say about them. The first of these is John Dunbar, for so many years superintendent of parks at Rochester. His variety, President Lincoln, raised in 1924, is certainly the finest really blue single lilac, and it deserves a place with the finest varieties which have already been mentioned. Of the 20 or more other Dunbar varieties named and grown in Highland Park, Rochester, it is difficult to know what to say. All of them are high quality but I question how many of them are needed in comparison with the Lemoine varieties that have already been listed. The only one that we have added in recent years to the Swarthmore collection is William C. Barry, which is an introduction of 1928.

Next in point of time of American production, is Mr T. A. Havemeyer, former president of the Horticultural Society of New York. His one introduction which is in American commerce, was named in 1924 for the wife of the New York seedsman and lily expert, W. E. Marshall. In later years Mr. Havemeyer told me he regretted having introduced this variety, as he felt it was not good enough. I am con-

vinced that he was entirely too modest in this as the variety is unique in its deep red purple coloring, and I think will hold its place for many years, even though the individual flower is not over large.

I have been much impressed with a dozen or more Havemeyer seedlings which have not been formally introduced into commerce, which were either named by him, or named shortly after his death. They have not been tried in other places long enough to tell how many of them are of value, but they certainly give great promise. I hope they will have a thorough testing during the next ten years so that we can tell more about them. I shall not name them all but merely mention Night, Zulu, Glory, White Swan and Sarah Sands, as varieties which quite possibly may become famous in the future.

The varieties named by Mrs. Hulda Klager have not made much impression in the East, and while they were at first received with enthusiasm on the west coast it is evident that since the newer French varieties have reached there that these varieties have no longer been felt of the first importance.

There are three or four breeders in our western states who have introduced a few varieties of lilacs, but as far as I know none of them has yet proved themselves of great importance. They are still too new of course for one to give final opinion on them.

These notes cover only varieties of the common lilac. The earlier blooming hybrids have not been considered. They are worthy of a story to themselves.

Philadelphia, Pa.

Day-Blooming Tropical Water-Lilies

IN presenting this series of pictures, it is the intention of your editorial group to carry on the review started last year. With the exception of Enchantress and Shirley Marie, all were grown under amateur conditions and all represent flowers somewhat under the dimensions possible with more generous cultivation.

Alice Tricker, white; Cleveland, a good medium pink; Enchantress, a very fine pale pink; General Pershing, rose color; Golden West, pink over yellow; Imperial, lavender; Jupiter, deep blue purple; Mrs. Buskirk, red violet; Mrs. Sawyer, rose red; Royal Purple, one degree lighter than Jupiter; Shirley Marie, a fine light rose; St.

Louis, clear light yellow; Snow white, a fine white.

Two varieties, Blue Bird, rather much like Jupiter but with more petals and William T. Innes, a most exquisite variety, one degree paler than Mrs. Edward Whitaker when newly opened, are not illustrated.

Of the group we should always be glad to grow again, Cleveland, Enchantress, Golden West, Mrs. Sawyer, Royal Purple, Shirley Marie, St. Louis, Snow White and William T. Innes.

No other group of plants will so reward the gardener in midsummer and the hotter the summer, the greater the reward.



Claude Hope

Alice Tricker



Claude Hope

Cleveland



Claude Hope

Enchantress



Claude Hope

General Pershing



Claude Hope

Golden West



Claude Hope

Imperial



Claude Hope

Jupiter



Claude Hope

Mrs. Buskirk



Claude Hope

Mrs. Sawyer



Claude Hope

Royal Purple



Claude Hope

Shirley Marie



Claude Hope

St. Louis



Claude Hope

Snow White

Some Brooms Worth Growing in Gardens

I. *The Scotch and Portugal Brooms and Their Hybrids*

SYDNEY B. MITCHELL

Soon after acquiring my present garden, a couple of acres of dry hillside facing east in the Berkeley Hills about a thousand feet above San Francisco Bay, I began to be interested in drought resistant shrubs demanding little care, hence my ventures with brooms. With the aid of English friends who sent me seeds, a California friend, Hugh Logan of Inverness, who gave me many species he had raised from seed, and a Canadian friend, H. C. Hyland Barnes of Vancouver, B. C., who sent me many hybrid plants not available here, I have been able to try out most of the brooms recommended as worth growing in our gardens. In general they are not long-lived shrubs, so a good many have disappeared from my garden in late years. If they have not been replaced it has been because a good many of the species are somewhat alike and their yellow flowers are not distinct enough to justify their inclusion when we have better species or hybrids in the same color or in a wider range of colors. In this series of notes, therefore, I shall confine myself to the brooms still in my garden and not mention even all of them, excluding the little shrublets and creepers only adapted to rock gardening. I will not, however, leave out any broom because it is not generally hardy. Most of those I mention will withstand any winter up the Pacific Coast as far as Vancouver and many up the Atlantic Coast to Virginia, some of course further. I think perhaps the San Francisco Bay area will satisfy more brooms than any other section of our country because its summers are never too hot or its winters too cold, and drought at

least means drainage, and they don't like wet feet.

When I moved out here beyond the pavement I found the Scotch broom, *Cytisus scoparius*, naturalized (from a neighbor's garden) along the roadside. It has escaped in many areas on the Pacific coast, in Placer County in the Sierra foothills east of Sacramento, in northern Washington and notably on Vancouver Island, where it has become a menace even if a beautiful one. It was too common for gardens, but the descendants of the chance seedling found in Normandy by Dr. Andre, *Cytisus scoparius* var. *Andreanus*, with its yellow wings almost covered in red, was more interested—though more spotty. In the catalogue of T. Smith, Newry, Ireland I found listed creamy yellow selfs and bicolors on yellow or cream grounds and after seeing one of them, Daisy Hill, in a garden near Burlingame I sent for seed of all those available and used the resultant plants for an informal, not to say ragged, hedge between our garden and that of Carl Salbach. These seemed to be exclusively color variations of *C. scoparius*, and though there was some range of color they were not exciting. What I really wanted were the red and the rose and the blends of pink and orange which I found described in named varieties in English nursery catalogues. Unfortunately I could then never find seed of these offered. These were not forms of *C. scoparius* but the second and later generation from a cross made at Kew by W. Dallimore between *C. scoparius* var. *Andreanus* as seed parent and *C. multiflorus* (syn. c.

albus), the Portugal broom, as pollen parent. From one of the four seeds which germinated there flowered in 1902 at hybrid of purplish rose coloring, later named *C. Dallimorei*. It seeded freely, and from it have come the host of named varieties such as Dorothy Walpole, Lord Lambourne, Lady Moore, Donard Seedling, all from Ireland, and the series raised by Burkwood and Skipwith at Kingston near London. For many years these attractive shrubs were not available here as they just couldn't survive the long journey to the United States without soil on their roots.

In 1930 I saw many of these at the Chelsea Show and in private gardens and coveted them for my own place. As commercial growers would not sell me seed I appealed to several English friends, in particular the late Sir William Lawrence, and from them I got about an ounce of seed. From this, sown in flats in October, several hundred seedlings germinated irregularly over some months and were set out direct on a dry hillside, where three years later many of them began to bloom. They were watered only the first summer. An infinite variety of colors and shades were obtained, several, including a pure white, not found in English lists. Because the British and Irish varieties were still unobtainable here I suggested to Victor Reiter, Jr., of San Francisco that he might care to distribute a few of mine, and we then selected out "California," giving the best pink effect; "St. Mary's," pure white; "San Francisco," red; "Stanford," red and orange; and "Pomona," apricot orange, all named for California universities or colleges. These vary considerably in growth and in vigor. The tallest and strongest, Pomona, has been most popular, though I think "California" the nicest of the set. Early

propagation was by grafting on *laburnum*, but later, with the advent of Rootone and other chemical aids to root development it has been found quite feasible commercially to supply them on their own roots, which is preferable. Later Carl Salbach made a few selections from my seedlings less widely distributed, including "Occidental," pink and white, a white and yellow called "Mills," and a quite prostrate all yellow form named "Southern California." More important, I believe, because it is dwarf rather than flat, and of red and white coloring, is the only recent selection from my seedlings, named "McGill" from its having the college colors of my own Canadian alma mater. This if moderately pruned after flowering can be kept under two feet for some years, in my experience. These brooms, like the named varieties from the British Isles, are of such varying vigor and growth they can have quite different garden uses. If one wants a mass effect it may best be obtained by using a number of plants of the same variety so that a fairly uniform height and a common season of bloom will be the result, though seedlings from one type of plant will also give a nice effect and more variety. My neighbor, Professor Sumner C. Brooks, has a dry bank covered with seedlings he raised from "California," and every one is different in color or shade, but the effect is homogeneous. Plants of most of these brooms are in California nurseries and seed may be obtained from Carl Salbach, Woodmont Ave., Berkeley, Calif., the only source I know of in America, so I do not hesitate to mention it.

About the time my own seedlings flowered I succeeded in locating plants of the Irish and English named varieties in Vancouver, B. C., and as these could be imported with soil on the roots "from a contiguous country," I got all

those available. Outstanding were Dorothy Walpole, red; Lord Lambourne, cream and red, tall and vigorous; Donard Seedling, a medium apricot and pink; Goldfinch, cream and pink, almost prostrate; Fulgens, a fine orange and red which I think is probably a pure *C. scoparius* selection, not a hybrid, and Geoffrey Skipwith, which is unique in being the result of a cross between the crimson Dorothy Walpole and *Cytisus multiflorus* (syn. *C. albus*), the Portugal broom. This means it has *C. multiflorus* twice in its parentage and so is distinct in its taller, more slender and more graceful, drooping habit, its smaller flowers and earlier season. On the same account it is probably less resistant to cold, but I know it succeeds in Vancouver, B. C. Its color scheme is attractive, standards white, carmine reverse, wings rosy red. It is very free in flower and seems to need less pruning than the other hybrids.

Cytisus multiflorus, the white Portugal broom, is an old timer in central California gardens though it is too commonly seen as a long, lanky, pendant shrub attractive only in the curtain of small white flowers at its extremity. It is so easily raised from seed that it is always thus propagated—in fact, on a dry bank in front of my house it springs up here and there, flowers in a few years, and here and there dies out just as much. It is shortlived and attractive when young, but hard to keep from looking old and scraggly after a few years, so best replaced at intervals.

A few notes on garden treatment may have some value, though it should be remembered that they are based wholly on personal experience on a hillside above San Francisco Bay at an elevation of 1,000 feet, with the usual minimum winter temperatures in the

upper twenties and the average rainfall, all coming between October and May, about 25 inches. Our soil is a heavy sandy loam with good drainage because of the slope of the land.

Seeds are best sown in flats when they are ripe, from August to October. Germination is slow and irregular, plants beginning to come up in a month and continuing for weeks thereafter. I wait until plants are three inches or so high before moving them into their permanent places in the open ground, a yard apart. If one is not then ready it is best to pot them up because they so resent transplanting that even where successful it sets them back a year or two. Propagation from cuttings is best done from July to October, using half ripened tips of the newer growth, dipping them in Rootone, knocking off any excessive powder by tapping on a pot, and then inserting them two-thirds of their length in a hole made by a pencil or stick in the sand beneath a glass frame, or in a greenhouse bench. Rooted cuttings must be potted up and grown on until spring or summer before it is well to plant them in the open ground.

I have found these hybrids require an annual pruning right after flowering to cut down the strain of ripening a terrific seed crop and to stimulate the new growth from which next season's flowers will come from March to May, depending on the variety. They also enjoy an occasional heavy watering where summers are rainless as here. They have not proven adapted to the hot summers of interior southern California, where they suffer extremely from infestations of aphids, but where happy they are most effective and colorful shrubs.

Berkeley, Calif.

Sphagnum for Seed Germination Inhibits Damping-off Losses on Unsterilized Soil¹

VERNON STOUTEMYER, CLAUDE HOPE AND ALBERT CLOSE

LIVING sphagnum moss has been used as a medium for the germination of nearly all seeds received at the U. S. Plant Introduction Garden at Glenn Dale, Md., for the last 15 years (2). During this period, plants of an estimated minimum of 2,500 species have been successfully started in this manner. Complete control of damping-off has been obtained with all these species and throughout this period. This remarkable record, however, was not supported by direct quantitative comparisons with conventional seeding media until 1940. When these tests were made, the cheaper and more generally available commercial baled sphagnum was compared also as a substitute for locally gathered living sphagnum.

Search through standard horticultural literature has revealed very few instances of the use of sphagnum for seed germination. Burbidge (1) recommended living sphagnum for germinating seeds of orchids and *Nepenthes*. Hatfield (8) favored the use of a one-sixteenth inch layer of fine dried sphagnum over soil for seeds of ericaceous plants and for very fine seeds. Craig (3) suggested essentially the same method. Morrison (7) used dried sphagnum to cover seeds of azaleas sown on compost. Doran (4) compared a mixture of equal parts of sand and sphagnum, a like mixture of sand and peat, sand, and soil for the control of damping-off. His results showed that the first three gave very good, but

not complete, control with little difference between them.

In the experiments reported here the dried sphagnum came from Wisconsin. The living sphagnum came from local bogs. The seeds tested were chosen to cover a wide taxonomic range and to include species generally regarded as particularly susceptible to damping-off.

The preparation of the sphagnum was that described by Close (2). The living sphagnum was dried enough to facilitate handling, but not enough to kill it. The commercial dried sphagnum was sometimes moistened slightly before handling, but this step appears to be optional. Following these preliminary steps, both kinds were rubbed through a screen of hardware cloth having three meshes to the inch. With both kinds of sphagnum, this was an easy task.² The flats used in these tests were usually made of new white pine, 20 by 10 by 3 inches, with provision for drainage. In most of the experiments, the flats were first filled to within 1¼ inches of the top with a mixture of two parts of imported peat and one part of sand. The loose moss was added to fill the flat, then firmed to bring the surface one-half inch below the top. As a final step, the flats were well watered, but sometimes not until after sowing. In order to insure a thorough wetting of the sphagnum, a second watering within 12 to 24 hours was decidedly helpful. No sterilizing or antiseptic treatment was ever given either to the sphagnum or its substratum.

¹Full details of this work will be published in the Proceedings of the American Society for Horticultural Science for 1940 under the title: The Control of Damping-off by the Use of Sphagnum for Seed Germination.

²Many people have indicated that this sounds like an impossible task. On the contrary, sphagnum is very readily rubbed through the coarse screen.

For comparison with the sphagnum, flats were prepared with: (1) washed river sand receiving Dunlap's (6) simple two salt nutrient solution—one teaspoonful each of superphosphate and potassium nitrate per gallon of water in an amount sufficient to saturate the material; (2) a mixture of one part sand and three parts of composted sod loam which had been steam-sterilized some weeks before and stored in a bin; (3) a mixture of two parts of imported peat and one part of sand.

In all the flats, the seeds were broadcast over the surface and received no other cover than a pane of glass placed over the top of the flat. Until germination, they were protected from direct sunlight on an open bench in a propagation house. As the seedlings developed, air was admitted gradually.

In the first experiment, one-third of each flat was devoted to a different seedling medium, which was again divided in half by a line of sand to provide duplicate sowings. Strips of glass separated the media. The flats were sown April 17. On May 6, 19 days after sowing, and on May 20, 33 days after sowing, the seedlings were counted. The flats were held under observation for several more weeks but there was no appreciable change. The graph set forth in Figure 1, showing the seeds tested and the relative stand, is drawn from the combined seedling counts of both plots of each medium. It shows the ratio between the best total for each species, considered as 100 per cent, and all other totals for that species.

