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ARNOLDIA



A continuation of the
BULLETIN OF POPULAR INFORMATION

VOLUME VIII

1948

PUBLISHED BY THE
ARNOLD ARBORETUM
JAMAICA PLAIN, MASSACHUSETTS



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ILLUSTRATIONS

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ARNOLDIA



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BULLETIN OF POPULAR INFORMATION
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NUMBER 1

METASEQUOIA, ANOTHER "LIVING FOSSIL"

GINKGO BILOBA, a monotypic genus of very ancient lineage, in fact from the standpoint of geologic history, outside of the Cycadaceae, the most ancient of living trees, is often spoken of as a "living fossil." The sole species, once of very wide geographic distribution in the North Temperate Zone of both hemispheres, can scarcely be distinguished from fossil forms of ancient Mesozoic times. This is a beautiful example of the persistence of selected life forms, in highly organized groups, through many millions of years. *Ginkgo* has persisted in cultivation in China, but there are a few places in that country where it is spontaneous in limited forested areas. Whether or not it is truly native in such places, or merely occurs as a descendant from planted trees, is not definitely known. It was introduced into Japan about 700 A.D., into Europe about 1730 and into the United States in 1784. Now another striking case develops, not quite as old geologically as is the *Ginkgo*, through a remarkable discovery originally made by Mr. T. Wang in 1945. *Metasequoia*, previously known only from paleobotanic records is now shown to exist in the form of a single living species in a very limited area, and it, or its immediate ancestry, goes back to Mesozoic times.

One of the leading articles of the issue of the Saturday Evening Post for January 3, 1947, is entitled, "There could be Dinosaurs." Its author discusses the possibility of some of the giant reptiles whose kin dominated the fauna of the earth in the Mesozoic era, through the Triassic, the Jurassic, and the Cretaceous times, actually existing today in the unexplored swamps of tropical Africa. He admitted that wishful thinking and vague rumors were involved and after considering the possibilities frankly stated that there is, as yet, no positive evidence that these giant reptiles do still exist. Much more than a strictly popular account will be needed to convince the herpetologists, although some representatives of the general public, reading the article, may be persuaded that there is the possi-

bility that somewhere in the world there still exist a few representatives of these ancient giant reptiles.

I have deliberately referred to the above admittedly popular article for the simple reason that in the same geologic era, the Mesozoic, when the world fauna was dominated by the great reptiles, the land vegetation was largely dominated by the Gymnosperms, the primitive flowering plants, and that a great many of the genera which then evolved are still represented by living species. This was particularly true of the Triassic and Jurassic times, but in the Cretaceous many types of Angiosperms, the highest group of flowering plants, had appeared on the scene. Various genera of these ancient Gymnosperms have persisted throughout geologic time to the present including *Ginkgo*, mentioned above, the genera of living Cycadaceae (the most primitive of living flowering plants) and many of the genera of that large group commonly known as the Coniferae, which make up the great evergreen forests of temperate regions with which we are so familiar. Thus it was, as to time of origin from a geologic standpoint, that the period of development of and dominance of the great reptiles coincided with that of the primitive flowering plants; but while the great reptiles have disappeared from the scene, many of the genera of Gymnosperms have persisted, and, especially in the temperate regions, still dominate the vegetation of vast areas, particularly in the North Temperate Zone. Actually some of the living Gymnosperms can scarcely be distinguished from the fossil forms of ancient Mesozoic times.

The Mesozoic era has been defined as a succession of ages extending over a few hundred million years, but modern estimates place its duration as about 130 million years; even this last estimate is impressive enough, for to it must be added perhaps another 50 million years covered by the Tertiary down to the present time. It was toward the end of the Mesozoic era, in the Cretaceous, that the families and genera of many of the striking and most highly developed groups of flowering plants originated, the Angiosperms as contrasted to the more primitive Gymnosperms. While the animal kingdom in Mesozoic times was dominated by the great reptiles, particularly toward the end of that era, in the Cretaceous, the mammals were also developing, although during the Mesozoic none of the modern types was known and none of the immediate ancestors of man had appeared on the scene.

Mr. Wang's fragmentary specimens of 1945 were supplemented by additional material collected in the following year, originally three large trees representing this strange conifer having been located in northeastern Szechuan, very close to the Hupeh border. With the additional collections made in 1946, the discovery then developed into one of extraordinary interest in that the tree proved to be a living species of a genus, *Metasequoia*, which, up to that time, had been known only from paleobotanic records. Various species of North America and Asia originally ascribed to the genus *Sequoia* as fossil forms, proved not to belong in that genus, and in 1941 the new genus *Metasequoia* was proposed to accommodate



PLATE I

The type tree of the new *Metasequoia* at Mou-tao-chi. This is a sacred tree as indicated by the small Todee temple in front of the tree, Todee meaning God of the Land. Courtesy of Dr. H. H. Hu.

these; and only four years after that genus was described, a living species was actually found in China. This, because of the ancient lineage of *Metasequoia*, and its former wide geographic distribution (various parts of North America, Japan, Saghalien, Manchuria), is a most extraordinary circumstance. The proposed paleobotanic species are *Metasequoia heerii* from North America, *M. japonica* and *M. disticha* from Japan, and *M. chinensis* from Manchuria and Saghalien. Assuming that all of these extinct species are actually congeneric, then, in former geologic times, *Metasequoia* was a genus of very wide geographic distribution, as was *Ginkgo*. The latter is represented by only a single living species and this apparently now persisting only because it was preserved in cultivation in China. And now this striking *Metasequoia* is found, confined to a relatively few individual trees scattered along small streams and on the slopes of northeastern Szechuan and the adjacent parts of Hupeh.

It is sufficiently extraordinary that only four years after *Metasequoia* was actually described from the fossil records, that a living species of the genus should be found in China; but what is perhaps even more extraordinary is that when found, this living species, the sole surviving representative of a former widely distributed genus, was apparently not far from the verge of extinction as a living entity in its native habitat.

As noted above, the first observer located only three trees. A second expedition was sent out by Professor Wan-Chun Cheng of the National Central University, Nanking, in 1946, and Mr. C. J. Hsueh, his assistant, who led this expedition, brought the census up to about 25 trees. When botanical specimens were received at the Arnold Arboretum in the latter part of 1946 I immediately became interested in the possibility of securing seeds of this extraordinary species, and accordingly communicated with Dr. H. H. Hu, Director of the Fan Memorial Institute of Biology in Peiping, one of the joint authors concerned with the actual description of the species. Incidentally Dr. Hu was trained at the Arnold Arboretum, receiving his Sc.D. degree from Harvard University in 1925. Dr. Hu responded favorably and accordingly a modest grant was made from the Arnold Arboretum restricted Chinese exploration fund provided by the late Harrison W. Smith of Tahiti, himself a graduate of Harvard in 1895 and long interested in matters Chinese. On the basis of this grant Professor Cheng organized a third expedition to the type locality, this also led by his assistant Mr. Hsueh. He flew from Nanking to Chungking on September 3, 1947, and arrived at Mou-tao-chi, 110 km. east of Wan-hsien, Szechuan, on September 11, where the type of the species was originally discovered. This is very close to the Hupeh border. He spent approximately three months prosecuting field work in this part of Szechuan and in adjacent parts of Hupeh. He reports somewhat more than 100 large trees representing the species, occurring on slopes, along small streams, and near rice paddies (some of the trees planted) between the altitudes of 900 and 1,300 m. scattered over an area of about 800 square kilometers. This is a region of con-

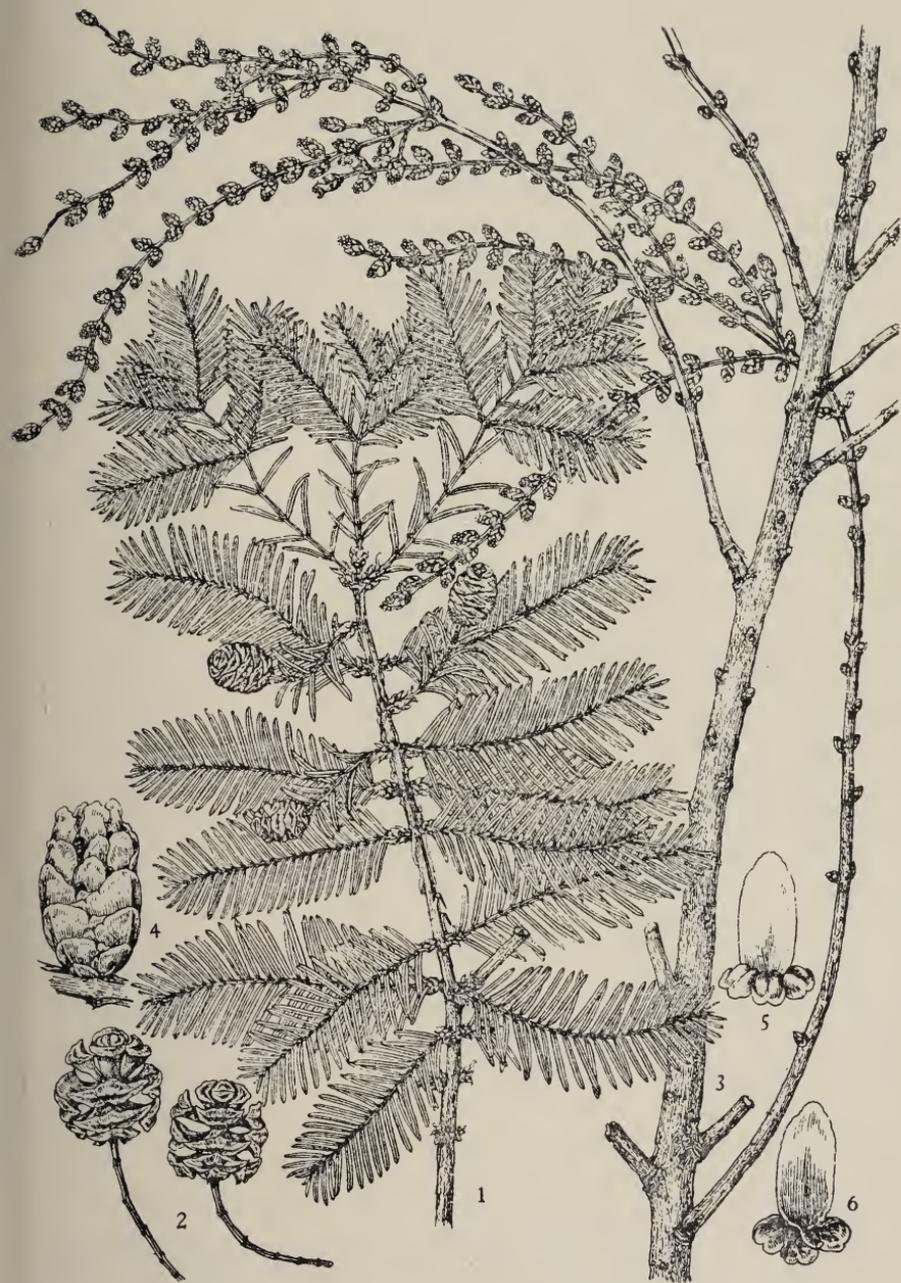


PLATE II

Metasequoia, showing botanical characters, courtesy of Dr. H. H. Hu.

siderable rainfall, with some ice and snow in the winter months. The center of its greatest abundance is in the Shui-sa-pa valley in Hupeh Province, where there are at least 1,000 of the trees, including the small ones; but there are no groves or forests made up of the species. In other places such as Houng-pin-ying and Mou-tao-chi, there are only a very few trees. It is of interest to note that the valley where most of the trees are now found takes its name from that of the tree, the tree itself known as *shui-sa* (*shui*=water, *sa*=fir or spruce), the place of its greatest occurrence being Shui-sa-pa.

The largest tree which was measured was 35 m. high, its trunk 2.3 m. in diameter. While 1947 was reported as not being a good seed year, an ample supply of seeds was secured during the time that Mr. Hsueh was in the field. These were delivered in Nanking early in December; the first small sending reached Boston January 5, 1948, and a second and larger shipment is now in transit. Seeds were planted in our propagating house early in January, and many of these germinated before the end of the month. Thus it is that in due time the Arnold Arboretum will have a certain number of living plants for distribution.

Following long established Arnold Arboretum practice, packets of seeds have been widely distributed to institutions in the United States and Europe. It is, of course, not known whether or not this remarkable species will prove to be hardy under the rather difficult climatic conditions characteristic of the Boston area. With excellent germination records it is now certain that we shall be able to establish this ancient but now nearly extinct type in various parts of the United States and elsewhere, for somewhere, with us, favorable climatic conditions will be found—if not in the northeast, then in the south or on the west coast. The point is emphasized that in spite of the present unfavorable economic conditions, in spite of adversities in China rendering travel difficult, and in spite of unfavorable exchange conditions, this cooperative project did succeed; that as a result an ample supply of seeds is available; that the seeds are viable; and, this being the case, the Arnold Arboretum has made an important contribution, working through its Chinese associates, in thus being involved in an attempt to preserve a remarkable conifer, and a species that in its native habitat is apparently not far from the verge of extinction. Incidentally Professor Cheng who, with Dr. Hu, cooperated with us, writes that without the modest grant made by the Arnold Arboretum, it would have been impossible for his representative to make the trip to Szechuan and Hupeh in 1947, and comments on the fact that trees are being rapidly destroyed by cutting in this region as well as in various other parts of China. He specifically mentioned *Picea heterolepis* Rehder & Wilson, which was described in 1914 from collections made by E. H. Wilson for the Arnold Arboretum in western Szechuan, in 1910, and a species now growing in our grounds. Not a single tree can now be found in the type locality, nor have the Chinese botanists been able to locate the species anywhere since 1932. The actual grant made by the Arnold Arboretum to finance this trip to Szechuan in 1947 was only

\$250.00 which, because of the extreme inflation, actually yielded \$9,750,000 in Chinese currency. This will give some idea of the current financial difficulties under which the Chinese botanists are carrying on their work.

