



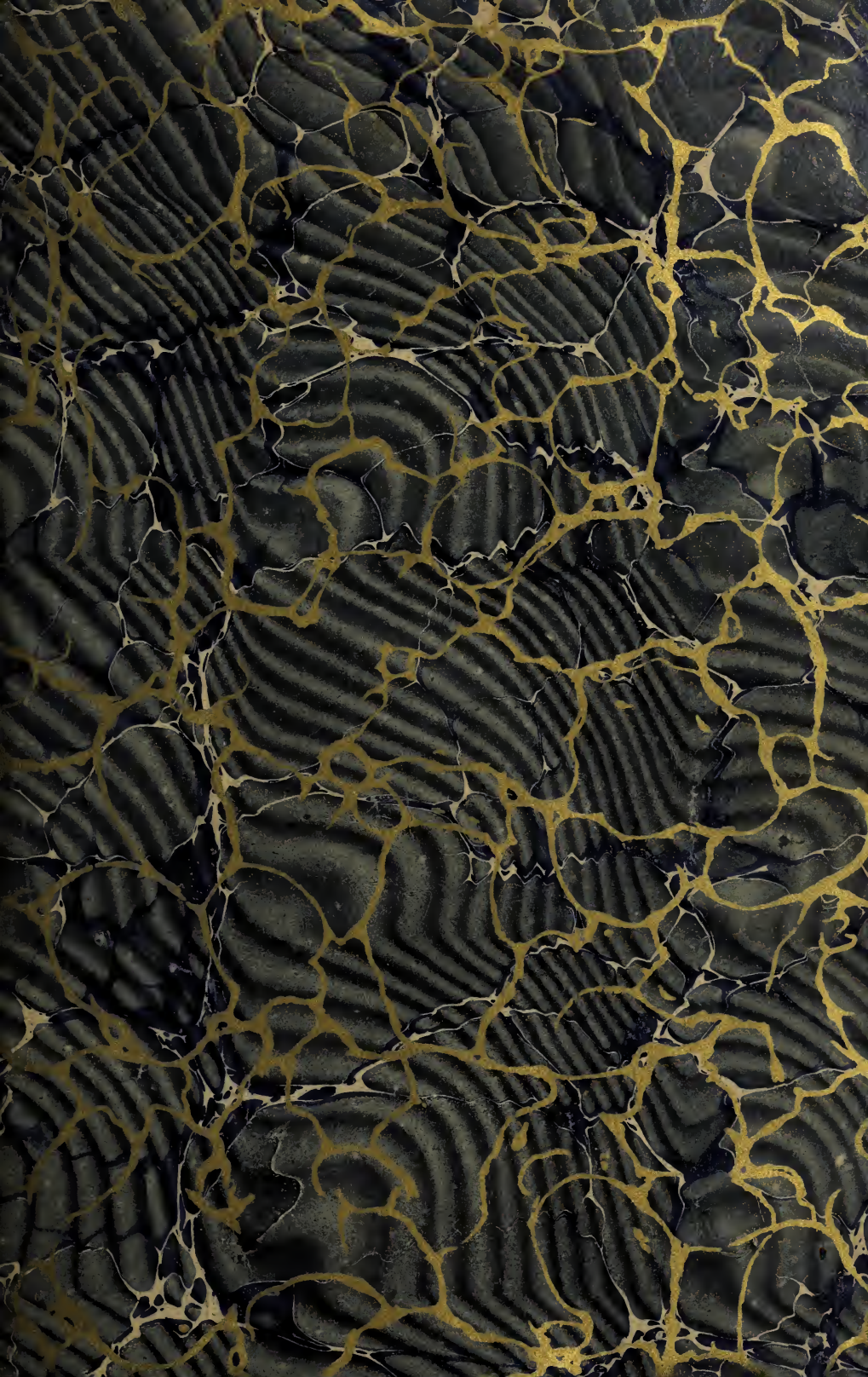
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ARNOLD ARBORETUM

HARVARD UNIVERSITY



BULLETIN

OF

POPULAR INFORMATION

JAMAICA PLAIN, MASS.