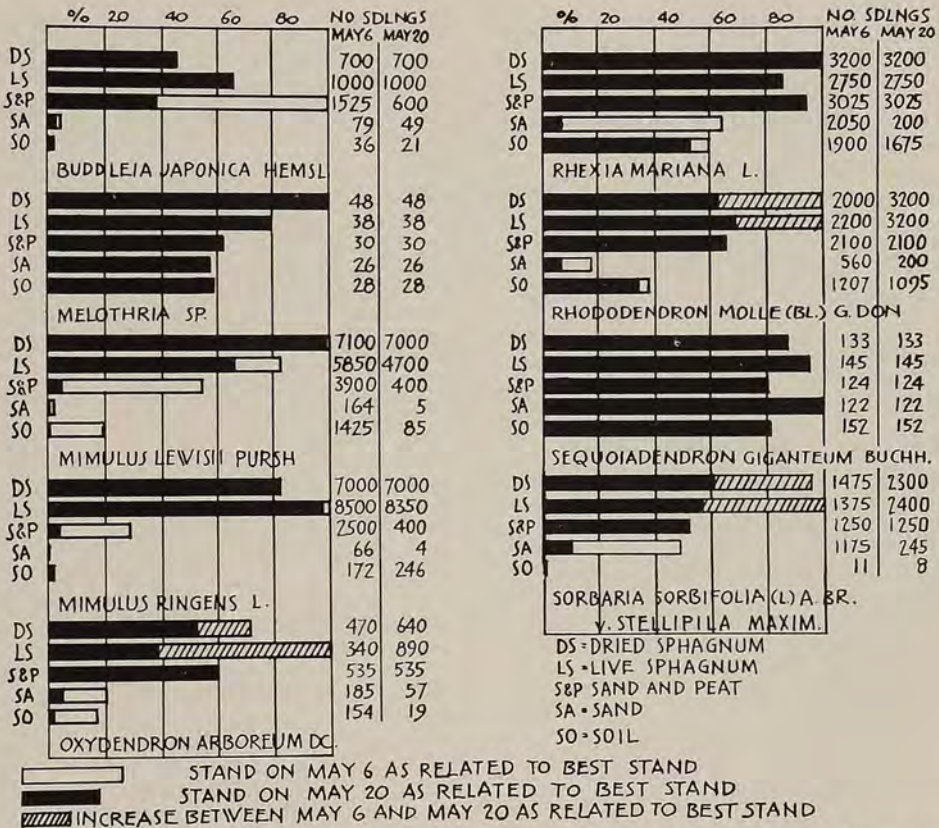
Spontaneous attacks of damping-off, which spread rapidly from the center of infection, were observed in the following: *Buddleia japonica*, *Mimulus Lewisii* and *M. ringens*, and *Sorbaria sorbifolia* on sand, soil, and sand and peat; *Oxydendrum arboreum*, *Rhexia mariana*, and *Rhododendron* on sand and on soil. The difference shown in

Figure 1 between the stands of May 6 and May 20 gives a measure of the extent of this loss. In no case were attacks observed on either of the sphagnum media, although there were on them some slight losses of undetermined origin in *Mimulus Lewisii* and *M. ringens*. As shown in Figure 1, seeds of several species continued to germinate on sphagnum after May 6.

On these unsterilized media, it is clear that sphagnum, either living or dried, was superior from every point of view. Furthermore, dried sphagnum was fully the equal of living sphagnum. In fact, the plants were actually larger and greener in the former, suggesting that the products of disintegration were stimulative.

In order to compare unsterilized sphagnum with the other media at their best, another greenhouse test was made. All flats except those containing sphagnum were subjected to steaming, after preparation, for 45 minutes at a pressure of about 50 pounds. In addition, flats of living and dried sphagnum, watered with Dunlap's two-salt solution, were included. Seedling counts were taken, but as no damping-off was observed in the sphagnum and the differences in stand were small, they are not given. Suffice it to say that the most satisfactory media in this series were sterilized soil and the sphagnums, particularly those to which nutrients were added. Again dried sphagnum was fully as good as living sphagnum. The only occurrences of damping-off were in sand and in peat and sand.

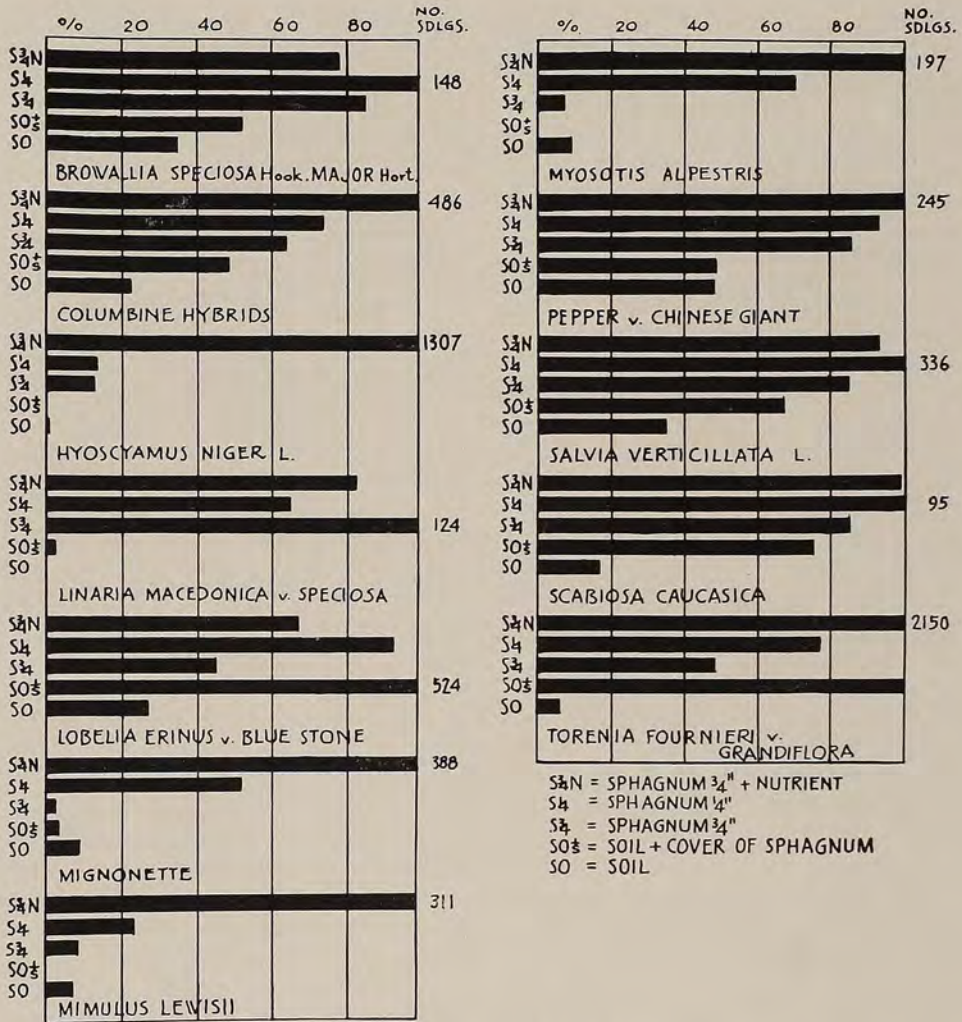
In April, 1940, dried sphagnum was given a rigorous trial in a small unheated greenhouse, using it in association with the same soil and under the same conditions which in other years had led to the loss of a high proportion of the seedlings from attacks of damping-off. Unfortunately, in this sowing,



The effect of various unsterilized media on the stand of seedlings in the greenhouse. For each species, the medium which gave the highest total number of seedlings regardless of the date of count, is taken as 100 and all other media related to it. In the column to the right of the diagrams the seedling counts are given.

no comparisons were made with other media, but the results were so highly successful as to warrant comment. A layer of sphagnum about half an inch thick was placed over unsterilized garden soil with a high humus content. The seeds were sown thickly in a band about an inch wide and an inch apart. After sowing, and at occasional intervals of 5 to 7 days, nutrient solution was used instead of water. The situation was such that the flats could be attended only early in the morning or late in the afternoon. In 40 lots of seed belonging to the genera *Adonis* 2 spp., *Alonsoa* 3 spp., *Amberboa*, *Am-*

mi, *Arnebia*, *Asperula*, *Boltonia*, *Brachycome*, *Browallia* 4 spp., *Centaureium*, *Chariois*, *Collinsia* 3 spp., *Crepis*, *Doeringia*, *Eucnide*, *Felicia* 2 spp., *Gamolepis*, *Hebenstreitia*, *Heliophila*, *Ionopsidium*, *Mimulus* 6 spp., *Nemesia*, *Nolana*, *Penstemon*, and *Trachelium*, germination was very good with all but *Arnebia*, *Asperula*, *Hebenstreitia*, and *Chariois*. Only a few seeds of each of these latter were available. The seedlings were held in these flats until they could be transplanted to the open garden. Only one center of damping-off appeared, in one of the rows of *Mimulus*; it spread so



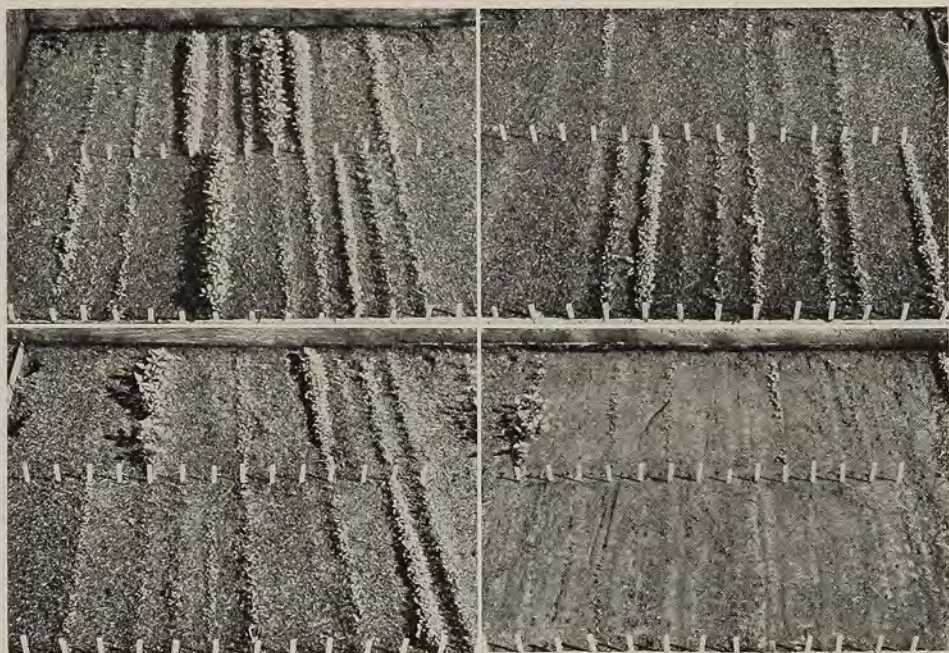
Germination on sphagnum and on unsterilized soil in the cold-frame. For each species, the treatment which gave the highest total of seedlings is taken as 100 and the others related to it.

slowly that after two weeks it was not more than two inches across. It is worthy of note that the seeds of *Trachelium caeruleum* in this sowing did not germinate until a month later, but at that time a very good stand was obtained.

So much success had attended the use of sphagnum in the greenhouse that it seemed worth a trial in the cold-

frame. Accordingly, a frame was selected in which damping-off organisms had been active enough earlier in the season to destroy entirely all sowings made there. Colorimetric determinations indicated a pH of 4.3 for the soil; sphagnum usually shows pH of about 4.4 to 4.5.

On July 22, four plots, each 6 feet wide, were laid out. Dried sphagnum,

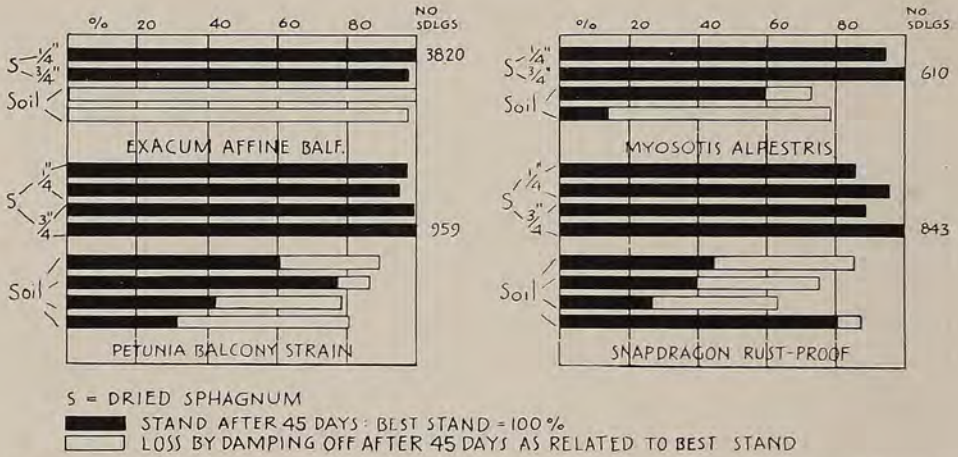


The cold-frame plots one month after sowing. Upper left: sphagnum in a layer $\frac{3}{4}$ inch thick to which nutrients were applied several times. Upper right: sphagnum in a layer $\frac{3}{4}$ inch thick. Lower left: sphagnum $\frac{1}{4}$ inch thick. Lower right: unsterilized soil.

screened as outlined above except that the preliminary moistening was omitted, was spread loosely to a depth of about three-fourths of an inch on two of the plots and about one-fourth of an inch on one plot and well watered down with a fine spray. The fourth plot received no sphagnum. Immediately after, the seeds were planted in duplicate with random arrangement in bands 1 inch wide and 30 inches long, spaced $3\frac{1}{2}$ inches apart. A light covering of sphagnum was placed over the larger seeds in the sphagnum plots, and a covering of soil was used for the same seeds in the soil plot. On July 26, another plot was added, adjacent to the soil plot. In this case, the seeds were sown on the soil but received a covering of sphagnum, varied in thickness according to the size of the seed. Dun-

lap's nutrient solution was applied to one deep sphagnum plot two days after sowing and repeated three times at about 5 to 7 day intervals. After sowing, the frame was closed tightly with glass sash, which in turn was covered with coarse burlap shade. As soon as most of the seeds had germinated, the sash was replaced by a screen wire shade. Unusually high temperatures prevailed during the period between August 2 and August 10. A maximum thermometer in the frame registered over 100° F. on several occasions during this period.

The kinds of seeds sown, the resulting numbers of seedlings counted on August 21, and the rank of the plots are shown graphically in Figure 2. There was little evidence of post-emergence damping-off, but numerous



Germination and damping-off survival on contaminated soil and on sphagnum in contact with the contaminated soil in the greenhouse.

observations gave positive evidence of pre-emergence attacks in the two plots with seeds in contact with the soil.