This new "living fossil" is a large tree, attaining a height of at least 115 feet with a trunk diameter of at least $7\frac{1}{2}$ feet. One of its striking characteristics is that, like the various species of *Larix* (larch) and *Pseudolarix* (golden larch), and our *Taxodium* (swamp cypress) its leaves are deciduous, the trees being leafless in the winter months. In general appearance the leafy branchlets suggest those of

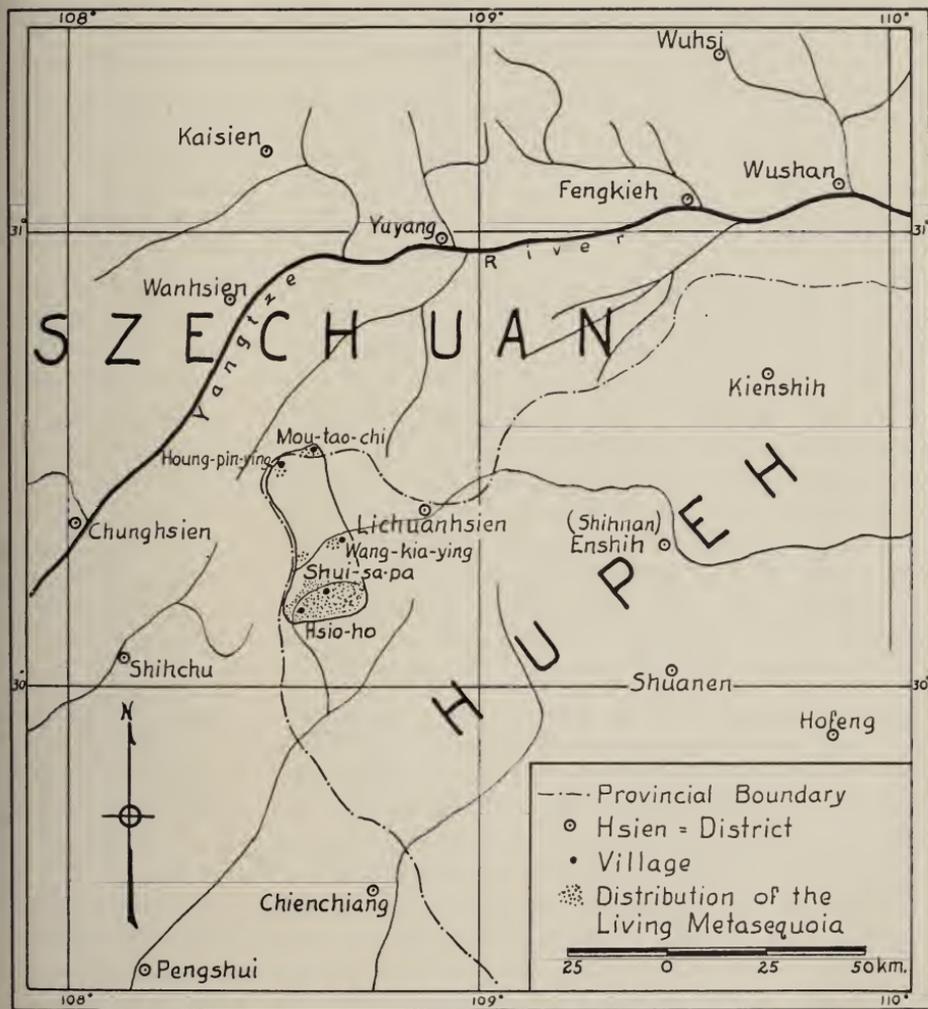


Fig. 3. Sketch map showing the limited geographic area of *Metasequoia*, drawn from data provided by Prof. Wan-Chun Cheng.

the genus *Glyptostrobus*. It is needless to repeat here the technical characters of this remarkable species, as these will be available when the formal description is published. All I have attempted to do has been to give the high lights regarding this remarkable discovery, and to call attention to the fact that viable seeds of the species have been received, from which young plants are now being grown.

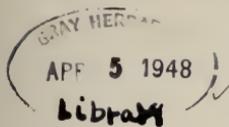
It has been argued in some quarters that we approach the condition of diminishing returns in the botanical exploration of China, a field that has long been one in which the Arnold Arboretum has specialized. This statement is doubtless true to a certain degree, but from what has appeared in extensive collections made within the past three decades, I am still of the opinion that a vast amount of field work is still called for and is still justified. This remarkable *Metasequoia* find bears out this belief. In spite of all that has been published on the enormously rich flora of China in the past century, and particularly within the past four or five decades, there are vast areas still remaining to be explored, and the already known flora will be very greatly increased, as to the number of actually known species, when the more recently assembled collections are studied in detail.

This *Metasequoia* case is by no means the only one where living species of Chinese plants have generic names which were originally based on fossil forms. In the walnut family (Juglandaceae) two cases occur to me. In eastern Asia one finds the very characteristic monotypic genus *Platycarya*, this name proposed in 1843. An earlier name for the same group is the paleobotanic one *Petrophiloides* (1840). Actually in 1933 Messrs. Reid and Chandler in their large volume devoted to a description of the London clay flora, i.e., the fossil plants found in the clay deposits which underlie the City of London, abandoned *Platycarya* as the generic name for this group and accepted the earlier *Petrophiloides*, with the binomial *Petrophiloides strobilacea* (Sieb. & Zucc.) Reid & Chandl. for the living eastern Asiatic tree. The other case is more recent. In 1941 the very striking new genus *Rhamphocarya*, with a single species, was described from recently collected Yunnan material; but shortly after the description was published it was discovered that the earlier paleobotanic generic name *Caryojuglans* (1935), which had been proposed to take a European fossil form, represented the same group. While in a way these two cases parallel *Metasequoia*, they are not as striking, for the Juglandaceae is, geologically speaking, a much more recent group than is the Coniferae; yet all three genera were formerly of very wide geographic distribution in the North Temperate Zone although the three living representatives, one in each genus, are now of distinctly restricted ranges in eastern Asia.

I am able to reproduce the figures, plates I and II, through the courtesy of Dr. H. H. Hu, one showing the type tree of the species, while the other the botanical characters. The map (fig. 3) was based on data provided by Professor Cheng. Dr. Ralph W. Chaney of the University of California kindly checked the geologic and paleobotanic aspects of this short paper.

E. D. MERRILL

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SPRING — 1948

SPRING has come at last—we hope—after a winter of record snowfall and record hardships to the general public. Plants did not suffer nearly as much as in the severely cold winter of 1933-34. At least this was true up until the time the snow cover melted. Since that time however, injury has been noted in many quarters and it is yet too soon to generalize on the reasons why certain plants have suffered. Some interesting points should be kept in mind when one tries to analyze the reasons for injury during the past winter.

Two rather important items should be noted; namely that there was a snow cover on the ground in most New England areas from December 23 until about March 15, and secondly, that there were some days in most New England communities when the temperature went below zero. As has been previously pointed out (*Arnoldia*, 3: no. 5-6, 25-36, 1943) rather extensive injury can be expected in the Arnold Arboretum when the temperature falls below zero several times during the winter. It may be this which has caused the rather widespread leaf burning on some of the broad-leaved evergreens as well as a few of the narrow-leaved types.

Rhododendrons and laurel have been especially hard hit in this vicinity. Normally the answer for foliage "burning" of evergreens is simple—that the leaves give off water during the winter months and that when the ground is frozen and soil water is unavailable, more water may be given off during periods of high winds than is good for the plants. This winter, however, the ground (in this vicinity) did not freeze. The snow blanket came while the soil was still unfrozen, and the heavy accumulation of snow kept it from freezing throughout the winter months. In fact, there are places on high ground in Weston on the Case Estates of the Arboretum which could be plowed only a few days after the snow cover had completely disappeared. Trucks could travel over much of the high ground in the Arnold Arboretum without leaving tracks by March 18. This is most unusual. Usually there is a long period of alternate freezing and thawing during which time the soil is very muddy

and tracks are easily made in it. The water from melting snow apparently went right through the soil with surprisingly little surface runoff.

After heavy snow storms there is always a certain amount of splitting and cracking of branches and trunks where strains from the heavy snow has been too much for the framework of the tree. Surprisingly little occurred in the Arboretum this winter, yet many a prized specimen in gardens in the Boston suburbs (where snowfall has been considerably heavier) has been ruthlessly split or broken. Mice damage has been considerably more serious than in other years, both in the Arboretum and in the Boston suburbs.

Some of the narrow-leaved evergreens are displaying burned foliage, but fortunately practically none has occurred in the Arboretum. In Wellesley for instance, forty-year-old trees of *Cedrus libani* and *Sciadopitys verticillata* have been heavily burned, together with some of the more tender plants like *Cryptomeria japonica* and *Pinus tabulaeformis*. It is difficult to know why such trees have been injured in one place and not in another only ten miles distant. Snowfall was less in the Arboretum, but minimum temperatures went to several degrees below zero about five times in both places. The trees showing the most injury are those growing in a very protected ravine and there have been few high winds, practically none since the end of January.

Rhododendrons and especially mountain laurel are showing much foliage burning. Whether the plants will really die back or whether the leaves only are injured, remains to be seen. Pruning such injured branches at this time would very likely be a mistake, since new leaf buds can quickly develop providing the twigs themselves are not seriously injured.

The flower buds of some plants that are frequently killed by winter cold, have not been injured this winter. *Forsythia*, *Lonicera fragrantissima* and *L. praecox*, *Hamamelis mollis* and *H. japonica*, *Magnolia stellata* and many other plants have been quickly forced into flower when cut branches have been taken indoors. This would indicate that as far as these shrubs are concerned, the winter has not been an unusually severe one. However, flower buds of *Corylopsis spicata*, *Abeliophyllum distichum* and *Viburnum fragrans* have been killed to some extent in the Arnold Arboretum.

This past winter with over 114 inches of snow and often a four-foot snowcover (at the Case Estates in Weston) on the ground for weeks at a time, will be one that is long remembered. As this goes to press, *Hamamelis mollis* and *H. japonica* are coming into full flower where grown in protected places, together with *Lonicera praecox*, but when grown in low areas the flower buds may have been killed above the snow line. Crocuses and snowdrops came into bloom by March 20. *Acer saccharinum* and *Hamamelis vernalis* were in full bloom by March 10. With spring very definitely on the move, a quick walk through the Arboretum shows surprisingly little plant damage from one of the worst winters on record in this part of the country.

DONALD WYMAN



PLATE IV

The Chinese witch hazel (*Hamamelis mollis*) one of the many plants introduced by the Arnold Arboretum (1902) now in full bloom.

NOTES

The "Friends of the Arnold Arboretum" is a new group now being formed, of people who are definitely interested in the Arnold Arboretum and subscribe to some of its work in horticulture. Annual membership is on the following basis:

Regular	\$10
Sustaining	\$25
Sponsoring	\$50
Patrons	\$100

A membership application card will be promptly sent to anyone requesting it. This group, it is hoped, will make possible some of the much-needed reconstruction necessary in the various collections of living plants growing in the Arnold Arboretum.

A new dwarf hybrid sweet corn of excellent quality has been developed at the Bussey Institution, especially adapted for growing in New England. Any member of the newly organized "Friends of the Arnold Arboretum" who wishes to try some of this "Harvard Hybrid" sweet corn may obtain seed simply by writing to Dr. Karl Sax and asking for some.

Field Class

A Field Class for the study of the flowering trees and shrubs as they are growing in the Arnold Arboretum, will again be held this year. The first meeting will be on Saturday, April 24, at 10:00 A.M., meeting at the Forest Hills Gate. Weekly meetings will be held every Saturday morning during May, unless prevented by inclement weather, when the class will meet the next clear weekday morning. The period is two hours long, and discussions will be held about the plants as they come into bloom during this spring season. Members of the "Friends of the Arnold Arboretum" are welcome to attend all classes without charge. Others must register in advance by mail and pay a registration fee.

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LABELS IN THE ARNOLD ARBORETUM

REQUESTS are continually being received at the Arnold Arboretum for information regarding the type of labels used on the thousands of trees and shrubs growing here. Many types of labels are available, and are being used by botanical gardens and arboretums throughout the country. The types found satisfactory here may not meet the needs of those in other areas of the country. Prime requisites for labels in the Arnold Arboretum are:

1. **Low Cost.** Thousands of labels must be made every year and in order to keep all of the plants labeled, the cost must be as low as possible, and the labels of such a nature as to last a long time, hence reducing the cost of replacement to a minimum.

2. **Ease of Making.** All labels are made by our own staff; hence materials and methods must be limited to as little equipment as possible. Much of this work is done indoors during the winter months.