APRIL 11, 1921

An early spring. An unusually mild winter during which a temperature of zero was recorded only twice at the Arboretum, followed by a March with a temperature of 80° on two days, and an unprecedented high average for the month, has caused many plants to flower earlier than they have flowered here before. On March 21 *Cornus mas*, *Dirca palustris*, *Prunus Davidiana* and *Acer rubrum* were in full flower. *Rhododendron dahuricum* and *R. mucronulatum* were opening their first buds, and on March 26 the first flowers on several of the Forsythias and on *Magnolia stellata* had opened, several Currants and Gooseberries were in bloom, and *Corylopsis Gotoana* was opening its innumerable flower-buds. The Silver Maple (*Acer saccharinum*) had flowered on the 9th of March, only eight days earlier than in 1920, although in the severe winter of 1918-19 it was in bloom in the Arboretum on the 28th of February. In earlier years *Cornus mas* has flowered usually as early as April 3 and as late as April 25. In the six years from 1914-1920 *Dirca palustris* which, with the exception of two or three Willows, is the first North American shrub to bloom in the Arboretum, began to flower as early as April 3 and as late as April 15.

The fact that the winter flowering Witch Hazels bloom later in mild winters than they do in exceptionally cold winters is not easy to explain. In the cold winter of 1915-16, and 1918-19, *Hamamelis mollis* was in full flower on January 26 and February 9. In 1916 *Hamamelis japonica* was in flower on January 26 and in 1919 the flowers were fully open during the first week in February. This year the flowers on these two plants did not open until the first week of March. On

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March 28 the thermometer fell from 78° at noon to 18° during the following night, and many flowers were injured or destroyed.

This unusual spring has made it possible to obtain some useful conclusions on the value in this climate of some of the early-flowering trees and shrubs. It has again shown that the flowers most easily injured by spring frosts are those of the Magnolias, and especially of *Magnolia stellata*, and of the earliest flowering Rhododendrons. This year only a few of the Magnolia buds had opened and the plants on the 6th of April are well covered with flowers which, although perhaps rather smaller than usual, are not discolored. Every flower and flower-bud on every plant of *Rhododendron dahuricum* has been killed, and the first flowers of *R. mucronulatum* are ruined. The flowers of *Dirca palustris* have been injured and those of *Corylopsis Gotoana* have been killed. Not more than one per cent. of the flowers of the Asiatic Forsythias and their hybrids have been injured, and the damage is so small that the general appearance of the plants is not affected by it. On the European species a larger percentage of buds has been injured. The flowers of *Cornus mas*, the Cornelian Cherry, were not injured by the sudden change of temperature and the trees in the Arboretum have not before been more thickly covered with their clusters of bright yellow flowers. The fact that severe spring frosts do not injure the flowers of this Cornel greatly adds to its value for the decoration of parks and gardens in regions with an uncertain spring climate.

The **Cornelian Cherry** is a native of southern Europe, and western Asia and Siberia, and is a large, shapely shrub ten or twelve feet high and broad, or if pruned when young to a single stem a tree with a short trunk and wide-spreading branches. The flowers are pale yellow, and are borne in compact clusters in the axils of the unfolding leaves, and although individually small are produced in such profusion that they cover the branches. The leaves, which are large and dark green, are handsome but fall in the autumn, like those of many other European trees and shrubs, without change of color. The fruit is of the shape and size of a small olive, and is bright scarlet and lustrous. Plants said to be of a yellow-fruited form have been planted several times in the Arboretum but the fruit has always been scarlet. The flesh of the fruit is sweet, of a rather agreeable flavor, and in Europe is sometimes made into a preserve. For regions too cold for the successful cultivation of the Forsythias the Cornelian Cherry is the handsomest of early flowering shrubs with yellow flowers. In its native countries it often grows in calcareous soil and should, therefore, prove valuable in the middle western states. A hundred years ago when the number of handsome plants available for American gardens was not as large as it is today the Cornelian Cherry was more often planted here than it is now, and it is doubtful if it can now be found in many American nurseries. Few exotic shrubs, nevertheless, are better worth the attention of northern nurserymen.