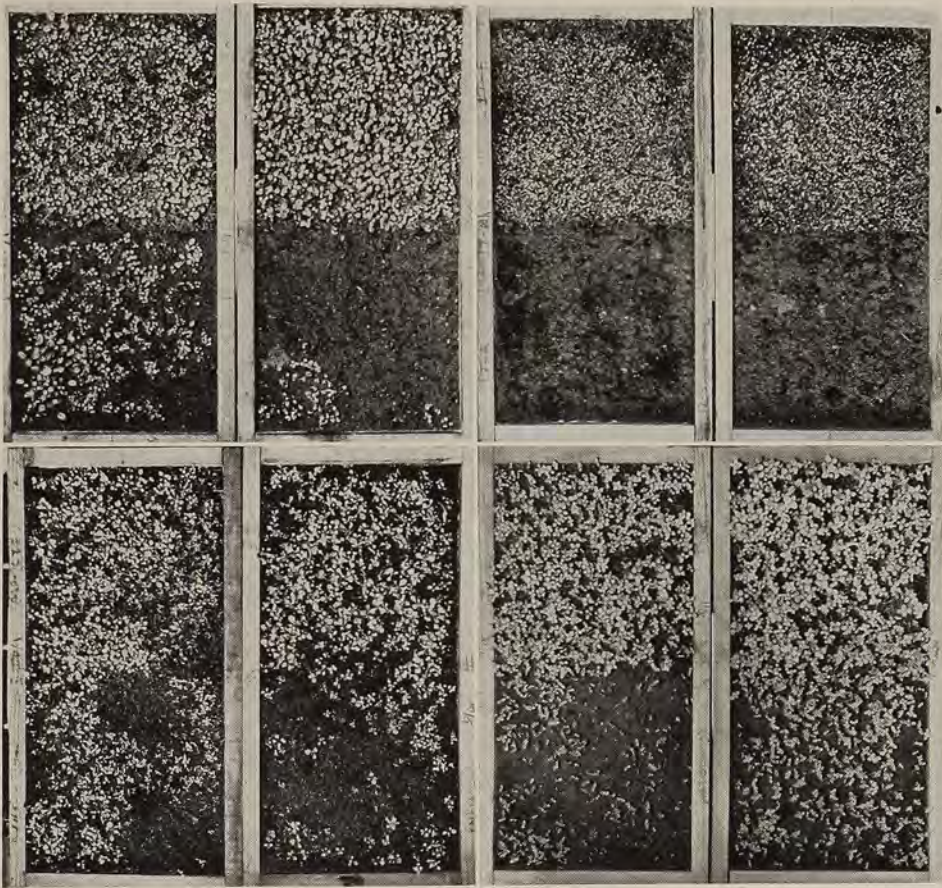
The margin by which the sphagnum surpassed unsterilized soil in this trial was most impressive. (See page 113.) In fact, the difference was that between a successful germination and a virtual failure. This same difference was reflected in the character of the growth of the plants. Only in a few scattered tufts of plants was the growth of the soil plot equal to that of sphagnum plus nutrients. In the plot where the seeds were sown on soil and covered with sphagnum, few of the seedlings made good growth, possibly because the roots failed to penetrate the soil and there was too little sphagnum to provide adequate moisture.

The number of surviving seedlings seemed to be increased by the application of a weak nutrient to the sphagnum. It is possible that the superior stand on the thin sphagnum likewise may have been due to nutrients diffusing upward from the soil. The seedlings on the thick layer of sphagnum which did not receive nutrients were definitely inferior in appearance, al-

though, on the whole, their germination was satisfactory.

As the first experiment in the cold-frame drew to a close, a somewhat more extensive trial was inaugurated, designed to permit a comparison with soil under conditions more favorable to the latter. However, due to unusually favorable weather for the germination of seeds, very little was learned. For the most part, a few more seedlings were obtained in soil that was steam-sterilized just before planting than on sphagnum. There were a few instances of slight loss by damping-off in sphagnum, but there was no spread of any extent.

In order to test further the capacity of sphagnum to inhibit the spread of damping-off, one half of each of a series of twelve flats was filled with untreated soil taken from the soil plot used in the first coldframe experiment. The other half of six of the flats was filled with the same soil to within three-fourths inch of the same level, and brought to level by a layer of three-fourths inch of screened, dried sphagnum. The junction between the soil half and the sphagnum half was closed carefully so



Flats of seedlings comparing the stand on soil with that on sphagnum contact with soil 45 days after sowing. In the upper half of each flat, the seeds were sown on a layer of sphagnum lying in contact with the soil. In each pair, the flat on the left received a layer $\frac{1}{4}$ inch thick, that on the right $\frac{3}{4}$ inch thick. Upper: left, *Myosotis alpestris*; right, *Exacum affine*. Lower: left, *petunia*; right, *snapdragon*.

that nothing separated the two media. The remaining six flats were filled in the same way except that the sphagnum layer was only one-fourth inch thick. The flats were sown on November 10 with the soil portions and the sphagnum portions receiving equal quantities of seed. Four flats were sown with petunia and four with snapdragon seed: two on each thickness of sphagnum. Similar comparisons were made with two flats of *Myosotis alpestris* and two flats of *Exacum affine*.

In Figure 3, the soil and sphagnum plots are compared for initial germination and for damping-off losses within 45 days after sowing. For the most part, germination was slightly poorer on the soil. Damping-off took almost all the seedlings of *Exacum affine* on soil. (See page 116.) A large portion of the petunia seedlings on two soil plots was killed by damping-off. One soil plot of myosotis likewise suffered heavy losses. Some losses on soil occurred in the other flats of petunia and



Seedlings which have remained in the sphagnum for four months. Left, Vitex sp.; right, Anaphalis royleana. About 500 seedlings were transplanted from the space at the right.

in all those of snapdragon. There was no evidence of spread into sphagnum in any flat, although in two cases with petunia, large circles reached the sphagnum. There were no losses on the sphagnum that could be attributed to damping-off. No distinction could be made between the two thicknesses of sphagnum.

Experience with the use of living sphagnum for seeds that are slow to germinate has shown that damping-off is prevented even after several months. The living sphagnum, however, tends to grow and thus submerge the seedlings. Observations on the suitability of dried sphagnum in this respect have been limited. In one instance a species of *Swertia* germinated without incident about two months after sowing. To test the keeping qualities of sphagnum, two flats of dried, and two of living sphagnum in three-quarter inch layers

over unsterilized sand and peat were prepared and watered on August 10 as if for immediate sowing. One flat of each was watered with the two-salt solution. They were covered with panes of glass, set away on a light bench, and kept moist. On November 8, each flat was marked off into six equal plots of 6 by 4 inches and sown in duplicate with measured quantities of seed of snapdragon, petunia, and torenia. The condition of the surface of the dried sphagnum appeared to be better than that of the living, although the latter had grown very little. There was an application of nutrient solution to all flats immediately after sowing.

The number of seeds sown per sample and the percentage germination as determined December 10 are shown in Table I. No post-emergence damping-off was observed in any of these plots. The same lots of petunia and snap-

TABLE I.—Stands of Seedlings after One Month on Unsterilized Sphagnum Prepared Three Months before Sowing

	No. of Seeds Sown	SEEDLINGS PRODUCED IN PER CENT							
		Living Sphagnum		Living Sphagnum + Nutrients in August		Dried Sphagnum		Dried Sphagnum + Nutrients in August	
Petunia, Balcony Strain	750	24.0	21.9	26.8	25.9	35.7	33.1	29.6	34.4
Snapdragon	325	46.2	51.7	40.6	33.5	57.8	51.4	55.1	54.2
Torenia Fournieri	975	92.8	74.9	75.4	75.4	63.6	83.1	90.3	72.3
Means		60.2	51.8	52.1	50.6	52.5	59.8	62.5	55.6

dragon seed, when sown on freshly prepared dried sphagnum at the same time and handled in the same manner, yielded germination percentages of 35.2 and 69.9 respectively. No reason has been assigned for the slightly reduced germination on the old surfaces.

In the use of sphagnum at Glenn Dale, it has been demonstrated repeatedly that seedlings germinated on live sphagnum may be kept alive for months in the original seed flat with very little care. It appears after one season's experience with dried sphagnum that the same may be expected of it. Certainly, seedlings of a number of species have been held successfully on it for four months. (See page 118.)

Sphagnum had two advantages over most media not shown in the experimental data given above. It permitted the removal of either small or large seedlings for transplanting with a minimum of injury to the roots. Some seedlings were merely lifted out. Larger ones were easily pulled out. It permitted great latitude in watering. In the greenhouse, it required very little water. In the coldframe daily watering was necessary, but it could be done without fear of the unfavorable reactions that accompany overwatering in the soil. Furthermore, rains did not harm the surface.

Judged purely from the standpoint of the control of damping-off, sphagnum is greatly superior to the other

unsterilized media tried. Compared with sterilized soil under favorable conditions, its only advantage is simplicity. Furthermore, contaminations of sterilized soil are always possible.

Sand as a medium has been recommended by Dunlap (5), but in the trials at Glenn Dale, it has not furnished adequate protection against damping-off unless sterilized. When sterilized, it does not appear to have any particular advantages over sterilized compost. Furthermore, it does not hold water as well as either sphagnum or compost. Mixtures of peat moss and sand have been recommended as seeding media by Wiggin (9). However, the mixture tried at Glenn Dale has been inferior to sphagnum.

For the home gardener and the small greenhouse operator, the use of sphagnum obviates the expense of soil sterilization and the uncertainty of chemical treatment in seedling cultures. When it becomes necessary to germinate seeds with which the gardener is not familiar, sphagnum is helpful. Should the seeds fail to germinate immediately, they are readily accessible for examination and recovery, if need be, for stratification or other stimulative treatment. Preliminary tests indicate that dried sphagnum may be prepared by machinery for sowing in large-scale operations.

Without sterilization of seed or substrate, and with little attention to wa-

tering, sphagnum has given as good results as any other good medium regardless of treatment. The diversity of plants used in these tests, covering a great taxonomic range, promises wide suitability of sphagnum to seed of various kinds. In other requirements of a germinating medium, it is always equal, and generally superior, to soil and to sand.

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Tuberous Begonias

LAMBERT DAY

The American Begonia Society

The modern or popular form of our tuberous begonias are winning new friends wherever they are seen. I wonder, as we gaze at their exquisite forms and colors, if we half appreciate the amount of work and skill that has been employed to produce these flowers. It has taken over eighty years of constant labor on the part of many hybridists. This means that several generations have been devoting their best energy and thought in this development. The job is as yet by no means complete and the hybridist is still silently and patiently at work, creating new forms, or removing defects from old ones, adding a delicate fragrance and changing growth habits to conform to our modern mode of civilization.

The ancestors of our tuberous begonias came from South and Central America. They were found growing at various altitudes between two and twelve thousand feet. This means that they are found growing in a temperate zone and require the duplicating of these cool conditions to be at their best. Mr. Henderson is credited with introducing the first tuberous begonia into England. This he received from Bolivia, and grew it under the name of *B. cinnabarina*. By 1854 *B. Pearcei*, *B. octopetala*, *B. Veitchii*, *B. Davisii*, and *B. roseaefolia* were in the cultures of the early hybridizers. Within ten years the first double flower made its appearance. From within this group came all of our present color and most of our present forms.

Hybridists have developed the begonia along three different lines. First, are those commonly called, "Lloydii," which were developed for use in hang-

ing baskets, and are available in yellow, red, and white, with intermediate shades. The flowers may be selected from singles or doubles, and large or small to suit the taste of the individual. The second group are the "Multiflora," which are unexcelled for profusion of bloom in brilliant color. They are compact growers, seldom reaching more than fifteen to eighteen inches in height. With some varieties the foliage is to be scarcely seen because of the dense bloom. This form deserves much more popularity than it has had in the past in this country. It may be used as a bedding plant and will stand more sun than other types.

In the third grouping are our regular tuberous varieties. These may be had in all varieties of color except shades of blue. The flowers have been developed into many pleasing forms among which are "Narcissiflora," "Cristata" and "Crispa" in the single flowered types. The double flowered include "Camellia," "Camellia Picotee," "Frimbriata," and "Rosebud" types. No garden or conservatory is complete without at least a few of the latter group.

These plants may be started from the dormant tubers procurable from most seed supply houses and nurseries during the months from December to March, at other times from nurseries as potted specimens. The dormant tubers should be kept at all times in places where they will not freeze. Temperatures between 50 and 60 degrees Fahrenheit are satisfactory. When the tubers begin to show pink sprouts it is time to start them on their first cycle of growth.

A very good way is to place them so

that they are just flush with the surface or slightly buried in moist peat moss. Spacing the tubers about three inches apart will allow ample room for root growth. The peat moss should be in a shallow box or seed flat about two and one-half to three inches deep. The tubers may then be given gentle heat in the greenhouse. For those that do not have a greenhouse, it is advisable to mix sharp sand and oak leaf mold in equal proportions with the peat moss as less water will be retained by this mixture. This will help prevent rotting of the tubers and young, tender growth. This mixture should be kept just moist and never allowed to become soggy. The flat should then be placed where it will receive plenty of strong filtered sun light but no direct sun. Night temperatures should not drop below 50 degrees Fahrenheit, while daylight temperatures may be allowed to rise to 75 degrees Fahrenheit. Warmer temperatures are liable to cause a more rapid, spindling growth. This is an undesirable condition because the plants are more readily attacked by diseases, and the succulent growth will not produce as many nor as large flowers as the plant that is allowed to start slowly with the resultant compact growth.

When the growth has reached a height of four to six inches and a good root system has developed it is time to transplant them. If placed in small pots, select a pot of the size that will allow the ball of roots to be within an inch of the edge. Fill the first quarter of the pot with good drainage material or sphagnum moss. The rest of the pot is filled with a soil mixture suitable for begonias. The tuber may be covered with soil only up to the first joint on the stem. Care should be used not to cover this joint as a new tuber will form at this place, and the old one will be destroyed. The plant may or may

not flower during this period and a very sickly plant with a small tuber may result or total loss of the plant may follow. From one-half to one inch of space should be left at the top of the pot as a basin for watering and fertilizing.

Tap the plant out of the pot occasionally for examination of the root system. When the roots have reached the edge of the pot, the plants should be transferred to the next size larger pot. Do not allow the plants to become pot bound until the greater part of their growth period has been reached. The first few flower buds should be pinched off in order that the plant may become sturdy. All female flowers should be removed as soon as they have developed enough to be recognized by the seed pods, visible, just below the petals.

For those that may wish to plant the tuber directly from the starting flat into the pot in which they are to mature, some additional suggestions are offered. An eight, ten or twelve inch pot should be selected depending on the size of the individual tuber. Use plenty of drainage material in the bottom of the pot and then add a couple of inches of potting soil. A tablespoon-full fish meal may then be sprinkled over this. At least two inches (more if practical) of soil should now be added before putting in the tuber. This method has the advantage of only one operation and little need of further fertilization during the growing season. The fish meal is far enough away from the root system of the tuber so that the plant is forced to send out its roots in search of food. This results in a well developed root system that is so essential in producing high quality flowers.

Unless great care and good judgment are used in watering the plants when put directly in large pots, their mortal-



Courtesy Vetterle and Reinelt

*Tuberous Begonia, Double Frilled Type
(Fimbriata plena)*

ity will be high. The soil should be only kept moist until the plants are well established, when they may be watered more freely.

The tubers may also be planted from the flats directly into beds if proper provision has been made for drainage and watering. Most of the standard tuberous varieties of begonias are one sided, so to speak, as the flowers all face in the direction that the leaves point. This should be remembered when placing in a permanent bed so that the flowers may open in the desired direction. While this is also true of hanging basket and multiflora varieties, they have numerous shoots so that the flowers will face in all directions.

The soil mixture for tuberous begonias should approximate one-third leaf mold, one-third *well rotted* cow manure or compost and one-sixth of sand and sod or friable loam. One five-inch pot of bone meal or fish meal to each wheelbarrow of soil. Charcoal bits are also beneficial in maintaining a sweet soil.