3. **Indestructiveness.** Unfortunately, vandalism is an ever-present problem, and the types of labels used here must be indestructive.

These prerequisites practically eliminate the costly baked enamel labels used in some gardens, the rather expensive plastic labels appearing in others, and some of the carved wooden labels being made of shipmast locust. Because of permanence and neatness, the hand-written or inked labels commonly recommended for amateur gardeners are not successful under conditions in the Arnold Arboretum. The types used have proved satisfactory under our conditions over a long period of time.

Considerable research and much money is being spent by various industrial concerns to find paints which are weatherproof, but it is impossible to change our procedure every time a "new" weatherproof paint appears. In order to keep abreast of the times, we have an experimental series of labels weathering on the roof of the Administration Building, in which new types of materials are made into labels and are under continual test. Here the labels are exposed to more severe conditions of wind, sun and rain than they would normally have on the plant. These experiments have been under progress for the past ten years. Be-

cause of the results obtained from these continuing tests, we have changed the materials we use in label making several times during the past decade, and will continue to do so whenever we are certain that better materials for meeting our particular requirements, are available. Rather than discuss these experimental results in detail, it will probably be most helpful to those interested in this problem to know the materials and methods we are using at the present time, the approximate costs, and the methods used in making these labels together with their probable life expectancy. It must be repeated that these materials are not offered as the only materials for this purpose, but they have proved satisfactory under our conditions, and are as good as, or superior to, many other types we have tried.

Cost

The initial cost of the equipment necessary to make our own labels is about \$350.00. This includes a small paint sprayer, an embossing machine for making the record labels and rubber type for lettering the display labels. This equipment, if properly cared for, will last years (the rubber type must be replaced occasionally) and makes it possible to produce good labels of low cost during the winter months when outside work is frequently difficult if not impossible.

Embossed or Record Label

Every plant of sufficient size to be placed in the collections has a record label containing its record number, scientific name, the type of material which was originally received (whether plant, cutting, graft or seed), and the place from which it came, sometimes with the date, although this is also contained in the record number. These are made on $\frac{1}{8}$ " zinc tape (purchased from S. M. Spencer Mfg. Co., 3 Cornhill St., Boston), and punched out by our men on an embossing machine made by Roovers Brothers, Inc., 3611 14th Avenue at 36th St., Brooklyn, N. Y. The label is attached to a branch by means of No. 18 gauge copper wire, and will last as long as the wire will. Last year some were removed that must have been on the plants twenty years, and still were in perfect condition. Thousands of these are made each year, since some are inadvertently removed in pruning, others are "lost" in the center of shrubs, and still others do fall off. They cost about \$.04 each, not including the labor of making them.

Wooden Display Label

These are $8\frac{3}{4}$ " long, $1\frac{1}{2}$ " wide and approximately $\frac{3}{8}$ " thick, made of either cypress or pine. They are painted by spraying, as are all our metal display labels, racks having been made to accommodate nearly 2000 at a time. Two coats of "White Rhinamel" (Tropical Paint and Oil Company of Cleveland, Ohio) are sprayed on them; then they are printed, using rubber type (R. A. Stewart and Company, Inc., 80 Duane St., N. Y.). The ink is purchased from the International Printing Ink Company, 175 Albany St., Cambridge, Mass., formula "Special Black 46c-10287." A rubber roller is needed to apply the ink and a press (in our case a small binding press borrowed from the library) for making the impression. A special dye wash is used to clean the type, called "Fedroid," manufactured by the James B. Matthews Co., 470 Atlantic Ave., Boston, Mass.

When the ink on the label has dried, usually over night is sufficient, then the



BETULA NIGRA
RIVER BIRCH
EAST. N.A.M.



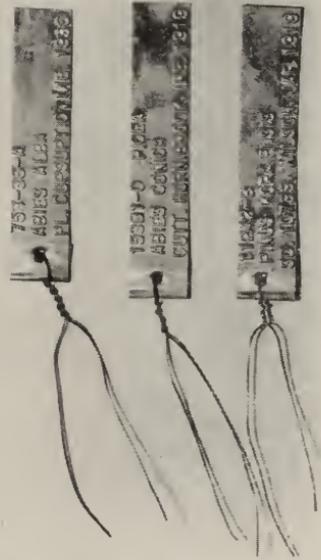
ELMS, AZALEAS AND
← BUSSEY HILL



ERICA CARNEA
SPRING HEATH
MTS. OF CENT. EUROPE



VIBURNUM SIEBOLDI
SIEBOLD VIBURNUM JAPAN



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ABIES ALBA
PL. DESCRIPTION FILE 1939

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ABIES CONICA
GUTH. HERBARIUM, U.S. 218

BIENIA
O PLANT. HERB. U.S. 1918
SP. ALBES. MOUNTAIN 1918

PLATE V

Trunk label

Stand label

Carved sign (cypress)

Record labels

Hanging display label

These are the labels used at the present in the Arnold Arboretum.

printed side is sprayed with "Tropelite Exterior Spar Varnish" (manufactured by the Tropical Paint and Oil Company), thus adding a year or two, to the usefulness of the label. Two holes are bored in the end of the label and it is strung with No. 16 gauge copper wire. It will last at least six years and possibly be legible for an additional three. The materials for such a wooden label cost approximately \$.10, exclusive of the labor needed in making it. The speed with which these and the metal labels described below are made has been markedly sped up with paint spraying and printing with rubber type, in comparison with the older method of hand-painting and lettering by hand with linseed oil and lamp black. Several labels of a kind are made once the type has been set, those not needed immediately are filed for future use. This year nearly a third of our labeling requirements were filled from this reserve file made in former years.

Metal Display Labels

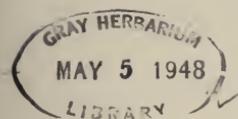
As seen from Plate V, these are of two types, one with two holes is put on a metal stand placed in front of a low shrub, and the other, with four horizontal slits, is nailed to a tree trunk with copper nails. The nails are placed as close together as possible so that there is some room for growth as the tree expands in girth. Both metal display labels are made of galvanized iron or cold rolled steel; in the case of the trunk label, 20 gauge and $4\frac{1}{2}'' \times 6\frac{3}{4}''$, and in the case of the stand label, 18 gauge and $4'' \times 6\frac{1}{4}''$. Both types are made for us by W. T. von Schoppe, 19 Palfrey St., Watertown, Mass. These labels are first washed with "Toluol" to remove any film on the metals, and then sprayed with "A. C. B. Metal Primer Red" manufactured by the Tropical Paint Company. Then a mixture of four parts "Rhinel Yellow" and three parts "Rhinel Brown" (mixture merely to supply the color we have used over a long period of years) is sprayed on, followed by printing and spraying with "Tropelite Exterior Spar Varnish" as with the wooden labels. Materials cost about \$.12 per label, exclusive of labor and the stand for the stand label.

Direction signs are placed about the Arboretum to show visitors the paths leading to the main collections and exit gates. These signs are made of first quality cypress planks, 30'' long, 12'' wide and 2'' thick. They are carved out on a regular drill press, using a $5/16''$ router bit, filed to make a V cut, and they were at first coated with linseed oil. After several years' use it was found that the color darkened materially with the linseed oil method, making it difficult to read them from a distance. To alleviate this, a dark shingle stain has been used and the letters are painted in with a bright yellow weatherproof paint, which seems to last several years. They cost about \$2.00 each, exclusive of labor. Other woods might easily be used.

These, then, are the labels and methods of making them at present in the Arnold Arboretum. It is necessary, of course, to keep a complete set of maps of the plants growing in the various areas, and to check them from time to time for missing labels. Some collections like the lilacs, are done every year, others are done every three or four years. Plants suitable for display in any arboretum must be kept properly and clearly labeled, for this is one of the most important functions of the modern arboretum.

DONALD WYMAN

ARNOLDIA



A continuation of the
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of the Arnold Arboretum, Harvard University

VOLUME 8

APRIL 30, 1948

NUMBER 4

DESTROY DEAD ELM WOOD IMMEDIATELY

MUCH has been written in the past months concerning the Dutch Elm Disease and its effective control. "Spray now and save your elms," "Contribute to this fund now and save New England's elms," are only two of several headlines originating from various sources, to try to force the property owner into spending money in certain ways for the so-called "control" of the disease. Unfortunately, such headlines are most misleading, and property owners are due a thorough report of the Dutch Elm Disease situation as it appears at the present time.

It must be admitted that the Dutch Elm Disease has come to stay, and will be with us a long, long time. We hope that it will not be responsible for eradicating all the elms of New England, but it will continue to be an ever-present menace for a number of years. Regardless of what the final control solution will be, there are thousands of elms in remote places which can harbor the disease or the insects carrying the disease, or both — trees which are growing on inaccessible land or which are on such cheap land that it will not pay to treat them for the disease. This fact is not pleasing to contemplate, but it must be considered when discussing a practical means of control.

A general meeting of scientists working on the control of this pest in New England, was called on November 7, 1947, by the New England Council in the Statler Hotel, Boston. Present were competent representatives from all the New England State Experiment Stations as well as from New Jersey and Maryland. Present also were representatives from the U.S. Department of Agriculture and certain Canadian Experiment Stations. In other words, this was a general meeting of all the interested scientific groups doing research on control problems for the New England area. Many of the men have been working on some phases of control as major research projects. This is not the place to discuss all the research projects under way at the present time, nor to study a history of control methods

used earlier in Ohio, New Jersey and New York. Certain facts were brought out during the course of these discussions which might be of interest to New England property owners, and it would seem advantageous to discuss a few at this time.

No Practical Control of Disease Fungus Yet

There is no practical method of spraying to control the disease fungus once it is in living trees. All spraying attempts are directed towards controlling the insects on the trees.

No Positive Practical Control by Spraying of the Bark Beetles

As most people know, there are two types of bark beetles which feed in the bark of dead or diseased trees and are responsible for carrying the fungus to living trees. Many statements have been made erroneously, that spraying will definitely control these insects. Unfortunately this is not true. It is practically impossible to cover all the small twigs of elms with sufficient spray materials to adequately kill insects in all parts of the tree. It is true that DDT kills bark beetles, but only when used in far greater quantities than has ever been used before on trees — quantities such that the price of spraying is often prohibitive for all practical purposes. The actual mechanics of applying these concentrated sprays, even with the latest types of blowers or hydraulic equipment, presents many serious problems which, it is hoped, will be solved with more experimentation. Consequently, thorough control of the bark beetles can not be obtained by spraying this spring with the equipment and materials normally in use at the present time.

Sanitation is the Best Present Control Method

Sanitation would include several things. First, it would include the removal and destroying of all dead elm wood. This is best done by burning immediately. Elm wood can also be stored indoors so that when bark beetles emerge they can not fly out-of-doors. Spraying dead elm wood with oil (1 lb. of DDT in $12\frac{1}{2}$ gallons of No. 2 fuel oil) *on all sides* has also proved an effective means of preventing the emergence of bark beetles and of killing them if they alight on such treated wood. Immediate burning, however, is best. Elm wood, dumped in piles, or thrown about miscellaneously at town dumps can serve as a source of disease infection for the entire community, unless it is burned or thoroughly sprayed immediately. Elm logs over a year old do not serve as likely sources for hibernating beetles, but freshly-cut elm logs do.

Completely removing the bark of all logs as soon as they are cut, or keeping them completely submerged under water has also been recommended, but these methods are rather difficult to carry out properly.

Sanitation would also include the prompt removal and burning of dead elm branches on normally healthy trees.

Fertilizing the trees to keep them in a healthy, growing condition could easily

be construed as being part of the general sanitation program. Many an elm growing in a prominent position bordering a street or on private property is a worthy subject for proper tree fertilization. This tends to keep such a tree in a vigorous growing condition and reduces to a minimum the number of weak spots where infection might possibly take place. It should be kept in mind, however, that even this is no cure nor is it a positive prevention measure.

Spraying for leaf-eating insects such as the elm leaf beetle, elm leaf miner, canker worm, gypsy moth and several other pests is also included in general sanitation measures. When such insects feed on the foliage of a tree in large numbers, the tree is weakened considerably and becomes easy prey to bark beetles and possibly disease infection. So, proper spraying of the foliage for leaf-eating insects by any acceptable means used at present, would greatly aid in keeping the trees in a good, clean condition. Competent entomologists have suggested that three sprays might be used in eastern Massachusetts for maximum protection; May 15, June 15 and July 15, although these times might vary slightly with weather conditions.

The Massachusetts Arborists Association is to be complimented on its statement of policy which emphasizes this sanitation program. Such a decision to make public this policy and not to flaunt popular hysteria in spraying primarily for the bark beetles when sanitation seems to be much the best approach to the problem under present practical conditions and with present available materials, shows that these commercial arborists are very definitely trying to give the public the best information available at the moment on this troublesome and confusing situation.