Forsythias. In spite of the loss of a few of their expanding flower-buds the Asiatic Forsythias have not often been in better bloom in the Arboretum, for the cold of severe winters like those of 1915 and 1916 too often kills the flower-buds. None of the newly discovered Asiatic

species are as handsome garden plants as some of the hybrids between the Chinese *F. suspensa Fortunei* and *F. viridissima*, to which the general name of *Forsythia intermedia* has been given. The best of these, the var. *spectabilis*, is the handsomest Forsythia which has yet been seen in the Arboretum. The flowers are larger and more abundant than those of either of its parents, and of a deeper color. Other distinct and handsome forms are var. *primulina* and var. *pallida*. The former, which appeared as a seedling in the Arboretum a few years ago, has primrose colored flowers; the flowers of the latter are pale straw color and paler than those of other Forsythias. Forsythias are often badly planted; they require space in which to spread their long gracefully arching branches and are not suitable for small gardens. To be most effective they should be planted as in the Arboretum, in a great mass on a bank or hillside. A Forsythia should never be planted nearer than ten or twelve feet to a road or path, for if there is not enough room between path and plant for its natural growth the side branches must be cut away and an ugly, awkward, bare-stemmed specimen will be left. In suburban gardens in which the care of plants is usually left to the mercy of the jobbing gardener, the branches of Forsythias and of many other shrubs are often cut back in winter or early spring. This destroys the beauty of the plants, and as Forsythias produce their flowers on the branches of the previous year most of the flowers are sacrificed. If a Forsythia must be pruned it should be done just after the plant has flowered, and the oldest stems and branches should be entirely removed that younger ones may grow naturally.

Asiatic Cherries. Like other plants these Cherries are flowering this year from three to four weeks before their normal time. The flowers of the earliest Cherry, *Prunus tomentosa*, were fully open on the 6th of this month. It is a native of northern China and a shrub only five or six feet high, and when it has not been crowded sometimes ten or fifteen feet in diameter. The flowers open from pink buds as the leaves unfold and the bright red stalk and calyx make a handsome contrast with the white petals. The small fruit ripens in June and is scarlet, covered with short hairs and of a pleasant flavor. This Cherry was first raised by the Arboretum nearly forty years ago and there are a few large plants in the Boston parks, but in spite of its beauty and handsome flowers it has not yet caught the popular fancy. As a fruit plant it has received attention in Manitoba and the Dakotas where it has proved hardy and promises to be valuable. The variety from western China (var. *endotricha*) flowers a few days later.

Prunus subhirtella opened its first flowers on April 7, and unless the buds are injured by cold it will be in full bloom when this Bulletin reaches its eastern Massachusetts readers. This is the "Japanese Spring Cherry" which has been described by a traveller in Japan who has made an exhaustive study of its Cherry-trees as "the most floriferous and perhaps the most delightful of all Japanese Cherries." When its branches are covered with its pink drooping flowers no other large shrub or small tree which can be grown in northern gardens is more beautiful; and the flowering of the "Japanese Spring Cherry" is one of the great events of the Arboretum year; and this spring the trees

promise to be more beautiful than ever before. Unfortunately *Prunus subhirtella* is still rare in gardens. It is not known as a wild plant, and its seeds produce plants of the type of which it is a form, a tall tree of the Japanese forests known as *Prunus subhirtella* var. *ascendens*, a much less desirable garden plant. *Prunus subhirtella* therefore can be increased only by cuttings or by grafting it on its own seedlings. The Sargent Cherry (*Prunus serrulata* var. *sachalinensis*), for the first time since the trees in the Arboretum were old enough to flower, has not many flowers this spring except on the upper branches, but the Yoshino (*Prunus yeddoensis*), which often loses its flower-buds from extreme cold, promises an unusual bloom this year, as does the white-flowered *Prunus incisa*, one of the best of the recent additions to the Arboretum Cherry Collection.