Provision should be made for protection of the plants from the direct rays of the sun at all times. This may be accomplished by a lath, cloth or greenhouse, or by planting beneath the shade of large trees and shrubs. As some sun is needed they will not do well in full shade. When the plants have become well established and hot



Courtesy Vetterle and Reinelt

Tuberous Begonia, Double Camellia Type

weather has arrived they will require an abundance of water and may be sprinkled overhead. Keep the humidity high by wetting the area adjacent to the plants.

The plants should be fed so that they will retain their vigor until the end of the season. For dry feeding cotton seed meal or ammonium phosphate used at the rate of one-half teaspoon per eight-

inch pot has proven satisfactory. Larger quantities are injurious, doing more harm than good. This should be sprinkled evenly around the edge of the pot, covered lightly, and the plant watered immediately. Never feed a plant that is dry or not in good growing condition. Two such feedings per season should suffice. Vigoro, Nitro-phoska and other commercial fertilizers, when used

according to directions, may be used if preferred.

With the coming of cool weather in the fall the tubers will begin to mature and the stems and leaves take on a yellowish cast. It is then time to gradually withhold the water. In localities that are subject to early killing frosts the tubers may be taken up with as much soil as will adhere to the roots, bunched close together and allowed to ripen inside. The tops may be cut off to within six to eight inches of the tuber. In either case when the tubers are fully matured the stems will loosen and break away from the tubers. The soil should be kept slightly moist during this period to prevent the tubers from shriveling. When the last of the stems

have fallen off the tubers should be dug up and the dirt washed off the roots. Leave them in a bright airy place for a few days until they are thoroughly dried off and then store in a dry dark place where there is no danger of freezing. Some growers recommend storing them in leaf mold or peat moss which is a good suggestion.

Tuberous begonias may also be started from seeds and the majority of them are raised from seed by the begonia specialist. Many amateurs are growing them successfully but until one has learned from experience, success is rather elusive. For those needing lessons in patience it is highly recommended, but alas! that is another story.

The Use of Simple Outdoor Frames for Rooting of Summer Cuttings

V. T. STOUTEMYER

Complaint is sometimes made of the perversity which makes cuttings of a great number of plants root best in early or mid-summer, when the care of the cuttings is most exacting. Many gardeners are deterred from utilizing this season because they interpret the terse direction of the garden manual "cuttings in June under glass" to signify a greenhouse as requisite to propagation. Actually many cuttings can be rooted as well or better in an ordinary cold frame than in a greenhouse in summer, and with less effort. For many years nurserymen have utilized cold frames extensively in summer propagation by cuttings.

In the cold frame, as in the greenhouse, success in rooting cuttings in summer depends on control of humidity and temperature. Adequate control of temperature at this season means principally avoidance of excessive heat, which is attainable by shading, and maintenance of high humidity, which can be secured with comparatively little watering through use of sash and shades. The general program is to seal the frames almost air tight and to disturb them only for watering; the tighter the seal and the denser the shade practicable, the less frequently is watering required.

This paper describes methods through which ordinary cold frames were used with considerable success at Glenn Dale, Maryland, a few miles from Washington, D. C. Since details of the equipment appear to be an important factor in results, and since certain features of the shading differ from conventional nursery practice, a complete

description is warranted. Long frames, six feet wide, with poured concrete walls were used. These were covered with standard six-foot hot-bed sash. The soil level within the frame was even with that outside. The rooting medium, either washed river sand or a mixture of 75 per cent sand and 25 per cent peat moss, was placed in the frame directly on the surface of the soil to a depth of about four inches. Frames of concrete, tile or brick have a certain advantage for summer propagation since the excellent insulation provides uniform conditions which are difficult to obtain with a board frame unless it is double-walled and filled with an insulating material or banked with soil. These frames sloped to the south, as do most frames used for plant growing. Some, however, have recommended that frames to be used exclusively for propagation should have the slope of the sash toward the north in order to obtain a more indirect light.

The amount of space between the glass of the sash and the rooting medium does not appear to be important. The cuttings root well even when practically touching the glass.

SHADING THE FRAMES

Frequently, propagating frames are set close together with service walks between, so that the whole area may be covered with extensive structures for shading, such as a framework covered with muslin or burlap, or lath shades. This type of shade has the advantage of leaving the glazed sash covering the frame easily and quickly movable at all times. However, when the cuttings, such as these, may be handled without

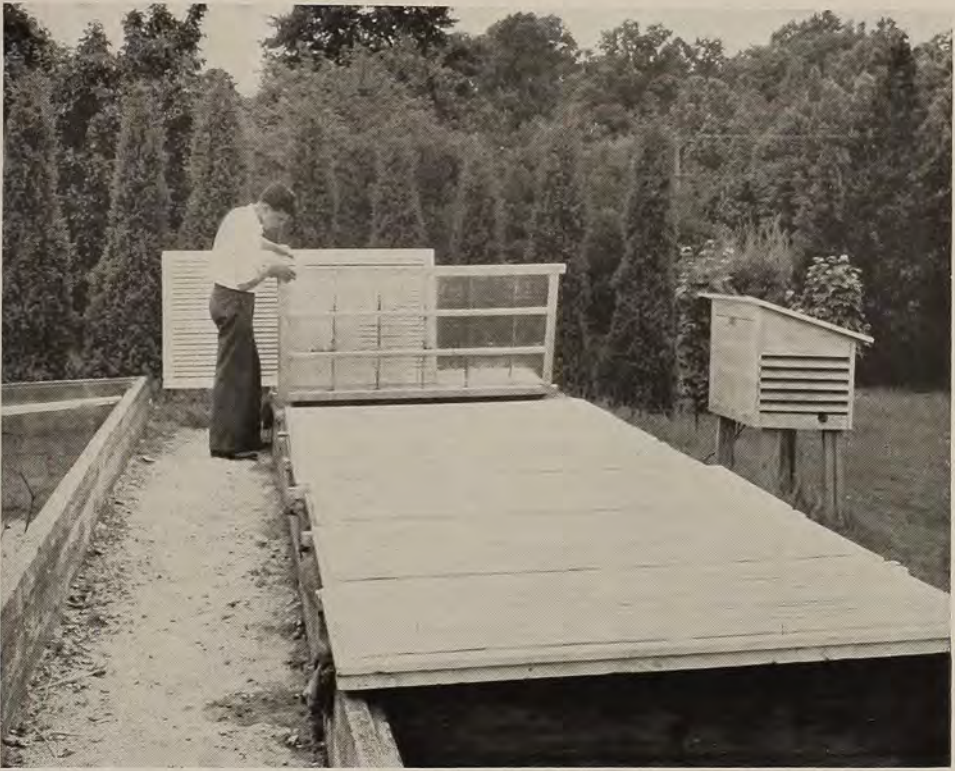


Fig. 1. General view of propagating frame covered with glazed sashes and single slat shades.

excessive opening or closing of the sash, the simpler and less expensive expedient of laying the shade directly on the sash is fully as satisfactory.

Two types of slat shades were used for shading the outdoor propagating frames, both with and without bottom heat. Shades of this type were three feet by six feet with a board two and three-quarters inches wide on both the longer edges of the shades. Between these were twenty-two slats laid longitudinally with an opening of approximately five-sixteenths between slats. Each slat was approximately one and one-eighth inches wide. When used over standard sash on the frames no additional shade was needed for the propagation of comparatively difficult cuttings and no difficulty was experi-

enced in keeping the cuttings from wilting. A general view of a frame covered with this type of shade is shown in Fig. 1.

Much lighter shades of the same type of construction were also used. These had a piece one and three-quarters inches wide on the outer edges of the shade but had only fifteen slats, each approximately one and seven-sixteenths inches wide. There was an opening of three-fourths of an inch between slats. These shades did not reduce light enough to be safe for most cuttings and therefore were always used in combination with an additional shade made by stretching a loosely woven burlap over a light wooden frame. Both light measurements and observation of the behavior of the cuttings indicated that

this double shade was the equivalent of the single heavier shade. Shading of the sash by painting the glass is not as desirable as a shade raised above the glass which allows a free circulation of air to take place between shade and glass. In windy exposed locations, the shades may be held in place by a wire stretched over the top of the frame or by weights.

AMOUNT OF SHADE

The amount of light is a critical factor in all propagation by means of cuttings. Greenwood cuttings should have as much light as possible without injury, which is usually a vastly reduced amount. A major cause of failure in propagation is often an incorrect amount of light on the propagating bed. Damping-off results from excessive shade; but, on the other hand, the cuttings may be lost by excessive light for even a short period. The shading used on these frames would be considered excessive by some propagators, but the results have justified the use of the amount specified here. The use of light measurements in propagation experiments is to be recommended highly, and probably some system of measuring light will be in common use in practical propagation eventually.

LIGHT INTENSITY WITHIN FRAMES

In order to obtain an estimation of the reduction of light within the frames, readings were made with a Weston Illumination Meter. At Glenn Dale, the normal intensity of summer sun at noon on a clear day is around 10,000 foot candles. The light on the cutting medium at this time under an unshaded sash with clear glass was reduced to about half this intensity. Averages of numerous readings on the cutting medium showed that under the sash with the heavy wooden slat shades, the light

intensity was only slightly over 300 foot candles.

Similar light measurements made in propagating cases in a north lean-to greenhouse at the same time were almost identical. Since excellent results in propagation were being obtained in the greenhouse under these conditions as well as in the frames, it seems safe to assume that these light conditions, if not precisely optimal, were at least adequate.

BOTTOM HEAT

Frames which are used without bottom heat require no excavation. Such frames may be electrified by lead-covered soil heating cables with thermostatic control, which provide ideal rooting temperatures for cuttings of any sort desired. However, the expense of the equipment is a disadvantage and in some localities the cost of the electricity is excessive.

Cornstalks, hay, weeds or other decaying vegetable materials may be used to provide bottom heat for cuttings, but a pit one or two feet deep is required and the heat does not last longer than is necessary for rooting a single lot of cuttings. Our records show that a layer of packed decomposing green rye straw a foot or more thick raised the daily mean temperature of the rooting medium about ten degrees Fahrenheit in midsummer and lasted over a period ample for the rooting of many cuttings with a gradual diminution toward the end of the rooting period.

Advisability of the use of bottom heat depends on two things: the climate of the locality and the time of the summer in which the cuttings are to be rooted. As one progresses northward, the tendency of propagators to use bottom heat in outdoor propagating frames generally increases, particularly in locations in which the nights are cool.

The decision to use bottom heat also depends to some degree upon the period during which the cuttings remain in the frames. The use of bottom heat is often unnecessary for propagation done in the early part of the summer in most of the United States. On the other hand, cuttings placed in frames in late July or August may not root well unless bottom heat is supplied, particularly in many locations north of the Mason and Dixon line. The nature of the plants to be propagated also must be considered in deciding the question of bottom heat. Thus, solar frames or other provisions for high temperatures are used in propagating certain tropical plants even in southern locations.

Some cuttings are benefited by bottom heat even though they form roots without it. Whether the expense and inconvenience of providing bottom heat is justified depends on certain factors which can be decided only on the basis of the experience of the individual propagator. Bottom heat benefits only those deciduous greenwood cuttings which are relatively active and are expected to root and grow on immediately. Cuttings of many sorts of evergreens, such as hollies and yews, are commonly rooted by placing cuttings of well-ripened wood in frames without bottom heat in late summer or fall, and leaving them over the winter with adequate protection. Rooting is completed during the following spring. Bottom heat is usually undesirable for cuttings such as these which are in an inactive condition when first made.

ROOTING MEDIA

Any of the standard rooting media may be used with success in outdoor frames of this type. However, mixtures of peat moss and sand are particularly advantageous for many plants, especially the ericaceous species, and are to be recommended whenever pos-

sible, since they hold water especially well and thus reduce the frequency of opening the frames for watering. Peat mixtures can be overwatered easily. Both the imported and domestic moss peats, somewhat acid in reaction, are satisfactory; but sedge peats should not be used.

On hot, clear days, or when there is considerable wind, great care must be taken to prevent the wilting of the cuttings during handling or when the frames are open. If the cuttings must be inserted during the hottest part of the day, an effort should be made to keep the sash over as much of the opening as possible. A portable shade is sometimes placed over the frame while cuttings are being set. Cuttings should be inserted firmly in the rooting medium, but a heavy watering is quite sufficient to firm the medium about the bases of the cuttings without tamping.

WATERING

The interior of the propagating frames was kept moist at all times. The effective insulation of the frame, however, due to construction, method of shading and also a burlap seal on the edges made only infrequent watering necessary, except in hot dry weather. Long strips of burlap 40 inches wide were folded twice and then laid over the top of the concrete wall, overlapping several inches on both sides. This burlap strip remains saturated with moisture, and provides an effective seal on the edges of the sash, preventing drafts and loss of moisture. Fig. 1 shows a general view of such a frame. The peat and sand rooting medium required much less watering than the pure sand. An occasional sprinkling over the top of the sash and shades of the closed frames was useful in hot weather and helped to keep the burlap moist. The cuttings were watered several times a week if hot weather fol-

TABLE I
Temperatures (Fahrenheit) of Outside Air Temperature and of Rooting
Medium in Frame

Date	Outside Air Temperature in Shade		Air Temperature within the Frame		Soil Temperature	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
July 4	85	64	90	68	74	72
July 5	77	70	81	68	73	70
July 6	86	62	91	65	72	69
July 7	90	69	94	72	72	69
July 8	92	73	98	76	73	69
July 9	89	71	93	74	73	69
July 10	91	68	95	68	74	70
July 11	79	58	84	60	76	71
July 12	87	55	91	56	77	72
July 13	91	63	94	66	75	71
July 14	89	69	92	72	75	71
July 15	85	54	84	57	77	72
July 16	80	60	83	52	75	69
Average	86	64	90	66	74	70

lowed insertion. After several weeks the frames having a peat and sand medium could be left for five to ten days without attention. In fall and winter practically no watering was needed, although routine inspections were continued at intervals of several weeks.

VENTILATION

No ventilation was given at any time during the period of rooting. After the cuttings were well rooted, a period varying in length depending on the nature of the plant, air was admitted to the frame in increasing amounts to harden off the cuttings. This was necessary only if the cuttings were to be carried over the winter in these frames, instead of being potted at this stage.

CONDITIONS WITHIN THE FRAME

The humidity of the atmosphere within the frames was high, causing frequent condensation of moisture on the glass, but because of the slope of the sash, the water ran downward to the edge of the frame.

Records with soil and air thermographs showed that the temperature of the air fluctuated considerably between day and night and also with changes in the weather conditions, but the temperature of the rooting medium remained relatively constant. The maximum and minimum temperatures of a frame covered with the single wooden slat shades as described previously are shown in Table I. These temperatures were recorded in early July and show that the rooting medium was maintained near 70° Fahrenheit, which is a satisfactory temperature for the rooting of cuttings of the majority of hardy plants.

RESULTS OBTAINED

Among the cuttings of woody species which have been rooted in these frames without bottom heat are:

Buxus sempervirens L., *Celastrus orbiculata* Thunb., *Cotoneaster* sp., *Dipelta floribunda* Maxim., *Disanthus cecidifolius* Maxim., *Ilex* sp., *Loropetalum chinense* Oliv., *Pyracantha coc-*

cinea Roem., *Rhododendron* sp., *Stranvaesia Davidiana* Dcne.

The few cuttings which have not rooted well were those having a densely pubescent foliage. Such plants are sensitive to excess moisture and should be handled in the greenhouse. Often, however, the frame has been superior in comparison with a greenhouse propagating bench. For instance, cuttings of *Dipelta floribunda*, which have never rooted well in the greenhouse in summer, were rooted with virtually no losses in these outdoor frames. Superior results were produced with much

less attention than would be required for similar cuttings in the greenhouse.