What One Town Has Done

Williamstown, Massachusetts, is one New England community which has vigorously attacked the Dutch Elm Disease and worked out an excellent local solution, which might well be adopted by other communities. With an energetic local committee of civic leaders, experts and citizens, a program of action was advanced leading to the cleaning up of all dead or dying elm wood in the community. Frequent announcements were made in the local newspapers, various civic organizations obtained volunteers to donate truck services and men to load and carry off dead elm wood, students in the high school and local garden clubs assisted in the hunting for dead and dying trees, property owners combed their wood piles out-of-doors for elm wood and removed it and local funds were made available so that a trained investigator assisted in a property-by-property investigation for dead elm wood. Much was accomplished in this sanitation program by a thoroughly aroused community. The credit for clean trees in this town goes directly to an intelligent and energetic committee, which knew what the local problem was, and took the proper steps to make every property owner morally responsible for assistance. Programs similar to this can be launched in other communities, the sooner the better.

No more fitting conclusion could be given than to emphasize the four points stressed by the Massachusetts Arborists Association in recommending that, for this spring, the Dutch Elm Disease should be fought in Massachusetts by :

1. Careful pruning to remove all dead and dying branches.
2. Maintaining fertility by judicious use of plant foods.
3. Prompt destruction or protection of all cut elm wood.
4. Spraying to control leaf-eating insects such as canker worms, gypsy moth caterpillars, elm leaf beetles, and other destructive pests.

DONALD WYMAN

NOTES

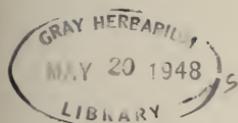
A very large shipment of *Metasequoia* seeds has just been received from Szechuan (see *Arnoldia* Vol. 8, No. 1, March 5, 1948). Packets of these seeds will be sent to all readers of *Arnoldia*, who request them, as long as the supply lasts. It is by no means certain that this tree will prove to be hardy in the northern tier of States.

Field Class

It is not too late to register for the Arnold Arboretum Field Class, conducted for two hours every Saturday morning in May. The second meeting is on Saturday, May 1, at 10 a.m. at the Forest Hills Gate. Registration is in advance by mail.

Through the efforts of Professor Stephen Hamblin, Assistant Professor of Horticulture in the School of Design, Harvard University, the Lexington Botanic Garden has presented the Arnold Arboretum with over 100 old-fashion roses. These have been collected from many sources in this country and abroad during the past ten years. The collection contains many varieties of *Rosa gallica*, *R. centifolia* and certain hybrids. They will be grown and observed in the nurseries at the Case Estates, Weston, for a few years, after which the better ones will be added to the collection in the Arnold Arboretum. The Arboretum wishes to take this opportunity to thank Professor Hamblin and the Lexington Botanic Garden for this valuable gift of plants.

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NUMBER 5

A TRIP THROUGH THE ARBORETUM DURING LILAC TIME

THOUSANDS of people have the opportunity of visiting the Arboretum during lilac time, and they are fortunate for the Arboretum is now at its best. This issue of *Arnoldia* is written in order to aid our many visitors in remembering a few of the many things they have seen in bloom. Perhaps too, those who have been less fortunate and are unable to visit the plantations during this period, may derive some enjoyment from reading this enumeration of the plants of outstanding beauty which are admired by so many.

Starting the trip through the Arboretum from the Jamaica Plain gate, we first notice the peculiar green flowers of the native *Magnolia acuminata* beginning to bloom. The flowers of the Asiatic magnolias have long since passed. Continuing on the road from the Administration Building, we pass the lindens and an excellent bed of *Rhododendron roseum* which has been in full flower for some time. A little farther on, near the horse chestnuts, is a planting of the daintily colored pinkshell azalea, *Rhododendron vaseyi*, which adds a bright spot to any landscape scene. Opposite this are the many forms of the Japanese maples coming out into full leaf, and the brilliant red of their foliage makes a beautiful contrast with the white flowering dogwoods close-by. In the woods are several hundred torch azaleas, *Rhododendron obtusum kaempferi*, which have been in full bloom for over a week, and because of the excellent shade of the surrounding oaks, their flowers keep their color for a considerably longer period than do those of azaleas planted out in the full sun.

Leaving the road for a moment, we stroll through these azaleas to a knoll in the woods overlooking the shrub collection. Approximately a thousand different shrubs are growing here, and with a hasty glance from our vantage point we notice that there are not many plants in bloom. At the extreme left there is a bright spot of white close to the ground (*Iberis tenoreana*), and nearby another bright spot of yellow (*Alyssum gemonense*), blooming at the same time, while *Iberis*

sempervirens will not bloom for another week. Looking farther, we see the white of some spiraeas in bloom, and at the end of the collection the tall pearl-bushes in full bloom. In front of us is a long row of vari-colored varieties of the Japanese quince, but as these have been in bloom for over two weeks they have now nearly lost their brilliance.

Continuing from the woods interplanted with torch azaleas, we glance backward through the shrubbery overhanging a pond on the left to see an excellent planting of *Rhododendron vaseyi* in full bloom, the dainty shell-pink color of the flowers reflected in the still water at their feet. Continuing between the ponds we turn to the right and approach the lilac collection.

What a sight! The bank is one mass of color. In this collection, one of the two best in the world, are over 400 different kinds of lilacs including over 300 different varieties of *Syringa vulgaris* alone. A good growing season during which all plants were pruned, fertilized and mulched has resulted in a profuseness of bloom unequalled for several years past. One of the first plants to draw our attention is the dark purple variety of *Syringa vulgaris* named "Ludwig Spaeth." We notice at least two lilacs (*Syringa amurensis*, the Japanese tree lilac, and *S. villosa*, the late lilac) that are not in bloom, for these come later, the first in June and the other in July. Continuing up the walk among the lilacs, we see the most fragrant of all, *S. pubescens*, and can easily recognize its value even though its flowers are not conspicuously colored.

On the left of the walk is the interesting small Persian lilac and its several varieties. Nearby is *S. chinensis*, the first known hybrid, resulting from a cross between *S. persica* and *S. vulgaris*. One of its varieties, *S. chinensis saugeana*, is particularly valued for its dark reddish flowers. Both the Persian and the Chinese lilacs are valued for their profuse, graceful, nodding sprays of flower clusters which make them among the best for cut flower purposes.

Near the end of the row of lilacs, placed between the walk and the road, are two plants outstanding for their deep reddish-purple flowers, namely "Congo" and "Negro." Incidentally, it was this row of lilacs which was cut to the ground twenty years ago in an effort to reduce the size of the plants and so force them to grow into better specimens which would be appreciated more.

Climbing up toward the top of Bussey Hill we pass through an old lilac hedge which is easily one hundred and thirty-five years old. These bushes are seldom pruned and sprayed, and are living examples of what lilacs will do under adverse conditions. They are now about ten feet tall (having been cut to the ground several years ago) and almost twice as broad, but even with the lack of care they do have many blooms each year. At the top of Bussey Hill in the Chinese Collection we find many things in full bloom. Our first impression is one of brilliant yellow color coming from the brooms which are at their best. These belong to the genera *Cytisus* and *Genista*. One plant stands out particularly among these because of its brilliant mass of profuse lemon-yellow flowers. This is *Cytisus prae-*



PLATE VI

The fiery red torch azalea (*Rhododendron obtusum kaempferi*) first introduced into America by the Arnold Arboretum.

cor, and those who have admired it will be glad to know that it is available from certain nurseries.

To the right of this walk, across from the brooms, we see the last of the royal azalea, which is one of the first in the collection on the hill to bloom. Over the brow of the hill we notice many of the torch azaleas dotting the hillside here and there. Walking on toward the century old pine trees, acting as guardian sentinels for the entire collection we pass a bed of two beautiful azaleas, *Rhododendron roseum* and *Rhododendron nudiflorum*. Their sweet fragrance fills the air. Beyond these is the Poukhan azalea, its lavender-purple flowers fading rapidly for it has been at its best for almost two weeks. However, one or two of the plants which are late to bloom indicate to us what the entire planting must have looked like when it was at its best.

We notice that the dove tree, so interesting because of its history, has again disappointed plant lovers and has not bloomed. This tree was killed to the ground during the cold winter of 1933-34 and has not bloomed since. Each year we look forward to seeing its blossoms, but always we are disappointed. Under the pine trees are the best plants of the torch azalea in the entire Arboretum. Here some are at least six to eight feet tall, literally one solid mass of fiery red blossoms. It is easy to notice the injury from the hot sun for some of the blossoms are badly faded and burned at the tip of the petals, but when they are grown in the shade they keep their color very well for some time.

Continuing down the hill among the azaleas, we come to an excellent group of "Ghent" and "Mollis" hybrids on the left, many of which are just beginning to show their excellent, highly colored blossoms. A number of these are perfectly hardy under Boston conditions and their wide variety of colors are unequaled by any other group of shrubs. On the right is the Arnold azalea, a chance hybrid in the Arboretum, having many of the qualities of *Rhododendron obtusum amoenum* but at the same time being considerably more hardy.

We walk down the hill among the beeches, admiring the beautiful young foliage of the different varieties, and now and then glancing toward Hemlock Hill at the base of which the first rhododendrons are just coming into bloom. Once more on the road at the foot of the hill some members of the group continue on toward Peter's Hill and the crab apples, some walk among the conifers, and others turn to the right and walk back toward the lilac collection. With time getting short, we hasten back to the lilacs where several in the group wish to spend the last moments of the trip, making notes and comparisons of these excellent plants to guide them in making their selections for their own homes. It is just for such concrete purposes as this that the thousands of plants in the Arboretum are being continually maintained.

DONALD WYMAN

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NUMBER 6

BLUEBERRY CAGES

WHOEVER contemplates growing highbush blueberries — whether on a commercial scale or as an amateur with restricted area — the small homeowner should immediately acquire the following pamphlets:

- (1) "Blueberry Growing"—U.S. Dept. Agric. Farmer's Bulletin No. 1951.
- (2) "Blueberry Culture in Massachusetts"—Mass. Agric. Exper. Sta., Amherst, Mass. Bulletin No. 358.
- (3) "The Blueberry"—Dominion of Canada Dept. of Agric., Ottawa, Publication No. 754—Farmer's Bulletin No. 120.

An excellent summary of the basic facts pertaining to the horticultural varieties of *Vaccinium corymbosum* was contributed by Dr. Donald Wyman of the Arnold Arboretum (*Arnoldia* No. 5, Vol. 2, 1942).

Blueberry culture has been thoroughly discussed, and so exhaustively, in many publications of various state experimental stations, that opportunity to contribute anything definitely new seems nearly hopeless.

Dr. F. V. Coville of the U.S. Dept. of Agriculture showed the necessity of providing an acid soil for successful growth. Working with Miss Elizabeth White from 1906 to 1937 the experiments in hybridization and selection of "the best" varieties were carried out.

The desired characteristics of size, flavor, color, ease of picking, and keeping qualities were increased; prolongation of season was increased by securing early, mid-season, and late maturing sorts.

The importance of growing several varieties to insure cross-pollination has been demonstrated.

During the past eleven years I have grown in Newburyport fourteen of the named varieties—all under the same conditions and with such satisfaction that I

would urge any home-owner able to provide suitable conditions to plant at least three different varieties of the highbush blueberry; not dug up from the wild, but the horticultural named varieties.

My experience with these fourteen varieties coincides largely with what seems to be the official ranking in order of importance with reference to certain characteristics of ripening, size of berry and dessert quality.

One can readily appreciate the commercial grower's preference for the varieties which stand up best for transportation, for ease of propagation, for least expense in pruning and "pickability," and which can be sold ahead of, or later than, the season when the market in a given district may be glutted.

The home-owner consuming his own produce could be more interested in choosing varieties primarily for flavor, appearance and "seasonability." Since the individual characteristics of some twenty named varieties have been accurately described and are available, a satisfactory choice can be readily made.

Properly grown, all of the varieties are prolific. Acid soil, a heavy mulch of oak leaves or pine needles all-the-year, full sunlight, avoidance of competition from weeds and feeding roots of large trees, suitable pruning, application of nitrate of soda in May — these constitute the main requirements. Watering may be required where the water table in some localities makes watering of other shrubbery necessary. As with other fruiting shrubs or trees, preventing the individual bush from overbearing does definitely aid production of larger berries.

Assuming our bushes have been selected, properly planted, have flowered and set fruit, we watch with pride the rapid growth of the berry clusters.

As the berries, some as large as cherries, begin to change color from green to pink on the way to blue, we contemplate harvesting our crop — not unlike bunches of Concord grapes.

"Just a few days more now." "Ah! Aren't they whoppers?" Really, they're so beautiful it's almost a shame to pick them.

As a matter of fact most of the varieties have their best flavor when picked as they become fully ripe. Not all of the berries in a given cluster become fully ripe on the same day, so properly we wait for just the right degree of color. But the feast is in sight!

Unfortunately, it is very much in sight — and who shall do the feasting? The owner? Perhaps!

Right here is the reason for this contribution to Blueberry literature.

Shades of Audubon and Lucullus! *Degustibus non disputandum!*

Chewinks, catbirds, robins, red squirrels and greys — all in the neighborhood have been eyeing the premises with no less interest than we, the rightful owners and lavish — if reluctant — hosts. These unbidden guests have tastes that seem less fastidious than ours; they wait not for that exquisite shade of blue but start with the pink and carry on.

With a large bird population due to deliberate protection at "Chailey" our



PLATE VII

Dr. Clark covering one of his high bush blueberries at fruiting time (*left*).
Illustrating the method by which Dr. Clark protects his high bush blueberries from rodents. (*right*)

home in Newburyport, our first blueberry crop underwent complete harvesting by these uninvited guests, and during the winter months rabbits showed a fondness for the bark of several bushes.