Several Apricots were in full bloom on April 6. The most conspicuous were a Japanese form of *Prunus Armeniaca*, known as "Mikado," and the Siberian *Prunus mandshurica*. The flowers of the so-called "Black Apricot" (*Prunus dasycarpa*) are a few days later and promise to be unusually abundant. The flowers of the Canada Plum (*Prunus nigra*) and of the Chinese Plum (*Prunus salicina*), and of an Almond of northern China (*Prunus triloba*) are also opening their flowers—fore-runners in a season which now promises an unusual flowering of all plants of the Rose Family—Cherries, Plums, Pears, Apples, Hawthorns, Quinces and Roses.

Andromeda floribunda, often called *Pieris floribunda*, was covered with its pure white, fully expanded flowers on the 3rd of April. This is one of the hardiest of the broad-leaved evergreen shrubs which are perfectly hardy in this climate. It is a round-topped plant occasionally eight or ten feet across and four or five feet high, with small, pointed, dark green leaves and terminal clusters of bell-shaped flowers. The flower-buds, which are fully grown in the autumn, are conspicuous and ornamental during the winter. This southern Appalachian shrub is an old inhabitant of gardens, and is still much propagated by nurserymen. After the Laurel (*Kalmia latifolia*) and a few Rhododendrons it is the most valuable broad-leaved ever green which can be grown in the northeastern states.

Mr. J. G. Jack of the Arboretum staff will conduct a Field Class on Saturdays during the spring and early summer, to assist those who wish to gain a more intimate knowledge of the native and foreign trees and shrubs which grow in New England. Instruction will be given in informal outdoor talks and in the examination of the plants. Different botanical groups will be examined at each meeting, although any trees or shrubs found may form subjects for study. No technical knowledge or special preparation is required in order to join the class as the instruction is intended to be simple in character, affording opportunities for questions and answers relating to the specimens under observation. Unless otherwise notified the class will meet promptly at 10 o'clock in the morning, on Saturdays, in the Arboretum, at the Forest Hills entrance.

A low temperature, with a heavy snowfall, on April 11, will probably destroy the flowers and flower-buds of many plants.

ARNOLD ARBORETUM
HARVARD UNIVERSITYBULLETIN
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POPULAR INFORMATION

JAMAICA PLAIN, MASS.

APRIL 29, 1921

Asiatic Crabapples. Some of the earliest of these trees are already in flower, twenty-five days earlier than last year, and when this Bulletin reaches its Massachusetts' readers it is probable that a large number of them will be at their best and as full of flowers as they have ever been here before, for this year all plants of the Rose Family are unusually full of flowers and flower-buds. To northern parks and gardens no genus of small trees and shrubs has given greater beauty than *Malus*, the name which is now correctly given to all Apple-trees, especially the wild types and their first hybrids generally known as Crabapples in distinction from the Apple-trees of orchards which are hybrids or selected and improved forms of European and western Asiatic Crabapples. All the species of *Malus* hybridize so freely among themselves that it is not possible to raise from seeds gathered on trees in a large collection of species like that of the Arboretum plants similar to those from which the seeds were taken. Among such seedlings there may be plants handsomer than their seed-bearing parent, although quite different from it, and among a hundred seedlings raised from the seeds of one tree it is not usual to find two exactly alike. The possible variation in seedling plants produced by a single Crabapple-tree is well shown in one of the parks of the city of Rochester, New York, in which there are growing some twenty-five trees raised several years ago from seeds gathered from one plant of *Malus floribunda*, a tree introduced many years ago into our gardens from Japan and by many students believed to be a hybrid of doubtful parentage. These Rochester seedlings now produce abundant crops of fruit. This varies on different trees from the size of a small pea to an inch or an inch and

a quarter in diameter. On some of the trees it is bright yellow, on others bright red and on others red and yellow. There is less difference in the flowers, but the leaves vary on the different plants in shape and in the absence or presence of a covering of hairs. Whenever the seeds of Crabapples are gathered from trees in collections great or small there will be new hybrids; some of these will be distinct and beautiful like the hybrids of the central Asiatic *Malus Niedwetzkyana* which have appeared in European gardens and are now cultivated under the name of *Malus purpurea*, and the persons who raise such new hybrids will naturally want to have them distinguished by name. The number of varieties of such hybrids has no limit, and as the same hybrid may appear in different countries at about the same time and receive different names students of these trees have the promise of even greater trouble in the future than they have had in the past when they had the offspring of only a few species to deal with. As has been often stated in these Bulletins there is but one way to propagate Crabapples if types of the species, varieties and hybrids are wanted and that is by grafting. It is cheaper to raise seedlings, and seedlings are often sold in American nurseries as species. They are often ornamental but rarely are true to the name under which they are sold.