ACKNOWLEDGMENTS

These observations on the environmental conditions provided by the frames used in this study were made during experiments on the propagation of difficult plants conducted jointly by the Division of Plant Exploration and Introduction, Bureau of Plant Industry, and the Hillculture Division, Soil Conservation Service. Mr. F. L. O'Rourke and Mr. J. L. Jester assisted in some of the details of propagation.

Glenndale, Md.

A Few More Oriental Crabapples

DONALD WYMAN

SOME OF the most outstanding of the crabapples have been mentioned in the three previous issues of the NATIONAL HORTICULTURAL MAGAZINE, but there are still at least seventeen other species growing in the Arnold Arboretum, most of which can be classified in this "oriental" group. Of these, some are more valued ornamentally than others; and, even though some of these are, fortunately, now common in the nursery trade, they might well be mentioned on these pages for the sake of emphasis.

Malus brevipes is probably closely related to *M. floribunda*, though the exact origin of this species is unknown. It has been in cultivation since 1883, and can be considered as one of the first—if not the first—of the crabapples to have colorful fruit in the late summer. Plants at the Arnold Arboretum face the ground well on all sides, making a dense mound of closely leaved branches. The fruits are about one-half inch in cross section and begin to color a beautiful deep red during the latter part of August while the green leaves are still in perfect condition, making an excellent display of color. The flowers are nearly pure white. This low, mound-like tree makes a splendid specimen, particularly for facing roads and walks where late summer and early fall interest is needed.

The tea crab, *M. hupehensis* (listed in nursery catalogues as *M. theifera*), was discovered by Wilson in China and brought to this country in 1900. Since that time it has proved its value in American gardens as a very decorative small tree. It has long, upright spreading branches, thickly studded with

short spurs which bear numerous clusters of flowers. These flowers are deep pink in bud; and when the weather is cool, the flower buds remain closed for some time. As the flowers open, they become almost white. It is easily one of the most striking of the crabapples, particularly on account of its fan-shaped form. Wilson has often told how certain of the natives in central China prepared a red tea from this plant. The variety *rosea* has buds and flowers of a deeper pink color. The tea crab is at its best in flower. It is the most picturesque of the crabapples and its irregularly spreading fan-shaped habit makes a winter display of considerable ornamental value. The fruits, however, are a poor greenish yellow with a red cheek, and not particularly ornamental. This is one of the few crabapples which when raised from seed will be practically identical with the parent plant in every way.

The Sargent crab, *M. sargentii*, is, fortunately, fast becoming a common resident in our gardens for it is the lowest growing of all the crabs, seldom growing over 6-8 feet tall. It was discovered by Professor Sargent, the first director of the Arnold Arboretum, in northern Japan in 1892. Typically, it is a shrub, mound-like in appearance with its lower branches lying on the ground. It is easily distinguished by its low habit and its three-lobed leaves. The flowers are pure white, but in the Arboretum there has appeared one plant with the flower buds a good pink. The fruits are smaller than those of most of the other crabapples and are a wine-red color. Although they are not particularly conspicuous, they do color



Arnold Arboretum

Malus Zumi calocarpa



Arnold Arboretum

Malus Sargentii

before the leaves drop off in the early fall. In this country it has been clearly demonstrated that when the plants are grown from seed collected in the United States (and this is where many nurserymen have received their first stock plants), many of the trees are considerably taller and do not have the desirable, low dwarf habit had by this species in Japan. In order to obtain this desirable habit, it is much better to propagate asexually from trees having the desirable qualities or to obtain seed direct from Japan. *Malus sargentii* is suited very well for the small garden where space is the limiting factor, and its small fruits are especially sought by the birds.

The cutleaf crab, *Malus toringoides*, need not be used for its flowers alone for they are small and white, appearing after those of most of the other single flowering crabapples have faded. Moreover, they are not particularly ornamental. The real value of this plant lies in its fruits. These are beautifully colored, red on the side towards the sun and yellow on the side away from the sun. They are not round but slightly pear shaped, and remain on the tree for several weeks after the leaves have fallen. This is one of the few crabapples in our collections which is known to breed absolutely true from seed. *Malus toringoides* and the somewhat similar *M. transitoria* are the last of the Asiatic crabapples to bloom. It is not a tree to be selected as the single representative of its class in a garden, but where other individuals are planted for their flowers and fruits and space is available, this tree might well be an added attraction in the fall, when it is at its best.

The pearleaf crabapple, *M. prunifolia*, is not common in nurseries. It is one of the hardiest of the oriental crabapples, being a native of northeast-

ern Asia. The flowers are pure white. The fruits are about the largest of those of all the Asiatic group, being approximately $\frac{3}{4}$ of an inch in diameter. Its variety *rinki* is called the Chinese apple, for it is this tree which was cultivated in China and later in Japan where it was the only apple cultivated as a fruit tree until the advent of the American apples. The flowers of this variety are pinkish. The fruits of both species and variety are yellow to red, quite conspicuous, and they last a long time after the leaves have fallen from the tree. Ornamentally then, these trees are valued chiefly for their fruits. Normally, they are somewhat upright in habit of growth but there is a fastigate variety growing in the Arboretum (*M. prunifolia fastigiata*) which is everything the name implies. As far as I know, this form is not available from any American nursery, but another upright crabapple, *M. robusta fastigiata*, is listed in at least two 1941 nursery catalogues.

Malus sieboldi was introduced into the gardens of Europe by von Siebold from Japan in 1853. It is a low dense tree of spreading habit, with small three-lobed leaves on vigorous shoots, and with small flower buds, tinged rose and fading white as they open. Actually, this is a small form of the larger tree, *M. sieboldi arborescens*, which may grow thirty feet tall and which has minute fruit, yellow on some trees and red on others. Although the flowers are small on both trees, they are produced in immense quantities. They bloom only slightly before *M. toringoides* but after most of the other Asiatic crabapples have finished. Like *M. brevipes*, *M. Sieboldi* makes a low, dense mass of foliage, has profuse flowers and fruits, and can be well used at the edge of a walk, drive, or border for this reason.

The last species to be mentioned here is another ornamental of great promise, not yet available from more than a very few American nurseries. It is the Zumi crab, *M. zumi*. It is a densely branched small tree. Borne in profuse quantities, the flower buds are pink and the flowers gradually fade white. The dark red fruit may be as much as $\frac{1}{2}$ inch in diameter. Fruits of the variety *calo-*

carpa may remain all winter long, which is quite an asset. Apparently, for some unknown reason, the birds do not feed on the fruits of certain specimens except as a last resort, thus allowing the trees to maintain their human interest for a longer period than they might otherwise.

Arnold Arboretum.

The Leucojums Spring and Summer Snowflakes

FRANCES EDGE McILVAINE

As the Autumn days wax and wane, the most comforting thought a gardener has, is of those bulbs that have been tucked away in the soil this year or last year or many a year ago.

Of all the species that gladden the spring, those that bloom earliest are the most precious, the snowdrops and the snowflakes.

Galanthus and *Leucojum* are their respective botanical names.

It is reprehensible, yet there are still many of those who call themselves gardeners, who say of the snowflake, "What a large snowdrop!" showing the casualness of the superficial. And I can say this with understanding, for I remember the time when I thought unintelligently and very casually that *Jasminum nudiflorum* was too much like forsythia to bother with and did not add it to my plantings for some years. In that dim distant time I had not handled, dug and planted my own roots and bulbs with the diligence that I learned later. There was a careful old German gardener then and I was not always there at planting time. Nor did I realize then what joy the handling of roots and bulbs would yield me, so that now after years of doing it, roots and bulbs have become my very Lares and Penates.

These genera are very unlike; indeed alike only in their earliness and in the bell-shape of their white and green spotted flowers.

Galanthus: gala, milk; anthos, flower.

Leucojum: leukos, white, ion, a violet referring to the color and fragrance of the flowers. Both *Galanthus* and *Leucojum* belong to the Natural Order, Amaryllidaceae. The *Leucojum* is the subject of this small monograph.

John Weathers lists nine kinds in his Bulb Book, but there are only three in general cultivation, *L. aestivum*, *pulchellum* and *vernum*. The nine are as follows, for some day after the present upheaval in Europe is over we may once more go bulb-hunting and all the autumn varieties to the three kinds we can still purchase.

L. aestivum, known as the summer snowflake, widely distributed over central and southern Europe to the Crimea.

L. autumnals, this is found wild from Portugal and Morocco to the Ionian Islands.

L. hyemale, native to southern France.

L. longifolium, this grows wild at an altitude of 4,500 to 6,000 feet in the Corsican mountains.

L. pulchellum, a native of Sardinia and the Balearic Isles, closely related to *L. aestivum*.

L. roseum, a small bulbous Corsican plant, leaves after the flowers rosy-red blossom!

L. trichophyllum, from southern Europe and West Africa.

L. vernum, the best of the genus native of central and southern Europe and naturalized in parts of Dorset, England.

This list makes only eight kinds but as he adds under *vernum* the var. *biflorum* or *Vagneri* and the var. *carpaticum*, one may call it ten.

Of the three species to be had in commerce, I will take first, *L. vernum*; it is my favorite and I have had long experience with it. Each Spring I wish I had transplanted and divided more of them. The broad leaves, of a bright deep green, show very early in the new year, often indeed they put their tips through the ground in December. They should be planted on the eastern side of the wall or house as the cold north and west winds shorten their stems and give them a stumpy ungraceful appearance.

They have a fault which should preclude their being planted where other and later bulbs are massed, namely that after their flowering season is over, they keep sending up such stout and luxuriant foliage that they take up far too much space in the beds or ground near the house windows where one wants other various "early comers" as Mr. E. A. Bowles calls the first flowers of the new year.

Their other fault is that their flowers, though more showy than those of the snowdrop, are not so lasting when brought into the house. They are fragrant and charming, but a day, or sometimes a few hours, in the warm atmosphere drains the life from their glistening petals and a thin transparency

results that is far from attractive, while their little step-sisters, the snowdrops seem to gleam whiter and whiter when brought indoors.

Here in Chester County, Pennsylvania, though the snowdrops may come first, they and the snowflakes bloom together for a long period. Most of mine which came from that good old Dutch firm of Krelage many years ago are the var. *Vagneri* with two flowers on a stem. The bulbs increase fairly rapidly and if one has left a clump in a place crowded by other roots, one finds just as with narcissi, many malformed long narrow growths, made in their anxious endeavors to reach the light.

L. aestivum has been with me longer than *L. vernum*, as large clumps of them were here in my grandmother's garden, and bloomed in May when the first peonies, *Festiva Maxima* bloomed on the central garden path. They have the same trick of showing their tips early in the winter. My clumps were so very hard to lift, being crammed in by the peonies, that I gave up in despair digging those and in my opulent garden days and the days of prompt shipment from Europe, we bought what we thought were the same; they were *Leucojum* all correctly, but were *L. vernum* and thus came that first early Spring surprise of bloom with the snowdrops. Later I tried again and received *L. pulchellum*, which as was noted above is closely related to *L. aestivum* but and alas! "differs chiefly in having narrower leaves and smaller flowers, and flowers somewhat later in the season." Much smaller and very insignificant flowers and hanging at the very end of very tall narrow leaf-like stems they are disappointing. However—a bit of information has just come to me in an unexpected manner and suggests a treatment that may improve them.

Idly picking up a book at the library some weeks ago, I decided to take it home, though with Autumn work still hanging over, I had no business adding a gardening book to my reading.*

They are often too stimulating and one rises with too many ideas and plans when the necessary tasks are still undone. This book was English and very sad with the atmosphere of the war to come and retrospect of journeys taken, and plants procured from the wild. Suddenly I came on something new. "Lodden lilies," he said, "grow about twelve miles from here on the river which gives them their name. Their Latin name is *Leucojum aestivum* and they are sometimes called Summer Snowflakes. I have rarely seen cultivated plants so splendid as the wild ones which were growing, many of them, in a foot or more of water. That, I think, is their secret. They are to be found wild on drier parts of the river bank, but the tallest and sturdiest and most floriferous are growing with their bulbs entirely under water. The Lodden lily is quite cheap in commerce, and we have a number of good clumps, all of which are planted where the bulbs are usually submerged."

This may be their secret but I should not like to try it through a Pennsylvania winter. Think of our freezes and our thaws, but a damp spot could be found. I tried this though for the *Narcissus albo plena odorata* and "niver a bloom" do I get; they all blast as usual, just as their long sheathe is ready to burst. Once in a blue moon, I do get one perfect gardenia-like flower. I shall try the experiment with a few of my newly christened Lodden lilies, namely that clump of disappointingly small flowered *Leucojum* by the gate.

There are great quantities of leucojums blooming in March around Charleston and Summerville, South Carolina; these must be *L. aestivum* also, as their climate is some two months ahead of ours in Pennsylvania.

It is strange, it is sad, that we do not progress very fast in our use of garden material. Here is a note from a garden in 1787, from F. W. Curtis at his Botanic Garden, Lambeth Marsh, England, and another note from Grey's "Hardy Bulbs," published in 1939, a long space of time during which the leucojums, Lodden lilies or snowflakes under whichever name one knows them, have not yet joined the list of bulbs of which one thinks when planning a garden.

F. W. Curtis, in Curtis' Botanical Magazine in the year 1787, says, "The blossoms of the *Leucojum* and *Galanthus* or Snow-Drop are very similar at first sight, but differ very essentially when examined; the Snow-Drop having, according to the Linnean description, a three-leaved nectary, which is wanting in *Leucojum*; the two genera then being very distinct, it becomes necessary to give them different names, we have accordingly bestowed on the *Leucojum*, the name Snow-Flake, which, while it denotes its affinity to the Snow-Drop, is not inapplicable to the meaning of *Leucojum*."

As the Spring Snow-Flake does not increase so fast by its roots as the Snow-Drop or even the summer Snow-Flake, so it becomes much scarcer in the garden, it may indeed be almost considered as one of our *plantae rariores*, though at the same time, it is a very desirable one.

It does not flower so soon by almost a month, as the Snow-Drop; but its blossoms, which are usually one on each foot-stalk, sometimes two, are much larger and delightfully fragrant. It is found wild in shady places and

*Three Acres and A Mill, by Robert Gathorne-Hardy.

moist woods in many parts of Germany and Italy. The most proper situation for it is a north or east border, soil a mixture of loam and bog earth; but by having it in various aspects this, as well as other plants may have its flowering season forwarded or protracted, and consequently the pleasure of seeing them in blossom, considerably lengthened. In a favorable soil and situation, it propagates fairly fast by offsets.

We will now follow this somewhat long-drawn out eighteenth century discourse by that of Grev of modern times, in 1939, in his "Hardy Bulbs." *Leucojum vernalis*. Linneaus. Widely distributed throughout Central Europe and the best known member of the genus as far as gardens are concerned. The bulb is round, about an inch in diameter with a pale green tunic; the leaves, ligulate, dark green, six to nine inches long; the stem, ancipitous, hollow, six to twelve inches in length, the spathe simple lanceolate, green, the

flower usually solitary, globose, sweetly scented, on a short drooping pedicel; the segments ovate, acute, white, green-tipped, with yellow anthers longer than the pale green filaments, the style short, filiform with small clavate stigma. It flowers throughout March and early April, and is a delightful garden plant, naturalized here and there in the south of England. It appears to me to be at its best in a limey soil. Var. *Carpathicum* (Herbert) Bake., a native of the Carpathians, with yellow tips on the segments.

Var. *Vagneri* Stpf., a robust form with two or more flowers.