Blueberry cages solved the problem.

The accompanying illustrations demonstrate the construction and installation of a protection which is relatively inexpensive and not too difficult to be practical.

Materials: one inch mesh galvanized poultry wire of 2 ft. width cut into 12 ft. lengths, ends fastened with 6 inch overlap, to encircle base of five stakes of cypress, 1 inch \times 1 inch, each 6 feet long, the lower end pointed and driven 1 foot into the ground inside the wire and at intervals around the bush. These stakes and wire I leave *in situ* the year round.

About July 5 we encircle the tops of stakes with string.

The tops of stakes are then covered with a sheet of mosquito netting.

To encircle the space between tops of stakes and wire a 13 foot length of mosquito netting suffices, starting at one stake and ending with a 6 inch overlap.

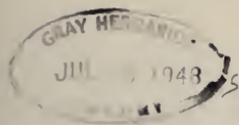
Two inch safety pins are the most convenient means of fastening at appropriate places, as they are readily removed and replaced at the times selected for picking.

These suggestions if properly carried out I have found essential to insure a crop of blueberries for the rightful owners. Too often horticulturists enthuse about the growing of these delicious fruits and fail to realize that the uninitiated amateur should be prepared for a mass descent of birds and squirrels as soon as the fruits are ripe. With a small amount of effort spent to protect these fruits, we at "Chailey" enjoy our blueberry crop annually.

DR. GEORGE O. CLARK, *Vice Pres.*
Massachusetts Horticultural Society

Editor's Note: It is with particular pleasure that we publish this most timely note on blueberry culture from Dr. Clark. Over a year ago he commented on our enthusiasm for the horticultural varieties of *Vaccinium corymbosum*, but stated, that like many others, we failed to emphasize the most important of all—namely the **protection** of the ripening fruits. With blueberries in New England just now starting to ripen, there may still be time for enthusiastic amateurs to erect the cages described by Dr. Clark, and so save their blueberries from uninvited guests.

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NUMBER 7

SYRINGA PRESTONIAE

IN 1925 Miss Isabella Preston, Horticulturist of the Government Experiment Station at Ottawa, Canada, became interested in trying to obtain some hardier lilacs. Among other crosses she made, one has proved outstanding; namely *S. villosa* × *S. reflexa*, later named *Syringa prestoniae*. From this original cross, a group of lilacs has appeared which bloom two weeks later than the *S. vulgaris* hybrids. The Arnold Arboretum has obtained many of these lilacs for trial, and, because there are now unfortunately so many named varieties, it has taken several years to study them and to record their ornamental characteristics. Of over forty now being grown in the Arboretum, not all were originated by Miss Preston.

The name of F. L. Skinner, of the Manitoba Hardy Plant Nursery, Dropmore, Manitoba, Canada, should also be mentioned in this connection. He has made the same cross (*S. villosa* × *S. reflexa*) and others, in an effort to find hardier lilac varieties for his rigorous climate, and he too has introduced some splendid late-blooming varieties.

In naming the original *S. prestoniae* hybrids, the authorities at the Ottawa Experiment Station were so enthused about the new plants, that many of the original seedlings in the row were named, by the simple expedient of walking down the row and allotting the name of one of Shakespeare's heroines to each plant. This has caused some confusion, for many varieties are practically identical and have been introduced into the trade at one time or another. All in all, 76 clones of the cross *S. villosa* × *S. reflexa*, have been named and the names published. At least 22 of these have since been recommended to be dropped by the Ottawa Experiment Station. Judged on their performance in the Arnold Arboretum, many others might be considered to be in the same category, and could well be dropped from further commercial propagation.

This is not the place to enter into a lengthy discussion of the history or parentage of all these clones and other similar crosses. Since many of these varieties



PLATE VIII

Syringa villosa (left). *Syringa reflexa* (right). These are the parents of *Syringa prestoniata*.

have been studied as they grow and bloom at the Arnold Arboretum for a period of six years or more, a resumé is given below only of those varieties as they grow here. A few species and other hybrids have been included in this general study of the late blooming lilacs. In the following list, all varieties are hybrids of the cross *S. villosa* × *S. reflexa* unless otherwise mentioned.

Varieties not appearing in the following lists might first be compared with those marked with an asterisk (*) before they are generally accepted. Those with the asterisk appear to be the best ornamental types as they grow under our conditions.

Color Groups

The colors of *S. prestoniae* varieties are not widely different. I have been comparing them since 1942, and the following notes are more or less composite, all the plants mentioned having bloomed in the Arnold Arboretum during that period, most of them blooming together this year when they were at their best about June eleventh. The colors have been compared with those of the Royal Horticultural Society's "Colour Chart," and range only from rhodamine pink to imperial purple, or in more general terms, being in the violet reds and reddish violets.

The flower clusters of most varieties are pyramidal; many are rather large and open; some are dense. Only a very few show the narrow type cluster of *S. reflexa*. One plant in particular, Arnold Arboretum, No. 701-36, *S. Stegiflexa*, from Hesse Nurseries in Germany in 1936, is very beautiful in this respect, showing slightly nodding clusters of the *S. reflexa* type.

As is usual in most plants, the sizes of the flower clusters vary from year to year; also they vary on the individual plants. Several measurements have been made in different years of the following varieties, but even with this as a background the following measurements can only be indicative. The density of the flower cluster is a clonal characteristic, fairly constant from year to year. All are vigorous growers and are very hardy.

Those varieties marked with an asterisk (*) have proved the best from an ornamental viewpoint, as they have grown in the Arnold Arboretum. Far too many varieties have been named. The object of this discussion is to show their similarities (color and size of blossoms) and to indicate those which have performed well here. A few late-flowering species and other hybrids have been included to show how they compare with the named varieties of *S. prestoniae*.

Group 1

Flower buds - rhodamine pink 527/1 to 527/2

Flowers - rhodamine pink 527/2 to whitish in most vars.

Flower cluster (inches)

Name	Width	Height	Density	Remarks
"Bellicent"	5	6	open	<i>S. josiflexa</i> var.

Name	Width	Height	Density	Remarks
*"Coral"	8	8	open	
*"Dawn"	5	9	open to dense	
"Elinor"	4	6	dense	
*"Hecla"	7	8	open to dense	
*"Hiawatha"	4	6	dense	
*"Lynette"	4	6	dense	<i>S. josiflexa</i> var. Fls. do not fade white
<i>pinetorum</i>	2	3½	open	
*"Romeo"	8	9	open	Fls. do not fade white
*" <i>swegiflexa</i> "	2½	6	open	Arnold Arboretum No. 701-36
<i>sweginzowi</i>	3½	5	open	
<i>tomentella</i>	4	6	open	

Note: The reason for recommending so many varieties in this group is that this delightful pink color is prominent in only a very few lilacs.

Group 2

Flower buds - fuchsia purple (28/2) to magnolia purple (030/2)

Flower - whitish when fully open but much color still on corolla tubes

Name	Flower cluster (inches)			Remarks
	Width	Height	Density	
"Audrey"	5	9	dense	
"Caliban"	5	6	open	
"Carlton"	9	9	open	<i>S. swegiflexa</i> var.
"Desdemona"	6	6	open	
"Dorcas"	8	12	open	
"Handel"	5	8	dense	
"Hedin"	4	7	open	(<i>S. villosa</i> × <i>sweginzowi</i>)
<i>henryi</i>	4	6	open to dense	
*"Isabella"	8	11	dense	this is the type; one of the best of all
"Katherina"	4	7	open	
*"Miranda"	5	10	open	
"Octavia"	4	6	dense	
"Paulina"	6	5	open	
"Portia"	8	11	dense	
*"Prairial"	6	8	dense	(<i>S. henryi</i> × <i>tomentella</i>)
"Silvia"	6	10	open	
"Titania"	6	9	open	
*"Ursulla"	7	10	dense	
"Valeria"	5	9	dense	
"W. T. Macoun"	5	8	dense	



PLATE IX

Syringa prestoniae "Isabella" one of the most prominent of all this hybrid group (left).
Syringa prestoniae "Hecla" showing a smaller and more compact flower cluster typical of some varieties (right).

Group 3

Flower buds – cyclamen purple (30/2) to magnolia purple (030/2)

Flowers – cyclamen purple (30/3) to magnolia purple (030/3)

Flowers of most varieties in this group *do not* fade white but keep their general color

Name	Flower cluster (inches)			Remarks
	Width	Height	Density	
"Donald Wyman"	3½	5	dense	
*"Enid"	7	10	open to dense	<i>S. josiflexa</i> var.
"Francisca"	6	8	dense	flowers fade whitish
"Guinevere"	6	7	open	
"Jessica"	5	7	open	
*"Nerissa"	8	10	dense	
"Olivia"	8	11	open	flowers fade whitish
"Rutilant"	9	10	open	<i>S. nanceana</i> var.
<i>wolffi</i>	3½	7	dense	

Group 4

Flower buds – petunia purple (32/2) to phlox purple (632/2)

Flowers – petunia purple (32/3) to whitish

Name	Flower cluster (inches)			Remarks
	Width	Height	Density	
*"Ariel"	7	9	dense	
"Charles Hepburn"	4	6	open	<i>S. villosa</i> × ?
"Charmian"	6	8	open	
*"Floreal"	6	8	dense	<i>S. nanceana</i> var. – later to bloom than most varieties and starred for this reason
<i>josikaea</i>	3½	5	dense	
<i>josikaea zabeli</i>	2	4	open	
<i>julianae</i>	5	7	open	
*"Lutece"	4½	8	open	<i>S. henryi</i> var.
"Nocturne"	4½	7	dense	
"Sulte"	4½	8	dense	<i>S. chinensis</i> var.
"Swanee"	3	5	dense	
* <i>velutina excellens</i>	4	6	open	starred for pure white flowers
* <i>villosa</i>	6	7	dense	some plants with pure white fls.



PLATE X

The late lilac *Syringa villosa*; in background *Syringa henryi* "Lutece" as they grow in the Arnold Arboretum.

Group 5

Flower buds – imperial purple (33/2)

Flowers – imperial purple (33/3)

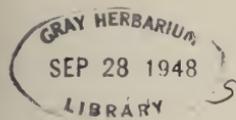
<i>Name</i>	<i>Width</i>	<i>Height</i>	<i>Density</i>	<i>Remarks</i>
“Royalty”	4	9	dense	<i>S. josiflexa</i> var.

These, then, are the late-blooming lilacs, flowering after *S. vulgaris* and its hundreds of varieties. The last of all the lilacs to bloom, *S. amurensis* and its variety *japonica*, the tree lilacs, and *S. pekinensis*, come slightly after the lilacs mentioned in this bulletin.

The late-blooming lilacs are mostly new, having appeared in the last two decades. They are interesting and vigorous as well as very hardy. This resumé of those which have been tried in the Arnold Arboretum should prove of value to those who want to try a few of the best in their gardens. Not all of those recommended are available yet commercially, but, a majority are being grown by a few nurseries and more will be later.

DONALD WYMAN

ARNOLDIA



A continuation of the
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PRUNING RHODODENDRONS

MANY shrubs respond well and quickly to pruning. Such plants as forsythias, privets, deutzias and lilacs will initiate shoots from below the cuts when these are made at almost any time during the growing season. The earlier the cuts are made, the more time is allowed for the new shoots to mature satisfactorily by the time cold weather occurs. The more shoots that are cut, the greater the opportunity for such plants to send out new buds. In discussing the pruning of hedges, the statement is frequently made that almost any deciduous tree or shrub can be used in hedge making (i.e. can be heavily pruned and be reasonably expected to quickly recover) if the pruning is done at the proper time and on plants that are not too old.

Two years ago, I tried pruning some old lilac plants which had grown to a single trunk at the base. Certain lilacs have shown a marked inclination to grow with a single trunk at the base, and pruning such plants heavily has presented a problem. There were 16 plants in all, each one with a single trunk nearly 6" in diameter at the base with no branches nor apparent visible buds at least eighteen inches from the ground. The plants were *Syringa vulgaris* "Ludwig Spaeth" and *S. vulgaris* "Macrostachya." These were all sawed off 12" above the ground on April 16. None had branches or externally evident buds below the cuts. Within six weeks, all but two of these stumps had sprouted (where no sprouts were superficially evident before) and at the end of the summer were growing satisfactorily. No buds, shoots or suckers came from the two stubs by August 16, and no obvious cause could be noted for the failure of these two, but the majority of the plants certainly responded favorably to this heavy pruning.

Rhododendrons do not respond to pruning as readily as deciduous plants, probably for several reasons. Gardeners in general have adopted the policy of cutting off dead or diseased wood only. However, commercial growers are familiar with the methods used in large areas of the southern Appalachian Mountains where

carloads of these plants, and mountain laurel, used to be collected and shipped for northern planting. Here the plants were periodically killed back by burning over large areas, thus forcing young growth from the base of the plants, resulting in smaller but more dense and more desirable ornamental specimens. Occasionally, commercial nurserymen prune large plants, but if the results are not satisfactory, they can afford to discard such plants in the nursery row. Experimenting with a large ornamental specimen in its permanent place in the landscape planting is quite something different. Few gardeners wish to jeopardize such plants unless they have to.

During the past few years, rhododendrons throughout the East have reacted in peculiar and often inexplicable ways. Branches and even whole plants will die in the spring for no apparent reason. Temperatures during the few winter months preceding were not subnormal. Drought conditions the preceding summer or fall may have been marked and contributed heavily to such failures among the plants. The older (and the taller) rhododendrons grow, the more difficult it is for the owners to prune them back. They visualize 10 to 15' plants literally covered with blossoms each year and fail to realize that the taller these plants grow, the more susceptible they become to all manner of ills. Most *Rhododendron catawbiense* hybrids are at their best when approximately 6' tall, and if grown taller, the branches become too heavy and easily broken, especially from winter snow and ice. *Rhododendron carolinianum* is about the same height, though often lower. Even *R. maximum* (which grows 35' tall in nature) does not thrive when grown too tall under garden conditions. Consequently, most of the commonly planted rhododendrons are at their best when they are six feet tall or less. There are taller plants, yes, but usually they are the first to suffer breakage, winter injury and to show effects from drought conditions. When this last happens, irrevocable damage has been done to the plant tissues before remedial steps can be taken.

The fifty-year-old collection in the Arnold Arboretum is no exception. To the best of my knowledge, the plants have never been "pruned" in the sense that one prunes with a definite determination to lower the height of the plants. However, the plants have suffered materially during the past few winters from drought conditions in the summer, from winter cold, and from several other things. At one time we were contemplating the repropagation of the entire collection. A few experiments were conducted at the Case Estates of the Arnold Arboretum last year on pruning rhododendrons, and the results were so favorable that this spring, the entire collection was "pruned" with the chief purpose of reducing the size of the plants, and forcing out new growth from the base of the plants and along some of the shoots. This was done in June, and the resulting growth to the present time has been excellent. These notes on pruning rhododendrons seem to be very much in order to help others who may be confronted with similar problems.

Species selected for the experiments were *R. catawbiense*, *R. maximum* and *R.*

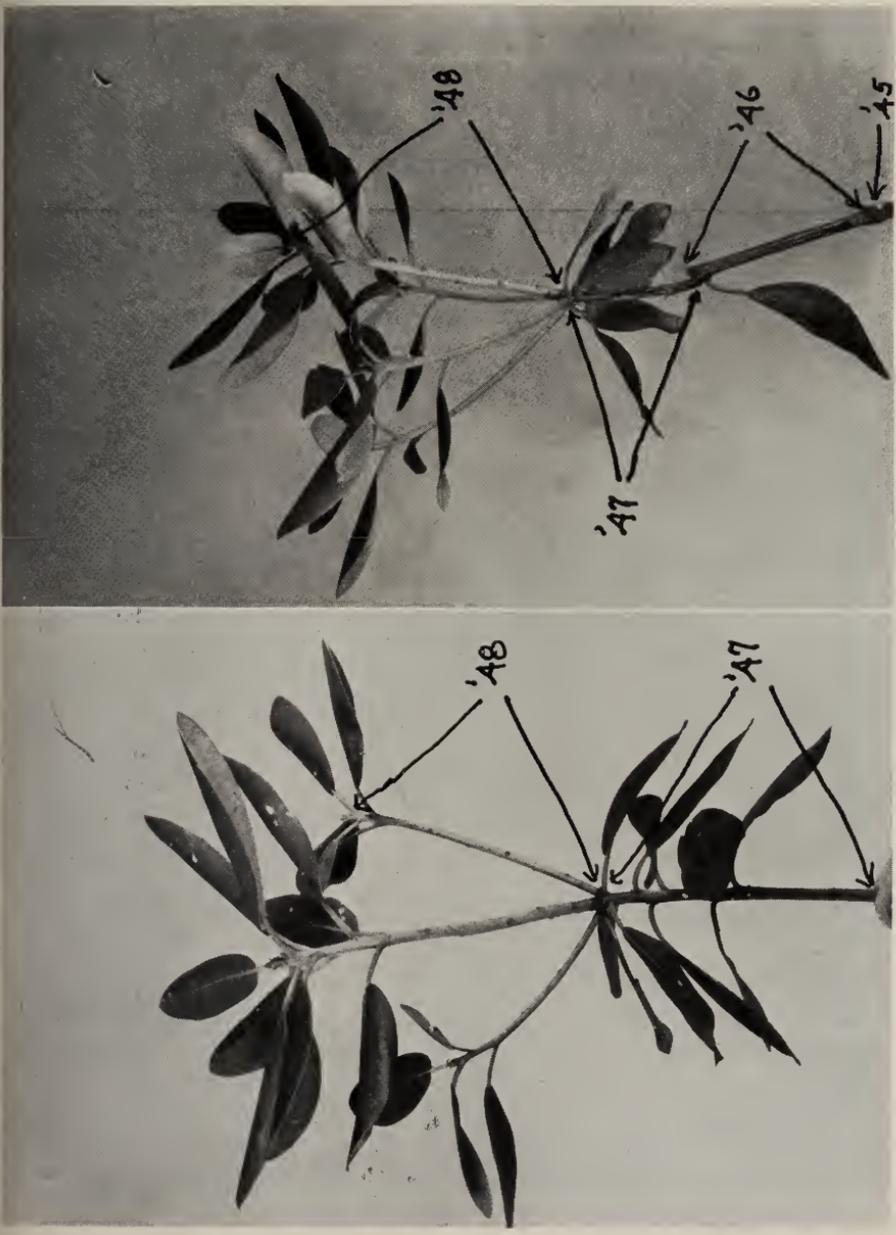


PLATE XI

(Left) Check showing normal growth of *R. catalinaense* for two years with leaves clustered at upper end of twig growth and bud scale scars at lower end. (Right) The '46 growth of this shoot was cut in June '47 with one leaf below the cut. The axillary bud grew and developed into this fine shoot.

carolinianum. On all of these the annual shoot growth was fairly clearly marked for the past six years at least. The object was to make cuts at different places on twigs of different ages and sizes and note the resulting reactions.

From the illustrations it will be noted that the annual twig growth of a rhododendron shoot consists of a part at the terminal end with leaves, and another part near the base without leaves. The leaves remain on the plant 2 to 4 years, depending on the species, possibly the variety and possibly the condition of the soil. In the axil of each leaf is a dormant bud, which remains dormant, usually, unless something happens to the above portion of the twig, when the bud may be forced into growth. These buds are potential shoots for as long as they remain on the twigs.

On the twig elongation each year, there are a few scars below the leaves (i.e. on the lower part of the twig) which look approximately like leaf scars, but lack a dormant bud. These are bud scale scars. If the cut is made so that a few leaf buds are directly below the cut, new shoots will be forthcoming from the dormant buds remaining. If the cut is made in the annual growth in such a way as to be below the dormant buds and above the bud scale scars, no buds will be formed on that year's growth, but they will be produced on the previous year's growth below the cut.

In the first experiment, pruning cuts were made on twigs of seven different ages, all on the same plant, but always at a spot where a few true leaf scars were left below the cut. This was done on each year's growth, 1947 to 1941 inclusive, on June 13, 1947. By July 15, buds were breaking immediately below each of these cuts, on the same annual growth as that cut. In other words, shoots appeared on twigs that were at least seven years old.

Other cuts were made on twigs of different ages, but with no true leaf scars below the cut for that year. In each case, it was the dormant buds in the true leaf scars of the previous year's growth which were forced into growth.

It is of interest to note that as the twig grows older, the axillary buds become less and less prominent, until after four or five years they are not recognizable as such without a lens.

In other experiments, twigs were pruned according to size with no attention given to age. For instance, some branches that were alive and in vigorous growing condition were cut off at 1" in diameter, some at $\frac{1}{2}$ ", $\frac{3}{8}$ " and $\frac{1}{4}$ ". In every case buds were appearing below the cuts within thirty days, immediately below if the cut were at the top of the annual elongation, and on the previous year's growth if the cuts were in the area of the bud scale scars. Such buds, once started, did not grow fast the first year, but only about 2". However, the second year they grew normally.

A large plant of *R. maximum* (8' tall) was selected with many shoots from the base. Half the plant was cut to within a foot of the ground, leaving 9 stubs on this side varying in diameter from $\frac{1}{2}$ " to $1\frac{1}{2}$ ". At the end of ten weeks, five



PLATE XII

(Above) The '47 growth of this was cut in June '47 below the leaves. The '47 growth died back and buds on '46 growth were forced into shoots growing in '47 and '48. No shoots at time of cut. (Below) '43 growth was cut above dormant bud, forcing dormant buds on both '42 and '43 growth. No buds apparent at time of cut.

of these stubs had formed buds and small shoots; the remainder did not.

All the shoots on one side of a vigorous plant of *R. carolinianum* (4' tall) were cut to within a foot of the ground in June, 1947, the stubs ranging from $\frac{1}{2}$ " to $\frac{3}{4}$ " in diameter. Within thirty days all the stubs were showing buds and within ninety days these had grown from 6 to 18" long, making a low dense shrub on that side of the plant.

Kalmia latifolia was cut similarly in June of 1948. These plants were much overgrown with 8' long branches and leaves only at the ends. The stubs left were 1 to 2" in diameter. Seventy-five percent of those cut showed buds and young shoots within thirty days. The same was done with 8' tall *Ilex glabra*, the stubs being 1 to 2" in diameter. At the end of the summer the plants were dense mounds of shoots 18 to 24" tall, and on their way to becoming healthy vigorous specimens once more.

The experimental laurel and rhododendron plants were growing in a shaded woods area without any particular care. The buds started to grow into shoots as soon as they appeared, but the length of this shoot growth varied from 2 to 8", depending on the size of the cut, the number of buds allowed to grow, etc. Some seemed to have a difficult time, once started, others seemed to flourish. It would seem advisable to do such pruning very early in the season to allow the maximum time for shoot elongation. The old adage about pruning spring-flowering plants after they bloom should certainly not apply to rhododendrons for the young shoots once formed need every extra day of seasonable growing weather possible.

The entire fifty-year-old collection in the Arboretum was pruned as a result of these findings. The cuts were not always made where they should have been, nor were plant responses all that might have been expected. This was mostly due to the fact that some of the plants had been allowed to become in a very poor and weakened condition.

However, the entire collection has responded remarkably well. The wet weather during June and early July, and the application of a complete fertilizer during May, did much to aid the vegetative growth. The serious drought of August may be responsible for winter injury later, but all in all, the collection is in a more apparently healthy condition than it has been in years. The plants would probably have responded even better if these pruning cuts had been made during April, rather than June.

In conclusion, rhododendrons and laurel can and should be pruned, but only when the conditions warrant it. Young growth can normally be expected on vigorous shoots, providing the pruning has been done at the right place and early in the growing season. It must be admitted that all plants, when cut to the ground, may not send up new shoots, possibly because some such plants are in an extremely weakened condition when cut. It should be pointed out that no rhododendrons should be allowed to deteriorate this far, but corrective measures should be taken (pruning, watering, fertilization and mulching) long before it becomes



PLATE XIII

(Above) *R. catawbiense* stub cut off 12" above the ground with no buds at the time of cutting in June '47. Showing buds developed and sprouts grew in '47, and both primary and secondary growth '48. No shoots at time of cuts. (Below) *Ilex glabra* stubs cut in June '48 (plants originally 8' tall) showing profuse growth developed within 60 days. No young shoots at time of cuts.

necessary to cut such plants to the ground to form entire new ones. Intelligent pruning practiced as a regular cultural operation and done at the right time and place, can do much to keep healthy plants in a healthy condition.

DONALD WYMAN

Fall Field Class

A Field Class for the study of berried shrubs, autumn coloration and evergreens as they appear in the Arnold Arboretum will be held this year. The first class will be on Saturday, October 2, at 10:00 a.m., meeting at the Forest Hills Gate. Weekly meetings will be held every Saturday morning during October, unless prevented by inclement weather, when the class will meet the next clear weekday morning. The period is two hours long, and discussions will be held about the plants as they take on their fall coloring. Members of the "Friends of the Arnold Arboretum" are welcome to attend all classes without charge. Others must register in advance by mail, and pay a registration fee of \$1.00.

The fall class is being tried this year at the request of many people who have expressed an interest in learning more about the ornamental fall characteristics of the thousands of plants growing in the Arnold Arboretum.

ARNOLDIA



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NEW OR RARE ORNAMENTAL PLANTS RECENTLY DISTRIBUTED
TO COMMERCIAL NURSERYMEN BY THE ARNOLD ARBORETUM

ONE of the functions of the Arnold Arboretum always has been to distribute new or rare ornamentals of high quality to the commercial propagators and so make them available to the plant-buying public. Many gardeners in the northern United States may not have had the opportunity to realize that the Arnold Arboretum has been doing this since it was established in 1872. Propagating material of plants not available in the trade in the form of seeds, cuttings, scions and budwood is frequently given commercial nurserymen who request specific items. Eight years ago a special program for the distribution of new or rare plants was started, and over 60 species and varieties of new or rare ornamental woody plants have been distributed to commercial sources as a result. It is always easy to lose sight of the fact that new plants are being made available to commercial sources (especially when no extensive advertising accompanies the program!). In 1941 a general program of propagation was started at the Arnold Arboretum in which particular new or rare ornamental woody plants were specifically grown for the nurseryman.