In 1818 there appeared a plate in Curtis' Botanical Magazine that would suit this description and moreover under it reads the caption "communicated in March last by Messrs. Whitley, Brame and Milne, who received bulbs of this plant with several other rarities from a friend who collected them in the Carpathian mountains."

Rhododendron Notes

CLEMENT GRAY BOWERS, *Editor*

Rhododendron hybridum Ker [See page 139]

In Rehder and Wilson's "Azaleas" there is a considerable discussion of those plants reported as hybrids between (evergreen) rhododendrons and (deciduous) azaleas which is based apparently upon the records in the older books and reports from garden papers of the time. With commendable skill the literature has been combed, various plants reduced to synonyms and diverse individuals of common ancestry gathered under one head.

For the excellent plant illustrated on

page 139, we have to use the most unfortunate name, *Rhododendron hybridum* Ker, if we follow botanical history, unfortunate since *hybridum* is a name that gives no definite individualization.

To quote Ker this hybrid was "raised by Mr. Herbert of Spofforth near Weatherby, from seed ripened on the common white glaucous-leaved Azalea in the flower of which pollen or dust from the anthers of *Rhododendron maximum* had been purposely substituted for that of its own flower."

The illustration that accompanies the Ker note [Bot. Reg. III t.195 (1817)]



R. L. Taylor

× *Rhododendron hybridum*

[See page 138]

is not nearly so good a counterpart to our illustrated plant as the figure that appeared in *Curtis Botanical Magazine* t. 3454 (1835) in which it is reported that "This charming plant has been for some time cultivated in the American border of the Glasgow Botanic Garden under the name by which it was received of *Rhododendron fragrans*. It has every appearance of a hybrid, and has so many points common with the *R. hybridum* (*bigener*, of the Botanical Register) that I have little hesitation in referring to that figure as a synonym. The chief differences are, that in the plant alluded to, the flowers are smaller, and the leaves larger than in ours, which latter is indeed the much handsomer of the two. *** Whatever be its origin, it is amply worthy of a place in every flower garden and shrubbery." (W. J. Hooker.)

The plant from which the photograph was made was purchased from the Sunningdale Nursery (England) under the name "*R. azaleodendron odoratum* (*fragrans*)" but it does not belong in the series for which Rehder has now reserved the name \times *R. azaleoides*, namely hybrids from *nudiflorum* \times *ponticum* nor those he calls \times *R. azaleodendron*, namely hybrids from *R. japonicum* \times *eurhododendron* hybrids.

One is tempted to retreat behind the last sentence quoted from Hooker!

As a garden plant it is valuable because its flowering coincides with that of *R. indicum* (the Azalea macrantha of the trade) and after most azaleas and rhododendrons have gone by, including most clones of *R. viscosum* but not *R. maximum* its other supposed parent. It is delightfully scented with a widely pervasive fragrance but the flowerheads are more or less hidden in the masses of new shoots. In our plant which is entirely deciduous, the buds are tinted deep lilac pink, paler on the edges of the open flower but there is practically no yellow in the area where the blotch should show. This, however, is a factor that varies greatly and should not be given too much importance.

Whether it has much merit to recommend it above its reputed seed parent *R. viscosum*, one cannot say with too much finality, since that is a beautiful and fragrant species and includes among its variations many tinted examples. Among the plants known to me, however, is none that has such broad lobes and therefore such effective flowers. Flowering here in mid to late June, when the air is already sweet with honeysuckle, swamp magnolia, wild grape, regal lilies and many other things, its spicy pungent scent only builds up the wealth of perfume that belongs to June.

Rock Garden Notes

ROBERT C. MONCURE, *Editor*

Rock Gardening in California

Several years ago the distinguished President of the American Rock Garden Society paid the Pacific Coast an official visit. He entered our state by way of Southern California and, as he

passed over the Oregon border, on his way to the Pacific Northwest, he is reported to have remarked that "rock gardening in California was like osculation in Scotland—just in its infancy." After twenty-five years of intensive,

not to say heart breaking experiment, I am inclined to think our friend "had something." Of course, rock gardening is a big subject and so is California, and, as my experience is confined solely to the San Francisco Bay region, it may be that someone in the northern part of the state could tell a different story. Certainly, if we are concerned with alpine plants rather than succulents, the southern part of the state could hardly qualify as a rock gardener's paradise. The principal reason for this, like everything else in California, is the "climate." It is decidedly not alpine—not in the principal cities, or their suburbs, where you would expect the rock gardeners to be. An English nurseryman friend of mine sent me some rare seed and admonished me to "be sure and give it a good freezing." In a refrigerator, yes, but not otherwise. We seldom, if ever, get a really killing frost in the bay district, let alone freezing weather.

Possibly the horrible examples which pass as rock gardens act as deterrents to the would be alpinists. Farrar, the High Priest of the English rock gardens, so aptly describes them as the "Almond Pudding," the "Dog's Grave," and the "Dragon's Teeth." In all fairness, I do not believe these fearful and wonderful creations are limited to California. At any rate, they do not help the cause of rock gardening. Another cause for lagging interest is the lack of success with our own High Sierra alpinists. They as a class, have proved anything but tractable in our gardens. British authorities refer to *Primula suffrutescens* as easy, but I have seen mighty few cultivated plants of this beautiful species, and fewer flowers, even when raised from seed.

I have tried many experiments, including the attempt to grow alpinists in sphagnum moss, as outlined and recom-

mended by the late H. Correvon of Geneva, Switzerland. The results, however, if compared with the beautiful pictures of the magnificently flowered plants in the English magazines are hardly satisfactory. Not that many, or nearly all the plants, do not grow. Here, in San Francisco at least, they do grow very well. I have many large specimens of saxifrages, European primulas, and rare campanulas, but they seldom bloom. Beautiful plants of *Soldanella alpina* have never had a flower. I saw many of our native penstemons in the Edinburgh Botanical Garden, of all places, blooming like the proverbial Bay tree. They just about exist here.

But there is a bright side to the picture, and patient effort always brings its reward. Most of the plants of the Mediterranean region do well here and, if we practice a little selection, there is plenty of material to choose from. South African bulbs find a congenial home in California. The Asiatic primulas of the bog type can be grown if planted in shade and where they can get abundant moisture.

Dwarf shrubs such as heathers, brooms, and some of the dwarf rhododendrons and many other members of the Ericaceae do very well. One can have a good collection of dwarf conifers, if you can obtain them. Australian and New Zealand plants do particularly well in the Bay District, especially the veronicas. A sheet of *Veronica rupestris* in full flower is not to be despised.

William Robinson, the great English gardener, referred to the androsaces as the most alpine of alpine plants. Strangely enough, they do very well here, and I have good flowering plants of the *Sarmentosa* group and several others.

The alpine dianthus are a success and *D. alpinus* and *D. neglectus* bloom freely in full sun and gritty soil, and this is

true of almost all the smaller species that I have tried.

The gentians, as a whole, are not easy. *G. acaulis* flowers for some of my friends, but not for me. I once had a plant of *G. verna* with four lovely flowers, but the plant did not last long. Sad to tell, the newer Asiatic gentians, which do so well in Portland, Seattle and Victoria, B. C., have not done so for me, although I have tried my best to suit them.

Most of the little iris species find San Francisco to their liking and *Ramondia pyrenaica* deigns to give us a few flowers. The commoner rock plants, the ones we rely on for color masses, can be depended upon. I have had veritable sheets of bloom on the mossy saxifrages—although the large plants or groups of plants covering more than a square yard, which we saw at Edinburgh, make me very modest. A list of successes include *Omphalodes luciliae*, *Ourisia coccinea*, *Campanula garganica* and *C. Saxifraga*, *Meconopsis Baileyi* and *M. integrifolia*, *Primula nutans*, *P. littionania*, *P. pulverulenta* Bartley strain, *Iris chrysographes*, *Asperula suberosa*, and many of the alpine phloxes.

These successes or partial successes only serve to spur one on, and I expect to die in the attempt to accommodate these "little children of the Hills."

Finally, let me say that a friend of mine had a good clump of *Saxifraga cotyledon*. There it stayed in his San Francisco garden for many years, and, to the best of my knowledge, just bloomed once in ten years. He also owns a place on Lake Tahoe, on the Nevada side. The elevation is about 6,700 feet. He took the saxifrage up to his Lake Tahoe garden and there it flourishes and blooms every year, with no particular care. The question is whether we can, at sea level, overcome

the disadvantages of climatic and altitudinal conditions.

ROBERT E. SAXE

San Francisco, Calif.

Native Gingers

For that difficult spot in the shade where the soil is poor and dry, where nothing will thrive we might try some of the asarums. If one will keep them watered until established there will be no further trouble.

These "heart leaves," "wild gingers," etc., of our childhood days are either one well advised as the foliage is shaped very much like a heart and the odor when crushed is that of ginger. These plants have fleshy roots which withstand drouth when established, and thick glossy leaves. There are several species of these plants, all about equally attractive. They all have small brown "jugs" for flowers carried at the ground level just at the junction of the leaves and one usually has to move the foliage aside to enjoy the blooms.

Asarum virginicum is perhaps the best known. It grows in this state from the mountains to the coast. The foliage is usually beautifully marbled with white lines. The small flowers have wide open "mouths" of rich purple with many spots on them.

A. heterophylla has the same handsome foliage but the jugs are nearly closed and not as attractive as any of the others. The "big-bloom" ginger is *A. Shuttleworthii*. The flowers are more than an inch across and flare widely at the tips.

A. arifolia is always attractive with the large arrow-head like leaves. This grown to perfection in the eastern part of the state although it's found in the foothills also.

The deciduous one that is common through here is *A. canadense*. The

*Vaccinium crassifolium**Arisaema pusilla*

leaves have a lovely sheen seldom seen in plants and the blooms are of deep chocolate color. It's like burnished steel and glistens in the light. It likes rocky shady places but grows well in ordinary woodland soil. As it spreads by underground runners a large colony is soon established. The flowers are rich chocolate and pointed at the tips.

A bed or just a few plants of any of these gingers will be a great help to any garden in shade.

ANNIE LEE R. CLEMENT

Asheville, N. C.

Vaccinium crassifolium

The need of a ground cover is often felt and to get one that is satisfactory in every way is very difficult. One wants a plant that is low; which will grow rapidly, yet not crowd out all other plants it comes in contact with; look neat at all times, even in winter, which means it must be an evergreen; grow in sun or shade; and grow in any kind of soil, whether rich or poor.

I believe there is one plant which will fill the order. *Vaccinium crassifolium*, creeping huckleberry is the nearest to these requirements of anything I have

ever seen. This little creeping plant grows in the pine barrens and is used to hardships. Often the plants are burned over each year, yet as soon as the smoke clears away they are back again and soon add their considerable beauty to the landscape. The foliage is very like that of boxwood, deep glossy and thick. In sun it is a rich bronzy color and in shade it is a rich green. It grows to a length of about 4 feet but as it takes root as it goes along one can hardly tell just what a plant really is. The plants withstand drouth to a remarkable degree. The bell-shaped flowers are small but attractive, popping out from the axils of the leaves. In fall the fruits are dark blue in color and have the delightful flavor of true huckleberries.

Growing among them in nature one usually finds *Arenaria caroliniana*, *Pyxidantha barbulate*, *Asarum virginica*, *Hypericum asphalathoides*, *Ilex glabra*, *Magnolia glauca*, *Cyrilla racemiflora*, *Kalmia cuneata*, many more of the semi-bog plants, all of which do well when transplanted to drier situations. I assume that they would require an acid soil as they are growing in very acid sandy loam and are so closely related in the Ericaceae. This, however,

can be easily managed by the addition of aluminum sulphate once or twice a year. I feel that the answer to "what shall I use for a ground cover" is answered here. When this plant is better known it will be much in demand.

ANNIE LEE R. CLEMENT

Asheville, N. C.

Arisaema pusilla

We all like the name "Jack-in-the-Pulpit" and are familiar with the Indian Turnip but how many of us really appreciate this handsome woodland plant and grow it in our shady gardens?

Arisaema pusilla is the smallest of the group and is usually about six inches tall. *A. triphyllum* is the common one and it is usually about two

feet tall. In both of these the spathe, or canopy of the pulpit, may be purple and green striped or it may be two shades of green. The spadix, the preacher, or Jack, is always dark brown or purplish. The foliage is large and strong and is tropical in appearance. The five leaved plant, *A. quinatum*, is fully as handsome as the preceding. The flowering part is always two shades of green, so far as I have observed and been able to find out. All produce handsome bright red fruits in fall and is very colorful among the greens and browns at that season of the year.

The roots are large corms, something like a turnip. If eaten or rather tried to eat it will burn worse than pepper.

ANNIE LEE R. CLEMENT

Asheville, N. C.

Cacti and Other Succulents

Leuchtenbergia principis Hook.

Plants of this Mexican cactus exhibit one of the most astonishing among the many curious forms that this diverse family presents. We know it only from a small seedling, newly acquired and from rather old plants in a local collection. The latter have suffered many vicissitudes particularly from over watering and insufficient light, with the result that their "thick fleshy stem" looks far from fleshy but rather woody, dark and scarred, with a somewhat uneven crest of the long triangular tubercles across its crown. This, I am told, is their usual unkempt appearance in adult life, especially late adult life!

The small plant is quite another matter with only a few, not over fourteen, tubercles which are so long and stand

so freely apart that they look rather like great gray green "jacks" such as children use in play.

The areoles are "rather large, with grayish wool, at the tip of the tubercles, bearing angular papery spines." In a small plant these make a curious effect at the ends of the tubercles.

According to the literature, flowers are borne at the tips of the new tubercles which surely must give an even more astonishing effect. The only record found so far to suggest how old a plant must be before flowering may be expected, is "four to five years from seed."

All the directions for cultivation suggest a deep pot to accommodate the long, tapering root; a porous soil mixture with lime, and a situation that will be both warm and sunny.

According to the text in Britten and Rose (*The Cactaceae*, Vol. 3, pp. 108-109), although originally reported from Hidalgo it is also known from the states of San Luis Potosí, Guanajuato, Zacatecas and Coahuila—and that “Dr. C. A. Purpus writes that he found this plant in slate and lime formation in the Sierra de la Parras near Parras, Coahuila, and still more abundant in the Sierra de la Paila, also in Coahuila. This last station is a very inaccessible desert mountain range, almost without water; vegetation is very scanty. This species is associated with other cacti and with *Agave lophantha* which it resembles in habit more than it does that of its own relatives.”

With such a native background as this the amateur who grows it in pots should think twice before pouring water on the specimen on the window ledge.

Mammallaria camptotricha Dams.

Among the species of mammallaria that have grown well on the window

shell is this plant, cited in Britten and Rose as coming from the “deserts of eastern Querétaro, (pronounced kě-rět'-ar-o), Mexico.” Possibly the word desert gives the clew to its present success! As it is still a young plant as cactus go, this may be ephemeral if measured in time. It is as yet scarcely more than an inch and a half tall but has already begun to show small offsets that make a clustered mass of pale green tubercles, rather longish as these go, each tipped with a whitish tuft of radial spines with several whitish central spines that are long enough to make a mass of almost lace like character over the plant mass contrasting finely with the tender green. Whether the appearance will be as good when the plant is older and taller and the oldest tubercles have withered and browned remains to be seen.

As yet there has been no sign of flowering but the illustrations show rather smallish flowers set almost within the mass. These are described as greenish without and white within.

A Book or Two

Plants and Chemicals. W. E. Bott, Lakewood, Ohio, 25 cents. 1941.

This is the fourth in a series of four annual reports of experiments by an amateur plant grower. Nothing new will be found here by those familiar with recent botanical and horticultural literature. However, some of the experiments in the inducing of plant mutations with the aid of colchicine were successful enough to interest a leading seed firm.

The booklet concludes with a plea for more plant experimentation by amateurs, which is probably a worthy ob-

jective. Certainly the achievements of some amateurs in the fields of plant breeding, systematic botany and the like have been impressive. Occasionally the amateur makes an outstanding discovery. Mendel, for instance, laid the foundation for the whole modern science of genetics using little more than a small garden plot, a notebook and a few packets of pea seeds. Personally, we are convinced that much profitable experimentation with plants may still be done using quite simple and inexpensive equipment.

V. S.

Green Enchantment. Rosetta E. Clarkson. The Macmillan Company, New York, 1940. 328 pages illustrated. \$3.00.

Before reading any book it is well to examine the preface, if there be one, especially if written by the author. Mrs. Clarkson has a brief preface which begins:

"My thought in *Green Enchantment* is to recapture a little of the mystery and lure of gardens, a little of the background that makes the thought of gardens one of peace and happiness to all of us, year in, year out. Always men have been fascinated by green growing things, have built tales and legends all about their plants and have invented plants of even stranger nature than the ones they knew."

To accomplish this, there have been assembled as a book a great number of

separate chapters chiefly unified by their background of time and interest. Most of them could stand alone. They deal with various ancient matters. One either likes such things or has no use for them at all. The reviewer does like them but does not know enough to say if Mrs. Clarkson has chosen "only the best." One can skip over "In a Monastery Garden" or "Herbs of Beauty" or "Early Gardening Tools" if he will and read "A Prelude to Salads" or "The Tooth of Saturn" or divert himself with "Herbs That Never Were."

If you are the sort of gardener who is concerned only with the largest marigolds or such, you won't care much for this book. If you are stylishly engaged with herb growing, you must read it. If you are just a comfortable and properly curious gardener, you will want to read it.

The Gardener's Pocketbook

Some Violets

If only violets were not such rampagous spreaders, and didn't root so tenaciously in the middle of mats of small campanulas or pinks, or in various other places where they couldn't be allowed to stay! Yet in spite of their wild ways, we must have some of them in any garden that is not too formal. They seem to occupy much the same place with us that primroses do in England. There is no flower that children like better to pick; and we had an aunt who every spring rode on the horse-cars ten miles out from Boston, just to pick violets. She liked especially the long-stemmed meadow violets that companioned the cowslips and small white violets in "Jack Hagar's meadow."

To me, the Birdfoot Violet, *Viola pedata*, is the most beautiful of all that I know;—and I mean *pedata*, not its variety *bicolor*, striking as is the rich velvety purple of *bicolor*'s two upper petals. *Pedata*'s pale blue-violet color varies considerably, and sometimes we have found a white one. Unlike most violets, the fine-cut leaves make no great mass of foliage, but the more than inch-wide flowers, the largest of the violets, I believe, carpet the ground in places that they favor. They used to like the scrub-oak woods that cover so many acres about Concord and Lexington, in Massachusetts. They like sunny places in sandy soil, with some acid leaf-mould, and satisfied in these respects, will endure almost any amount of dryness.

Another cut-leaved violet, though not a native, is the Japanese *V. eizanensis alba*. The leaves of *pedata* are usually finer cut than those of the Japanese species, the almost linear segments (commonly seven in number) being cut close to the petiole, though in some plants all the divisions are not so deeply cut. These leaves reach a width of about two-and-one-half inches, and a height of six inches or so. Those of *eizanensis alba* are somewhat larger, and are cut as deeply as possible into usually five parts, each of these parts being cut into three parts about a third of the way down, and these still further shallowly toothed. There is more substance to these leaves than to those of *pedata*, and they are held more nearly horizontal.

I planted seeds of *V. eizanensis alba* in February two years ago, and set the little plants out in a sunny place by the rock edge of a garden bed. After a time they began to produce cleistogamous flowers, and in the fall a few very round and shapely flowers nearly an inch across, though as the petals reflexed somewhat at about half their length, they seemed hardly so large. They were pure white, except for a few very short purple lines in the throat. The old plants did not survive the winter, but seedlings appeared in the spring to follow the same procedure, as they are doing again this year. As the plant grows steadily through the season, the contrast of the rich deep green of the older leaves with the successively paler greens of the younger ones, is very attractive. The plants are six or eight inches across, and about six inches tall. I hope to be able to keep at least a few plants over winter, so that I may see them in full spring bloom, but I would grow a few of the plants for the foliage effect alone.

We greatly like another white violet

which we have not been able to name. It is certainly not a native, of this part of the country, at least. It is literally smothered for several weeks in the spring with inch wide, rounding white flowers, almost destitute of throat markings, and the fresh green foliage is attractive for a long time afterward, if the season is not too dry. These leaves will reach the height of a foot, and a breadth of about three inches.

One of the violets we loved when we were children, and have carried with us in our wanderings, is *V. pubescens scabriuscula*. *Pubescens* itself grows in this locality, though I think not very commonly, but the variety we have never happened to find growing except in a little copse by the side of that same "Jack's meadow," where we went for bloodroot, also. This is one of the branching violets, growing up to something more than a foot in height. It is more slender than *pubescens*, and almost entirely smooth. The rather small yellow flowers, with madder purple throat markings, grow singly on two or three inch stems, in the axils of the leaves. In a clump, this foliage also has a pleasant effect of several shades of green, though the greens are lighter than those of *eizanensis alba*, the leaves are rather thin, acute at the apex, and somewhat scallop-toothed.

The Canada violet, *Viola canadensis*, also branches, but is usually taller, and an altogether larger plant, sometimes reaching two feet in height. The lower leaves are broadly heart-shaped, of rather heavy texture, and about four inches across. The inch-wide flowers are white with a few purple markings. There is only one purple line on each of the side petals, which perhaps helps to give the flowers their decidedly impish air. The flower has a noticeable yellow throat, and a pale purple flush on the back of the upper petals. A

clump makes a lovely patch of cool green and white for at least two months, and there is scattering bloom all through the season. This species, like the preceding, seems to enjoy a little shade, though neither is very particular. The nameless white one romps all over the sunny side of the garden.

There comes to mind a line written in Greece about 600 B. C.—“Violet-crowned, pure, sweetly smiling Sappho”—a long time for a small flower to be beloved!

RACHAEL CAUGHEY

Antrim, N. H.

Witsenia maura Thunb. [See page 149]

It is odd to find a member of the Iridaceae, which is therefore a monocotyledon, rated as an evergreen shrub. It is so-called in Paxton's "Magazine of Botany" (Vol. viii, 1841), and Bailey in the "Standard Cyclopaedia of Horticulture" says that it is an ornamental greenhouse shrub. It is found in South Africa.

Shrub or not, its oddity is of an engaging type. This writer does not feel with Dr. Pole Evans in the "Flowering Plants of South Africa" (Vol. i, Plate 34, 1921) that it "would only interest enthusiastic cultivators on account of its rarity." It is queer and rare but it is also rather intriguing.

It grows in swampy places of the Cape Province from a fibrous rootstock, its woody stems rising to two feet or more and its erect, stiff, sword-shaped, acutely pointed leaves rising in two vertical ranks and embracing the stem nearly to the top.

The flowers are peculiar. They grow in dense terminal heads, one (or two?) to a spathe, with an involucre of overlapping, rigid, smooth yellow to brown bracts. The tube of the flower is cylindrical, yellow to brown below, blue-black above, two inches long. The

segments are much shorter, erect, dark blue, the outer segments smooth within, covered on the outside with tawny-yellow hairs with a tuft of these hairs at the top of the inner segments. Style and stamens are threadlike, not protruding. The stigma is minute, 3-pointed. Ovary small, 3-celled, the capsule small, horny, splitting into three valves. Seeds few, angular. The flowers are said to be "sweetly scented."

The genus is monotypic. The flower long known as *Witsenia corymbosa* is now referred to another genus (*Aristea*). *Witsenia maura* was found by Thunberg on the Cape Peninsula and described by him in 1782. It seems to be found in damp places only. The local name is "Waiertje."

Lt.-Col. Grey, in "Hardy Bulbs" (page 396, 1938), says that it flowers in June and July in England. Though introduced many years ago, it does not appear to be in cultivation at present. It should be well worth raising from seed, he says, and trying in warm southern gardens in damp loam and leafmold. He would not expect it to appreciate the swampy conditions which it requires in South Africa.

Paxton ("Magazine of Botany," Vol. viii, 1841) says it was introduced first to Kew Gardens in 1790 and to cultivation later. It should be potted in a soil composed chiefly of turfy leafmold, to which may be added a little open loam and sand. The plant, he says, must on no account be overpotted and peculiar caution is required to preserve it from superfluous moisture, which, if allowed to collect either in the air or about the roots, inevitably kills it. It should be placed in a light, dry and airy part of the greenhouse and if thus managed, there will be no danger of its being destroyed. Strange, is it not, that a plant which lives in swampy places in its native habitat, should be so cranky about moisture



South African Railways & Harbours

[See page 148]

Witsenia maura

when under cultivation. It is probably a question of drainage.

Cuttings, Paxton says, of the young branches may be struck in a moderate heat, if dampness be properly avoided.

It was named for Nicholas Witsen, Dutch patron of botany in the first half of the 18th Century.

SARAH V. COOMBS
Scarsdale, N. Y.



Edgar T. Wherry

× *Phlox Henryae* at Gladwyne
(See notes page 151)

A New Hybrid Phlox

In an account of the eastern Phloxes and their horticultural derivatives published in this magazine several years ago (July, 1935, page 209) it was noted that hybrids between the species-pairs *bifida-subulata* and *nivalis-subulata* are in cultivation. The third possible combination within the subulate-leaved group can now be announced.

For some years Mrs. J. Norman Henry has been growing *Phlox bifida* and *P. nivalis* not far apart in her rock garden at Gladwyne, Pennsylvania, and about 1936 a seedling appeared which had evidently resulted from chance cross-pollination between them. Its leaves are intermediate between those of the parents in outline and size, and its flowers, though in size and color resembling *P. nivalis*, show the deep notches in the lobes characteristic of *P. bifida*.

This seedling proved very vigorous, and soon increased in size to the point where it could be propagated by cuttings, which strike roots readily in moist sand. The resulting plants are highly attractive rock-garden subjects, and will accordingly appear sooner or later in the horticultural trade, so a name for the hybrid is desirable:

× **Phlox Henryae**, hybr. nov. (*P. bifida* × *P. nivalis*).

Plant up to 15 cm. high; leaves linear-lanceolate to oblong-elliptic, up to 15 mm. long and 4 mm. wide; inflorescence - herbage glandular - pubescent; sepals 8.5 mm. long, united for nearly $\frac{2}{3}$ their length; corolla-tube 12 mm. long; lobes 11 mm. long and 9 mm. wide, notched to a depth of 4 mm.; color delicate lilac-purple, with striae forming a violet 10-rayed star in the corolla-center; stiles 5mm. long, united for 4 mm. and free for 1 mm.

Planta inter *Phlox bifidam* et *P. nivalem* hybrida. Folia lineari-lanceolata

ad oblongo-elliptica, usque ad 15 mm. longa et 4 mm. lata. Sepala 8.5 mm. longa, usque ad $\frac{2}{3}$ longitudinis conjuncta. Corollae tubus 12 mm. longus; lobi 11×9 mm., profunde (4 mm.) bifidi. Styli 5 mm. longi.

Type in herbarium of Academy of Natural Sciences, Philadelphia, collected by Edgar T. Wherry in garden at Gladwyne, Pennsylvania, May 6, 1939. Two photographs taken at the time of collection are reproduced herewith, the one showing the original plant growing just below a clump of typical *Phlox bifida*, the other a full-sized view of an inflorescence. EDGAR T. WHERRY

Propagating Tropical Water Lilies at Home

Get a tuber that has not been exhausted by propagation and keep it growing in a pan of rich soil and water—an inch or two of water is enough. Keep in hot sun all day and protected from night chilling. Tubers send up one to a half dozen plantlets. Then these develop white roots an inch or two long. Ease plantlets and roots free from the tuber and plant in three inch pots or in pint strawberry boxes of rich garden soil, kept in pan or tube with water to cover. These, too, need full sun all day and night protection until the weather is settled enough for outdoor planting. If you use boxes, break the edges gently and plant box and all in the mud. This involves no root disturbance and usually gives splendid results. Your tubers should soon make another crop of plants. Each plant will become a growing crown, unless my observation is erroneous. If you want a plant with many crowns, do not remove any of the second lot. If one or two crowns will satisfy you, remove surplus plants and pot up as you did the first lot.

Your education will not be complete until you try tropicals from seed. Flowers increase in size as the plants do, and

on well developed plants I thought the flowers the equal of those from named varieties in the same pool.

Seedlings resent transplanting. I like to broadcast the seed in shallow water in March or April and let it develop as it wishes. As late as this you could start a few plants in pint strawberry boxes of rich garden soil set in a pan of water to cover. Daytime sun and night protection are indicated here, too. I keep mine in a tub that I can cover easily at night. I mean a tub outdoors in a hot, sunny spot. Break box edges gently and plant box and all after the weather is settled. I do not, however, like to plant seedlings until after the rosette that soon follows the first lone leaf begins to send floating leaves to the surface. MAUDE R. JACOBS

Laburnum vulgare [See page 153]

The laburnum is associated in our minds with English literature, and is so attractive, it is a mystery why it is not more widely grown in this country where two species *Laburnum alpinum*, called Scotch Laburnum, although it is native to Southern Europe, and *Laburnum anagyroides*, called Golden-Chain Tree and several of its varieties and hybrids are hardy as far north as Boston.

The subject of this note, is called *Laburnum vulgare* by W. J. Bean in his book "Trees and Shrubs Hardy in the British Isles," but Dr. Rehder calls it *Laburnum anagyroides*. These two authorities also disagree on the common name, Dr. Rehder calling it Golden-Chain and Mr. Bean, Golden-Rain.

Whatever the name, the tree is one of the loveliest of many beautiful plants which bloom the third week in May. It always causes a thrill to see the branches thickly clad in pendulous, yellow racemes and silky leaves swaying in the breeze like a curtain of yellow

and green, and wafting the fragrance of honey-locust and sweet pea into the cool Spring air.

The tree grows twenty or more feet high and the main trunks branch fan-wise and low from the ground. The branches are round, smooth and green with short horizontal lines on them. When young, the branches are grey with soft hairs. The leaf stalks are $1\frac{1}{2}$ to 2 inches long, round, and grey-green because of the somewhat appressed silky hairs on them.

The leaves are trifoliate, each of the leaflets are rounded at the tip, soft to the touch, thin textured, and cedar green. They measure $3\frac{3}{4}$ inches across. When young, they are shiny and grey-green on the under surfaces because of the hairy covering. The midrib is quite hairy and projects a little beyond the leaf and is clothed with a tuft of hairs when young and later becoming more like a thorn.

The flowers grow on last year's wood, in cylindrical racemes $\frac{7}{8}$ inch long. They are pulse-shaped and each is on a pedicel about $\frac{5}{16}$ inch long. The calyx is green, two-parted and encircles the flower loosely. The large back petal or standard is marked with brown. Two thin petals or wings are at right angles and enclose the third the keel which is closed and enfolds the stamens and pistils. The flowers measure $\frac{5}{8}$ inch long and $\frac{1}{2}$ inch across and are "Picric Yellow." The stamens and pistils are combined at the base, the style and stigma are green. The filaments are green and the anthers deep gold. The fruit is a pod of light yellow-green, and glistens because of the hairs on its surface.