Our experience had shown (see ARNOLDIA, Series 4, Vol. VIII, No. 3, May 1940) that seeds, buds, cuttings and scions when given to nurserymen frequently "failed" for several reasons. As a result, rare specimens in the Arboretum were being heavily cut in order to provide commercial growers with propagating material. Too often young plants propagated by nurserymen from such material, easily obtained, were quickly sold or forgotten, and requests were repeatedly made to the Arnold Arboretum for more propagating material.

As a result of years of experience, it was decided to actually grow plants here in the Arboretum, and to offer these to the commercial growers under the agreement with the Arboretum that such plants could neither be sold nor patented, but could be used for propagating purposes by the nurseryman receiving them.

Arnold Arboretum is about sixty feet tall with an approximate twelve-foot spread of the branches. It is an easily-propagated, fast-growing maple which is valued for its columnar to narrow-pyramidal habit.

Acer saccharum monumentale - 50'+ In Arnold Arboretum since 1885
Distributed many times and in 1943 19, 21, 22, 23, 25

A slender, slower-growing form of the sugar maple which is dignified by the common name, "Sentry Maple." We have had many demands for this tree during the past thirty years because of its narrow, upright habit, and are now about to stop sending out large amounts of propagating material.

***Albizia julibrissin rosea** - small tree First introduced 1918
Distributed many times and 1948 4, 11, 13, 18, 19, 21, 25, 27, 29, 31

This variety, introduced into the United States by the Arnold Arboretum about 1918, is more hardy than the species, and does well in Boston except in the most severe winters. Seedlings twelve to eighteen inches tall were available for trial. The hardiness of these seedlings is still questionable, but all seed came from the original plant that has been growing here since 1918. Seedlings should be worthy of trial, but need further protection during the first few winters in the north. Seed is the best method of propagation at present, but root cuttings are worthy of a trial.

***Berberis triacanthophora** - 4' First introduced 1908
Distributed many times and 1941 2, 17, 19, 22, 23, 25, 27

This is the hardiest and most useful of the evergreen barberries and the most attractive. The narrow leaves are a clear, bright green in color, and it is one of the few evergreen barberries which are immune or highly resistant to the wheat rust. As a result of this immunity, the Plant Quarantine Act allows for its purchase and sale by nurserymen in the United States. It is easily propagated by cuttings.

Carpinus betulus compacta - small tree In the Arnold Arboretum since 1922
Distributed 1942 11, 14, 17, 18, 19, 21, 22, 25

Here is a shrub with all the good qualities of *Carpinus betulus*. In addition, it is densely compact, slow in growth, and gives the appearance of being clipped. This plant is hardy in Zone 5, and is chiefly propagated by grafting.

***Celastrus flagellaris** - Vine First introduced 1905
Distributed 1942 4, 17, 18, 19, 20, 21, 22, 25

The bittersweet is the only one of those hardy in this area to have thorns. The thorns, however, are only about $\frac{1}{4}$ " long. We offered plants of the fruiting form (pistillate). This plant does not grow as fast as the other bittersweets,

but it does make a good ground-cover, and it forms a dense, impenetrable mass of vines and foliage when grown over a low fence. Cuttings are the best method of propagation.

****Celastrus orbiculata major* - Vine** First introduced 1920

Distributed 1942 4, 17, 18, 19, 20, 21, 22, 23, 25

Plants of the fruiting or pistillate form of this variety were offered which had fruits nearly twice the size of the species. The Arnold Arboretum introduced this plant into the United States from China. This excellent vine is perfectly hardy and is easily propagated by cuttings.

***Clethra barbinervis* - 30'** In the Arnold Arboretum since 1886

Distributed 1941 2, 17, 19, 22, 23, 27

This shrub can be classed as picturesque because of its reddish bark which flakes off almost as much as the bark of *Acer griseum*. The flowers are fragrant, and the shrub sometimes reaches a height of twenty-five feet. Propagation is by cuttings and seed.

****Corylopsis platypetala* - 10'** First introduced in 1908

Distributed 1941 8, 17

This shrub is only hardy south and west of Philadelphia. It is propagated by seed.

****Cytisus praecox* - 4-6'** First introduced 1924

Distributed many times and in 1942, 1943 4, 11, 17, 18, 19, 20, 21, 22, 23, 25
When we first offered this plant for distribution, it was being sold only by two or three nurseries in the country. Last summer we had unusual success with an experiment in the propagation of this species, and we are therefore offering it again. Two series of cuttings were run, one with every care and moisture consideration a cutting required, and the other simply on an open greenhouse bench in the hot sun, where the rooting medium frequently dried out. The rooting of the "checks" on the dry greenhouse bench was nearly one hundred per cent, and so this can be recommended as the best practice. When something is as easily propagated as this, it should become popular. You will remember that the Warminster Broom is noted for its pale lemon-yellow flowers which are prolifically produced in May, and for its colorful twigs which are green all winter long. It is one of the hardiest brooms in the Arnold Arboretum collections, and it will recover quickly from heavy pruning.

***Cytisus purpureus* - 1-2'** In the Arnold Arboretum since 1878

Distributed 1942 4, 11, 17, 18, 19, 21, 22, 25, 27

This broom is a decided asset in any rock garden or in a foundation planting



PLATE XIV

Hardy form of the silk tree (*Albizia julibrissin rosea*); close-up of flowers and the tree itself as it blooms throughout the summer in the Arnold Arboretum.

where a low flowering plant can be used. It is not much over a foot high and has large purple and white flowers in May. It is perfectly hardy in this area and is propagated by cuttings.

***Deutzia candelabrum** First introduced 1908
 Distributed 1943 4, 17, 18, 19, 21, 22, 23

***Deutzia "Contraste"** First introduced 1932
 Distributed 1943 4, 17, 18, 19, 21, 23

***Deutzia "Magicien"** First introduced 1932
 Distributed 1943 4, 8, 17, 18, 19, 21, 22, 23

Deutzia rosea eximea
 Distributed 1943 4, 17, 19, 21, 22, 23

These Deutzias might well be considered as a group. None of them are any hardier than the "Pride of Rochester" group. All are slightly taller than *D. gracilis*. *D. candelabrum* and *D. rosea eximia* bloom at the same time as *D. gracilis* and the other two bloom about a week later. In the large collection of Deutzias at the Arnold Arboretum, these four and *D. gracilis* are the most outstanding in flower. The flowers are all single and all but those of *D. candelabrum* are slightly pink. *D. candelabrum* has the largest flower clusters of this group. My suggestion would be, if you are interested in Deutzias other than those you now carry, to try out all four and make your own selection for propagating from this group, after you have observed them in flower.

***Forthysia "Arnold Dwarf" - 2'** Originated in the Arnold Arboretum 1942
 Distributed 1946 and 1948 10, 13, 17, 19, 21, 25, 26, 29, 30

Forsythia intermedia × *japonica* "Arnold Dwarf" is a small dwarf forsythia, developed by the Arnold Arboretum, which should be of value as a border plant or as a ground cover. The original plant in the Arnold Arboretum nursery is about two feet tall and it had a spread of over seven feet at the age of six years. The drooping branches strike root readily and form a mat of foliage. The leaves are small, about an inch long, and are ovate or ovate-lanceolate with serrated margins, sometimes pinnatifid. Unfortunately this dwarf forsythia has not flowered even after eight seasons of growth and we are not sure that it will flower. Even without flowers, its vegetative habit is so attractive that it should be of value for certain types of planting.

***Ilex yunnanensis - 12'** First established in 1929
 Distributed several times and 1942 11, 17, 18, 19, 21, 22, 27

This holly is evergreen even in New England. It has red berries and small



PLATE XV

Prunus "Hally Jolivette," conspicuous for its double white flowers opening during a several-weeks period in early May.

leaves similar to those of *Ilex crenata convexa* or boxwood. Plants of the pistillate form were offered and fruiting is obtained when pollen from other species is available. The pollen requirements of this form have not been worked out definitely, as yet, to insure fruiting, but it is hoped that we will be able to have staminate plants of the same species available in a few years. It is propagated by cuttings.

***Kalopanax pictus** - Tree 75' First introduced in 1892
Distributed many times and 1948 3, 16, 17, 22, 25, 26, 31

Although this tree has been growing in the Arnold Arboretum since 1892, it has been a neglected ornamental. One reason for this may be that it is difficult to propagate and the seeds take two years to germinate. It is a tree of striking tropical appearance, with large five-to-seven lobed leaves, sometimes fourteen inches across. Thorns are present on the young plants, and the flowers and fruits are akin to those of the Aralias. This plant is reported to be propagated by root cuttings as well as by seeds.

Laburnum alpinum - 30' In the Arnold Arboretum since 1874
Distributed many times and 1942 12, 17, 21, 23, 27

This species is considerably hardier than *L. vulgare*, and is, in fact, the hardiest of all the Laburnums. In addition, the flower clusters are longer than those of *L. vulgare*. It may be propagated by grafting, or by seed.

Ligustrum vicaryi - 6'? In the Arnold Arboretum since 1933
Distributed 1948 4, 10, 17, 18, 19, 21, 25, 27, 30

This privet probably originated some time before 1920 in the garden of Vicary Gibbs of Aldenham, Middlesex, England. It has been growing in the Arnold Arboretum since 1933, when it was obtained from the New York Botanical Garden. Its chief ornamental characteristic is its yellow foliage which remains a good yellow throughout the spring and summer, especially when grown in the full sun. In partial shade this coloring is not so pronounced. It is probably a cross between *L. ovalifolium aureum* and *L. vulgare*. The weaker and shaded leaves are fully green. If a bright yellow-leaved privet is desired for its color in the full sun throughout the growing season, this is it. Easily propagated by cuttings.

Ligustrum vulgare pyramidale - 8' In the Arnold Arboretum since 1888
Distributed many times and 1941, 1942, 1946 17, 18, 21, 22, 25, 27

This is an unusual dense privet of narrow pyramidal habit, which is of considerable value from the standpoint of its form. Being a variety of *L. vulgare*, however, it is susceptible to the same serious twig blight, and should be grown only in areas where this disease does not prove serious. It is easily propagated by cuttings.



Interesting bark of the true Chinese elm,



PLATE XVI

The fruit of *Celastrus orbiculata* compared with the



PLATE XVII

Malus "Dorothea," a new crabapple noted for large semi-double pink flowers which do not fade, and brilliant yellow fruits.

the former somewhat, and the fruits, the latter. The original plant and plants grafted from it have bloomed very well. Flowers are semi-double (eleven to sixteen petals) $1\frac{5}{8}$ " to 2" in diameter, and a pale crimson or Tyrian Rose (22/1 to 24/2 of the British Horticultural Colour Chart) with darker buds. The flowers do not fade white. This is one of the very few crab apples with semi-double flowers which also bear fruit, in this case $\frac{1}{2}$ " in diameter and a golden-yellow when exposed to direct sun. This combination of large semi-double pink flowers, followed by colorful fruits, is rare among the ornamental crab apples and should make this one of the best for two seasons of interest. It is named for the eldest daughter of Dr. Donald Wyman who originally found it growing in the Arboretum.

***Malus "Katherine"** - 15-20'?

First introduced 1943

Distributed 1948 1, 2, 3, 4, 10, 13, 16, 18, 19, 25, 26, 27, 30, 31, 32

This is a seedling which was found growing in Durand Eastman Park, Rochester, New York, and named in 1943 by Dr. Donald Wyman. The double flowers are over two inches in diameter, with nearly twenty petals. The flower buds are deep pink and the flowers gradually fade white. Even though the flowers are double, they are followed by small red fruits, making this double-flowered crab apple one of the best of its kind. It is propagated by budding and grafting.

***Malus "Prince Georges"** - 15-20'?

First introduced 1943

Distributed 1948 1, 3, 4, 13, 16, 18, 21, 25, 30, 31

Originating in the form of seed in the Arnold Arboretum in 1919, this is probably a hybrid between *M. ioensis plena* and *M. angustifolia*. The flowers are very double, two inches in diameter, and light pink. Blooming at the same time as *M. ioensis plena*, the flowers have more petals, and the leaves are narrower. It was originally grown by the Glenn Dale Station of the U.S.D.A. Division of Plant Introduction and it is named for the county in Maryland in which the Station is situated.

Philadelphus grandiflorus - 9'

Distributed 1941 17, 22, 23, 25

This is one of the best of the native mockoranges from the standpoint of habit. It grows about six to twelve feet high and has drooping branches which face well to the ground on all sides. The flowers are $1\frac{1}{2}$ " in diameter, slightly square in shape and are not particularly fragrant. The shrub is perfectly hardy and is easily propagated by cuttings.

Philadelphus inodorus - 6-8'

Distributed 1943 19, 20, 21, 22, 23, 25

The flowers of this native mockorange are single, 2" in diameter, and borne in



PLATE XVIII

Malus "Katherine," also noted for double white flowers, followed by a wealth of small red fruits.

groups of one to three. They are pure white, but not very fragrant. What makes this one of the outstanding mockoranges in our collection of about 100 different kinds is its lustrous dark green foliage and its arching branches which face the ground on all sides, something which is not found in most *Philadelphus* species. The habit of growth makes up for the lack of fragrance in the flowers. When habit of growth is more important than flower production alone, *P. inodorus* could well be used.