The seeds fall to the ground and germinate, forming little colonies around the parent plant, just as the Dogwoods and Judas Trees do.

Peekskill, N. Y. HELEN M. FOX



Walter Beebe Wilder

Laburnum vulgare

[See page 152]

Alsine pubera [See page 155]

The Alsines are chickweeds and belong to the Pink family. It is a pleasant surprise to find a worth-while garden plant in this group in the Great or Star Chickweed, *Alsine pubera*. According to Britton and Brown, it is found in moist rocky places in New Jersey, Pennsylvania, on to Indiana and South to Georgia and Alabama and in Carolina ascends to 4,500 feet. In New York it flowers from the second week in May but elsewhere sometimes in June.

Alsine pubera or hairy alsine is a most attractive plant with large soft leaves and dainty starry flowers. It has an effect of fluffy whiteness similar to some of the asperulas and gypsophilas. The plant has done well in shade and when in flower rises to five inches and has gradually spread to a foot and a half across.

The stems are fleshy and easily broken, many form a central clump, each with a tiny rootlet susceptible of division. The stems are glistening, yellow-green, round, softly hairy, branching and recumbent. The leaves are opposite, ovate, stalkless and with entire margins. Their surfaces are covered with tiny hairs and the large ones measure three inches in length and one and one-quarter inches across. They are pointed at both ends, widest at the center and in the specimen grown by me, their surfaces are faintly mottled with light and dark green. The flowers three to four in loose clusters, grow on pedicels rising from the termination of the stems. The corolla is composed of five petals so deeply cleft as to appear like ten strap-like petals and these are subtended by five-pointed oblanceolate green and furry sepals. The sepals stand out at right angles to the stalk as do the petals, giving the flowers a crisp

look. The white ovary is odd, being conical and like a button in the center of the flower. The three stigmas project from its tip and are also white. The stamens between the petals and ovary are white, with bean-shaped anthers and the pollen is cinnamon colored.

HELEN M. FOX

Peckskill, N. Y.

Cyrilla racemiflora

Our experience with this shrub in southern England may be of some interest to your readers, following upon the note and photograph in the issue for October, 1940.

In these Gardens, approximately 80 feet above sea-level, where winter temperatures only very rarely fall to zero Fahrenheit, and the average annual rainfall is rather more than 24 inches, several examples were planted about twenty-five years ago in acid soil under the shade of oak trees (*Quercus pedunculata*), and amongst *Vacciniums*, *Pieris*, *Oxydendrum*, and other members of the Ericaceae. Here they receive only indirect sunlight in summer and the benefit of a thick annual mulch of oak leaves in autumn. No particular attention has been paid either to feeding or pruning. They have become seven or eight feet in height and almost as much in width, generally branching from near the base. The majority of the leaves are persistent throughout the winter, some of the oldest alone falling towards the end of the year; unfortunately they do not become brightly coloured, — merely a dull yellow,—although adjacent *Enkianthus* and *Vaccinium* species colour magnificently each season. The leaves may be described as oblanceolate, or obovate-oblong, $2\frac{1}{2}$ - $3\frac{1}{2}$ ins. long by $\frac{5}{8}$ —nearly 1 in.—wide; the upper surface is



Walter Beebe Wilder

Alsine pubera

[See page 154]

shining, the lower paler and dull with a fine network of veins; at the base they taper to a reddish stalk less than $\frac{1}{4}$ in. long. They are quite glabrous.

An interesting point is the time of flowering. Records at Wisley for the past five years show that this lies between late August and early October,

varying somewhat with the season; early to mid-September would be the average period of maximum flower.

No writer whom I have been able to discover records it as late as this in the wild state; Sargent says late June to early July, Chapman ("Flora S. U. S. A.") July, and Rehder June to July. On the other hand Bean states "late summer and autumn" (under English conditions) and an anonymous writer in "The Garden," LXVIII, 144, (1914), that it flowers at Kew during August and September. It has even been exhibited as late as November. (See "Jour. R. H. S." LI, cv. (1926).) It appears therefore that the plant flowers about three months later in England than its native home, perhaps due to a differing amount of daylight, or temperature.

Another noteworthy fact is that no fruit has ever been observed here. Possibly this is connected with the late flowering season, paucity of suitable insects, or because the plants are of clonal origin and self-sterile. Observations on this point from those who have tested *Cyrilla* for self-sterility would be most instructive. Propagation may be achieved either by cuttings rooted under glass or by the adventitious shoots produced sparingly from the roots.

The present stock seems to have been introduced to England by Messrs. James Veitch about the end of the 19th century; an Award of Merit was granted to the shrub in London in August, 1901.

As it grows at Wisley it is an attractive semi-evergreen bush valuable for the delayed flowering season; if it bloomed in July most of its value would be lost or overlooked amongst the many other plants of all kinds flowering that month. In September it has the field almost to itself save for the hydrangeas.

It need only be added that it is en-

tirely hardy here, suffering neither from late spring frosts, summer drought, nor any other weather conditions to which we are liable.

B. O. MULLIGAN

*Royal Horticultural Society's Gardens,
Wisley, Ripley, Surrey, England*

Cyrilla in Puerto Rico

Some time ago I saw your note in THE NATIONAL HORTICULTURAL MAGAZINE about the "shrub" *Cyrilla racemiflora* and now I see the longer, illustrated note in the October 1940 issue of that magazine ending with "our magazine would particularly like to hear from readers who have grown this shrub." When I read the first note I recalled frequently seeing this tree in the mountains of Puerto Rico.

It was in the Luquillo Unit of the Caribbean National Forest that I first became acquainted with this tree. There as elsewhere in Puerto Rico, it is called "Palo Colorado." A good name, for it is truly a red tree. In form it is never a tall tree for it reaches a height of only about 40 feet, but it is the largest in trunk diameter of any tree I have seen in Puerto Rico. A specimen three feet in diameter is not rare and I have seen them about five feet in diameter. The tree is conspicuous because of its red color, its profuse flowering, and its abundance in the forest. On the mountain tops at about 3,400 feet elevation it does become shrubby, as do many other species which are normally trees. In the fall and winter the leaves assume the autumn colorations we see in the north. Here, however, this species is never entirely free of leaves. It is a weed species in the forests of Puerto Rico. Its lumber is red and warps beyond use as it dries. The trunk seems susceptible to rots, for an old tree that is not hollow is difficult to find. In



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Lagueria Pattersonii

fact, it is because of this that this species is the favorite meeting place for the parrots endemic to the Luquillo mountains.

Lagunaria Pattersonii G. Don. [See page 157]

The first sight of this tree having been in southern California with a thin layer of dust overlaid on the naturally grayed foliage, it was something of a surprise to see the fine specimen at Coconut Grove, Florida. It is probably too easy to assume that most plants from the country of its origin would do better in the arid type of southwestern climate than in the humid southeast. Within its natural range, however, is Norfolk Island and this has a climate humid and tropical enough to support bananas. So in the end the whole matter resolves itself, as is so often the case, into a lack of complete knowledge.

In Florida one does not feel the intensity of grayness that California contributed and the pale pink flowers do not seem so washed out. How far north in the state it may prove of use is not reported, but as it has already been listed in trade catalogues it may be that it will be useful through most of the peninsula.

Maiden in his Forest Flora of New South Wales is worth quoting, particularly as he too quotes variously and pertinently.

"*Lagunaria*," a name given to this genus from its similarity to *Lagunaea* (D. Don, op. cit.) (Gen. Syst. 1485-Ed.). The name *Lagunaea* was given to a genus of tropical plants belonging to the same natural order, and now merged in *Hibiscus*, in honour of Andreas Laguna, a Spanish physician and botanist of the sixteenth century, who translated Dioscorides into his native tongue. *Pattersonii* after Colone! Patterson, Lieutenant-Governor of New South Wales.

"The *Lagunaea Pattersonii* is a native of Norfolk Island, from whence the seed were brought to England by Col. Patterson" (M.M. t. 769) in 1792 (according to Endlicher, Prod. Norf., p. 75).

"Habitat—Scattered on the grassy hills of Norfolk Island, it forms a spreading tree of 40 ft. in height. It is perhaps the largest plant known to exist, belonging to the Mallow Tribe. In a thick wood I met with it 80 ft. high, and with a trunk 16½ ft. around (Backhouse, p. 258)."

The Curtis Botanical Magazine t. 769 is not a very well colored plate and the note is uninteresting.

T. R. Sims, "Flowering Trees and Shrubs for Use in South Africa, p. 101 (1919), shows that it does well there." * * * * It seeds freely and is easily raised from seeds, but should be finally planted out while still small.

Eugenia Jambos L. [See page 159]

As far as this recorder is concerned, almost the whole case for the Rose-apple is summed up in the first paragraph of Wilson Popenoe's "Manual of Tropical and Subtropical Fruits" (p. 305) which reads:

"As an ornamental tree, the rose-apple is of value for all tropical and subtropical regions. As a fruit, it is beautiful and interesting, but is not much used except for making preserves." The reason for this moderation does not appear until the next page: "The fresh fruit is fragrant and attractive, but owing to its peculiar character it is not pleasant to eat unless in small quantities; yet as a preserve or crystallized it is delicious."

All this perhaps is not entirely fair, because one of the pleasures of going to Florida is to see, to smell, to taste all the strange new things and perhaps even to hear the prodigious tales of their several excellences.

*H. F. Loomis*

[See page 158]

Eugenia Jambos

Whatever one may feel about it as a fruit, the plant makes an attractive evergreen tree usually up to twenty-five feet or thereabouts with handsome

deep green leaves that are pinky-bronze as they grow. As can be seen from the picture, buds, flowers and fruits may be had at one and the same time al-

though one usually thinks of the main flowering season in Florida as March with the major fruit crop in June.

Other minor virtues are urged by Doctor Popenoe as: "On account of its beauty it (the fruit) is often used for table decoration. Its enticing perfume, strikingly similar to that of rose-water, makes it unique among fruits."

Recalling the beauty of several eugenias grown in California, often sheared as for hedges, one is tempted to wonder how well this might respond to similar treatment, and trimmed hedges are by no means to be despised in pseudo-tropical plantings since nothing accentuates luxuriance as the trimming or clipping of some nearby element. This may have been tried already and disproved. Certainly Doctor Fairchild's little *Eugenia coronata* from the Gold Coast trip will tolerate a certain amount of clipping without much interference with its intermittent flowering or the production of its black and puckish fruits.

Unless the reader should think the rose-apple is being discriminated against, it may be fair to say that Doctor Popenoe is scarcely more favorable to the six other eugenias which he discusses in the same book. As fruits, they have little praise, as ornamentals, they pass by some with mild acclaim.

The same sort of splendid curiosity must have attended its first flowering and fruiting in Britain in those days when the greenhouse for tropical plants was known as a "stove!"

Although Popenoe implies that one does not care for the fresh fruit, it is Rumpfius, quoted in the *Botanical Magazine* with tab. 1696 (1815), who speaks plainly and discusses our plant as "one of the wild sorts of Jambosa, distinguishing it from the domestic or *Eugenia malaccensis* of Linnaeus by its smaller size, crooked growth of stem,

and austere, round-compressed fruit, which is seldom eaten in Amboyna, being less juicy, more insipid, and leaving a bitterish taste on the palate."

In *Hortus Malabaricus*, the flower is described "as at first white and scentless, afterwards turning yellow and acquiring an acid or vinous smell; and the fruit is said to be sweet and grateful, with a pleasant rose-like scent * * * *." Here again Rumpfius, quoted in the *Botanical Magazine*, confirms the later dicta.

As a matter of pure curiosity, this species was looked up in Indian Medicinal Plants (1918) by Kirtiker, Bastu and I.C.S., a book that seems as much given over to quotations as this small piece. They quote from Watt (Dictionary of the Economic Products of India, v. 3, p. 288):

"In Bhamo, Upper Burma, the leaves are boiled and used as medicine for sore eyes." Some of the other eugenias listed had other and more diverse uses.

So again the gardener here can be content to look on this as an ornamental tree and no more.

Mucuna Bennettii F. v. Muell. [See page 161]

This tropical vine from "the Fly River" in New Guinea which is illustrated on page 161, from the specimens once growing at Coconut Grove, Florida, is a tropical plant that will always seem improbable because of the tales that were woven about it at the office, its wonder, its beauty, its inaccessibility. One senses the same sort of unrest in Baron von Mueller's original description, Descriptive Notes on Papuan Plants, p. 63-65 (1876, since in his discussion he writes: "* * * * *M. Bennettii* has red petals according to Signor D'Albertis, thus differing from *M. pruriens* and *M. monosperma* in this respect; therefore this, if I rightly understand, is the one, about which the discovered expresses



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Mucuna Bennettii

[See page 160]

himself in rapture, 'as it was one of the most gorgeous sights there in the whole floral kingdom.'" He describes the red color of the flowers as similar to that of *Methonica* or *Gloriosa*, and adds, "that the plant grew in the greatest abundance on the banks of the Fly River," and "that to see the pendulous masses of such flowers, covering the trees from the base to the summit even of the most lofty was one of the most beautiful sights to behold. * * * *"

Similarly ecstatic praise was given by C. A. Monckton writing in *Taming New Guinea*, p. 283. "At the time we camped on the shore of the Agaiambu lake, I noticed on the bank of a stream leading into it, a *D'Albertis* creeper, with white blossoms instead of the usual vivid scarlet; I had never seen a white one before and have never seen it since. The *D'Albertis*, whose botanical name, by the way, is *Mucuna Bennettii*, is quite the most marvellous and beautiful creeper in the world; but as all attempts to transplant it, or introduce it into cultivation, have failed. No water color nor slickness of oils can reproduce the wonderful brilliance of the scarlet color of the ordinary variety of this plant; its blossoms simply strike one dumb with their startling beauty."

Now it is a far cry from the Fly River in New Guinea to even the warmest parts of Florida and the mind turns quickly from the thought of *D'Albertis'* quoted phrase describing the creeper covering the trees "even the most lofty" to the trees of the warmest Florida where trees of the present are not famous for their height. Nevertheless, at the U. S. Plant Introduction Garden at Coconut Grove, Mr. McClelland tells me that the vine had reached about fifteen feet and that in season it hung out or down its pendulous branches which end in the umbel-like

racemes so clearly shown in Mr. Loomis' picture. Unfortunately, the winter of 1939-40 was much too cold and its immigrant life has now ended.

Whether or not Doctor Fairchild, who yearned for it as for the moon, can conjure up the tropical valley of the Fly River from these few flowers, one does not guess; or whether Miss MacIlvaine, who fell in with his plans, has felt herself repaid, one need not ask.

For the inquiring gardener the sight of these curious inflorescences and the amusing flowers which, in the illustration, look like so many little dolls hung up in bunches, will always be a sight to see. He may even wonder at this diversity of form that brings such a member of the Bean Family to so conspicuous a place. And, if his imagination is really alive, he will make a thousand comparisons with other members of this almost universal tribe.

In the just published "New Guinea Expedition," Richard Archbold and A. L. Rand (McBride & Co., 1940) which deals with the "Fly River Area, 1936-1937," there are several references to the *D'Albertis* creeper. The most interesting, perhaps, is the passage on pages 80-81.

"The clusters of large, scarlet, pea-like blooms amongst the green foliage form one of the most spectacular sights of New Guinea. Their beauty makes river travel doubly pleasing. The best display was along the little waterway near the little island above camp. The large bunches of flowers seemed like blooms of the tree itself, not draped nor festooned but appearing like patches of burning scarlet. Here and there we had the magnificent spectacle of pendant clusters of the brilliant flowers like lighted paper lanterns hanging from a bare vine draped from tree to tree. * * *"



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