Philadelphus splendens - 6'

Distributed 1941, 1948 2, 3, 16, 17, 18, 21, 22, 23, 25, 27, 30, 31, 32

Another excellent native mockorange from the standpoint of habit, a hybrid between two American types. Its excellent rounded habit of growth makes it a far better lawn specimen than either *P. coronarius* or *P. virginalis*. The flowers are not so square in shape as those of *P. grandiflorus* and it is easily propagated by cuttings.

***Populus maximowiczii** - 90'

First introduced 1878

Distributed many times and 1942 14, 17, 18, 22, 23

This tree is one of the handsomest of the poplars. It is hardy in New England, is a vigorous grower, and has leaves which are a dull dark green above and whitish beneath. Propagated by hardwood cuttings.

***Prinsepia sinensis** - 10'

First introduced 1903

Distributed many times and 1941, 1946 3, 4, 5, 17, 21, 22

This shrub is particularly thorny and it has considerable merit as a tall, dense, spiny barrier plant. The flowers are small and yellow and they appear very early in the spring. The leaf buds begin to open sooner than practically anything else. It is propagated by seed and possibly by cuttings.

***Prunus "Hally Jolivette"** - 15'

Originated 1941

Distributed 1948 3, 11, 13, 17, 18, 19, 21, 22, 25, 29, 30, 31, 32

This is an ornamental cherry of the *Prunus subhirtella* type which was originated and first introduced by the Arnold Arboretum in the spring of 1948. It is a small, graceful tree with semi-double flowers which are a delicate pink when first open and white when fully open. The continuous succession of bloom is distributed over a ten-day period to several weeks, depending on the season, and the plants begin to bloom when only two years old. This hybrid is a cross of *P. subhirtella* × *yedoensis* back-crossed with *P. subhirtella*. Dr. Karl Sax, who produced this hybrid, has given it the maiden name of his wife, "Hally Jolivette," the translation of the French name meaning "pretty little one."

***Sambucus canadensis maxima** - 8'

First introduced 1908

Distributed many times and 1943 18, 20, 21, 22, 23

This is the largest flowering and fruiting variety of the species. When properly grown, the flower clusters are over twelve inches in diameter. This variety might well replace the species which is grown from seed in most nurseries. Easily propagated by cuttings.

Symphoricarpos orbiculatus leucocarpus - 3'

Distributed 1942 17, 18, 21, 22, 25

This native plant is comparatively new and is only listed by one or two nursery-men. It is similar to the coralberry, except that the fruits are white and not red.

***Syringa vulgaris "Congo"** - 15'

First introduced in 1900

Distributed many times and 1942 17, 19, 21, 22, 25, 27

This is an old favorite, originating in the Lemoine Nurseries in France in 1896, and one of the best of the dark purples.

Syringa "Evangeline" - 20'

In Arnold Arboretum since 1936

Distributed 1942 4, 8, 17, 18, 19, 21, 22, 23, 25, 27

F. L. Skinner originated this plant in 1935. It is a cross between *S. vulgaris* and *S. oblata dilatata*.

Syringa josiflexa "Guinevere" - 20'

In Arnold Arboretum since 1935

Distributed 1942 4, 8, 17, 18, 19, 21, 22, 23, 25, 27

This is one of the newer lilacs which rates with the best and was originated by Miss Isabella Preston of Ottawa, Canada. It is a cross between *S. josikaea* and *S. reflexa*, and it blooms with the *S. prestoniae* types.

Syringa "Hedin" - 20'

In Arnold Arboretum since 1936

Distributed 1942 4, 8, 17, 18, 19, 21, 22, 23, 27

This is a cross between *S. villosa* and *S. szeginzowii*, and it was originated by F. L. Skinner of Manitoba, Canada, before 1936.

Syringa "Mrs. W. E. Marshall"

Distributed 1941 4, 17, 18, 19, 22, 23, 25, 27

This is one of the darkest purples of all the *Syringa vulgaris* hybrids and was originated by Mr. T. A. Havemeyer of Glen Head, Long Island, in 1924. It is easily propagated by softwood cuttings immediately after flowering.

Syringa laciniata - 6' (formerly *S. persica laciniata*) In Arnold Arboretum since 1881

Distributed many times and 1941 4, 17, 18, 19, 22, 23, 25, 27

The arching branches and the small, deeply-cut leaves of this plant probably make it the most graceful of all the lilacs. The foliage gives it particular merit.

It is rather difficult to propagate, but softwood cuttings and "Rootone" give fair success, and it comes fairly well from seed.

Syringa prestoniae hybrids - 20'

Here are some of the best of Miss Isabella Preston's lilacs with several of the introductions of F. L. Skinner in Manitoba, Canada. Several are listed, but note the way they compare with each other. All, of course, are late-blooming, appearing a week or so after the *S. vulgaris* hybrids, and all are very hardy, even more hardy than many *S. vulgaris* hybrids. These plants must be tried out in a number of places in order to find which are best. Those nurserymen who are interested in them should try a few and see which do best under their own conditions. (For more complete information see ARNOLDIA, Vol. VIII, No. 7, 29-36, July 23, 1948.)

"Handel" originated by F. L. Skinner in 1932; in Arnold Arboretum since 1936

Distributed 1942, 1943 4, 8, 17, 18, 21, 22, 23, 25, 27

"Hecla" originated by F. L. Skinner 1932; in Arnold Arboretum since 1936

Distributed 1942 4, 17, 18, 21, 22, 23, 27

"Isabella" originated by Miss Isabella Preston, Ottawa, Canada, before 1927; in Arnold Arboretum since 1935

Distributed 1942, 1943 4, 8, 17, 18, 19, 21, 22, 23, 25, 27

"Nerissa" originated by Miss Isabella Preston; in Arnold Arboretum since 1938

Distributed 1942 4, 17, 18, 21, 22, 23, 27

"Octavia" originated by Miss Isabella Preston; in Arnold Arboretum since 1938

Distributed 1942 4, 17, 18, 21, 22, 23, 27

"Paulina" originated by Miss Isabella Preston; in Arnold Arboretum since 1938

Distributed 1942 4, 17, 18, 21, 22, 27

***Syringa pubescens - 20'**

First introduced 1882

Distributed many times and 1942 4, 18, 19, 21, 22, 23, 25, 27

This is the most fragrant of all the lilacs and the color varies from pink to white. It is not outstanding in flower and is valued only for its fragrance. It is not new, but it is rather hard to find in nursery catalogues.

***Syringa swegiflexa - 20'**

First introduced 1936

Distributed 1942 4, 17, 18, 21, 22, 23, 27



PLATE XIX

Upper: *Viburnum dilatatum xanthocarpum*. Lower: *Viburnum setigerum aurantiacum*.

This is a cross between *S. sweginzowi* and *S. reflexa*, originating in the German Nursery of H. A. Hesse before 1935. The panicle of bloom is 8' tall by 6" wide at the base, pyramidal in shape, and loose and open in growth. The flowers are a deeper pink than those of "Isabella" but soon fade white. It does not have the purple tinge that most *S. prestoniae* types have, and for this reason the color is good, but the loose panicles of bloom may be too much of a deterrent. It certainly is worth a trial.

Taxus cuspidata aurescens - 2' In the Arnold Arboretum since 1919

Distributed many times and 1943 17, 20, 21, 22, 23, 24

This yew is of value because it is very low, not over 1½' tall. The tips of the branches and their foliage are a golden yellow in the spring and early summer, changing to yellowish during late summer and continuing this color throughout the winter.

Taxus cuspidata expansa

Distributed 1943 4, 17, 18, 19, 21, 22, 23, 24, 25

Many nurserymen do not realize that *T. cuspidata* is normally a single trunk tree! This variety is the typical vase-shape so frequently sought as an ornamental.

Ulmus parvifolia - 50'+ In the Arnold Arboretum since 1884

Distributed many times and 1946 1, 2, 5, 17, 19, 21, 25

This is a small tree about 50' tall with a broad, round head. It is the true Chinese elm and is one of the few elms to color red to purplish in the fall. Older trees are particularly outstanding for their mottled bark. It is also far less susceptible to attacks of the Japanese beetle than is *Ulmus pumila*. Like *Ulmus pumila*, it is fast-growing and has weak wood, but because of its autumn color and mottled bark may be of more ornamental value than is generally recognized at present. It is easily propagated by seeds or cuttings.

Viburnum dilatatum xanthocarpum - 9' In the Arnold Arboretum since 1919

Distributed several times and 1941 2, 4, 8, 17, 19, 22, 25

This shrub is similar to *V. dilatatum* except that it has yellow fruits.

Viburnum fragrans - 9' In the Arnold Arboretum since 1920

Distributed 1941, 1942 4, 11, 12, 17

This is the earliest of the Viburnums to bloom. The plant itself is perfectly hardy north of New York, but the flower buds appear so early in the spring that in the vicinity of Boston they are frequently killed entirely by cold weather. The flowers are somewhat similar to those of *V. carlesii*, though not as good. Propagation is by cuttings.

Viburnum opulus xanthocarpum - 12' In the Arnold Arboretum since 1898

Distributed many times and 1943, 1948 3, 4, 10, 16, 17, 19, 21, 22,
25, 26, 27, 29, 31

This shrub is similar to *V. opulus* except that the fruit is a golden yellow. Although we have offered it for distribution several times, it still is not grown as much for landscape work as it should be. It is easily propagated by cuttings, and both it and *V. dilatatum xanthocarpum* add considerably to any situation in the fall because of their colored fruits.

***Viburnum sargentii flavum** - 10' First introduced 1904

Distributed 1948 3, 4, 16, 17, 18, 19, 29, 30, 31

The yellow-fruited Sargent viburnum is still very rare. Its golden-yellow fruit is its chief ornamental characteristic. As a result of a five-year experiment, I have found that, although the seeds will not yield 100% yellow-fruited plants, nevertheless the plants can be segregated as one or two-year seedlings according to the color of the leaf petiole. Red petioled leaves are borne on plants which later on will produce red fruits, and yellow or greenish-yellow petioled leaves are only borne on plants which later will produce yellow fruits. This is an accurate means of differentiation in the seed bed years before fruit is borne.

***Viburnum setigerum aurantiacum** - 12' First introduced 1908

Distributed many times and 1941 4, 8, 17, 18, 19, 22, 23, 25, 27

This is of considerable merit because of its reddish-orange fleshy fruits. It is easily propagated by cuttings. All of the viburnums on this list add materially to the color range of this group in the fall.

***Weigela "Bouquet Rose"** - 8' First introduced 1913

Distributed several times and 1943 4, 8, 11, 17, 18, 19, 21, 22, 23, 24

The flower of this weigela is about the same size as that of *W. "Gracieux"* but it is a pale pink, making it one of the best of the hybrids growing in our collection from the standpoint of conspicuous color.

***Weigela "Gracieux"** - 8' First introduced 1905

Distributed several times and 1943 4, 8, 17, 18, 19, 20, 21, 22, 23, 24

The flowers of this variety are white on the inside of the corolla and are streaked with purplish-pink on the outside. They are $1\frac{1}{4}$ " in diameter. This and *W. "Bouquet Rose"* are among what might be considered the best of the French hybrids and might well be compared with varieties grown commercially.

DONALD WYMAN

List of Cooperating Nurserymen

(Those nurserymen receiving the plants listed from the Arnold Arboretum have been listed according to number under each plant.)

1. Adams Nursery, Inc., Westfield, Mass.
2. Armstrong Nurseries, Ontario, Calif.
3. Bay State Nurseries, North Abington, Mass.
4. Bobbink & Atkins, East Rutherford, N. J.
5. Bristol Nurseries, Inc., Bristol, Conn.
6. C. R. Burr & Co., Manchester, Conn.
7. California Nursery Co., Niles, Calif.
8. W. B. Clarke & Co., San Jose, Calif.
9. Cole Nursery Co., Painesville, Ohio
10. F & F Nurseries, Springfield, N. J.
11. Fruitland Nurseries, Augusta, Ga.
12. Glen St. Mary Nursery, Glen St. Mary, Fla.
13. Hicks Nursery Co., Westbury, Long Island, N. Y.
14. Hill Nursery Co., Dundee, Ill.
15. Hillier & Sons, Winchester, England
16. Jackson & Perkins Nursery Co., Newark, N. Y.
17. Kingsville Nurseries, Inc., Kingsville, Md.
18. Henry Kohankie & Son, Painesville, Ohio
19. Littlefield-Wyman Nurseries, Abington, Mass.
20. Manitoba Hardy Plant Nursery, Dropmore, Manitoba, Canada
21. Princeton Nurseries, Princeton, N. J.
22. Rare Plants Nursery, Linwood, N. Y.
23. Rockmont Nursery, P.O. Box 266, Boulder, Colo.
24. Sherwood Nurseries, 141 S. E. 65th Ave., Portland, Oregon
25. Siebenthaler Co., Catalpa Drive, Dayton, Ohio
26. Snyder Bros., Inc., Center Point, Iowa (now called *Linn County Nurseries*)
27. Upper Bank Nurseries, Media, Pa.
28. Verhalen Nursery Co., Scottsville, Texas
29. Verkade's Nurseries, Wayne, N. J.
30. Wayside Garden Co., Mentor, Ohio
31. Weston Nurseries, Weston, Mass.
32. Wyman's Framingham Nurseries, Framingham, Mass.

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