The first Crabapple to open its flowers this year is again the Manchurian, north China and Korean form of *Malus baccata* (var. *mandshurica*) which is the eastern form of the better known Siberian Crabapple (*Malus baccata*) which has been cultivated in Europe for more than a century and has been the parent of many hybrids. The Manchurian form as it grows in the Arboretum is a tree some fifteen feet tall and broad. The flowers, which are produced in profusion, are pure white, more than an inch across and more fragrant than those of any other Asiatic Crabapple. The fruit is round, yellow or red, and not larger than a large pea. A form of this tree, var. *Jackii*, brought from Korea by Professor Jack in 1905, is distinguished by its larger dark scarlet fruit. The Manchurian Crabapple, which is still rare in this country, should, for the fragrance of its flowers alone find a place in all collections. Almost as early is *Malus robusta*, which is believed to be a hybrid between *Malus baccata* and *M. prunifolia*, a north China plant. This tree was raised here in the early days of the Arboretum from the seeds of *Malus baccata* sent from the Botanic Garden at Petrograd. It is covered every spring with large, pure white, or rarely greenish, fragrant flowers which are rather more than an inch in diameter and larger than those of the other Asiatic Crabs. The fruit differs somewhat in size on different trees and is subglobose and dull red. In good soil and with sufficient space for development this Crab will grow into a large tree, with a broad, round-topped head of spreading, often slightly pendulous branches. This is the handsomest of the white-flowered Crabs and one of the most beautiful of early spring-flowering trees which can be safely planted in this part of the country. The largest specimens in the Arboretum are in the old Apple Collection on the left-hand side of the Forest Hills Road.

Malus micromalus, another early-flowering Crab, is one of the least known of these trees. It was first sent to Europe by Von Siebold in 1856

under the name of "Kaido," a name which in Japan belongs to *M. Halliana*. In Japan *M. micromalus* is rare and known only in gardens, and by Japanese botanists it is believed to have been introduced into their country from China and to be a hybrid possibly of *M. baccata* and *M. spectabilis*. In habit this Crab is more pyramidal than that of the other species and hybrids, and this habit makes the plants conspicuous in the collection. They are covered this year with their small pale pink, delicate flowers which will be followed by light yellow fruit often rose color on one cheek. The largest Arboretum specimen is in the collection at the eastern base of Peter's Hill.

Malus theifera, which is one of Wilson's discoveries in western China, promises to be a good addition to the list of early flowering Crabs. Its long, upright, and spreading, rather zigzag branches make it easy to distinguish at any season of the year; they are continuously studded with short spur-like laterals which bear numerous clusters of flowers rose-red in the bud and pale or almost white when fully expanded. In central China the peasants collect the leaves and prepare from them the palatable beverage which they call "red tea." *Malus theifera* has now flowered for several years in the Arboretum, the largest plant being in the Peter's Hill collection where it is now a conspicuous object. In the color of its rose-red flowers drooping on slender stalks *Malus Halliana* with its variety *Parkmanii*, which has double flowers, is perhaps the most distinct of all Crabapples. It is a small tree with erect and spreading branches which form a narrow, vase-like head, and dark green leaves; the globose reddish fruit is not larger than a small pea. It is well known in Massachusetts gardens, having been sent by George R. Hall, in 1862, to Boston, where it was first planted in Mr. Francis Parkman's garden on the shores of Jamaica Pond. The Parkman Crab is a favorite in Japanese gardens where it is known as "Kaido" and was no doubt imported into Japan from China where the single-flowered form was found by Wilson. Whatever its origin the Parkman Crab is one of the most distinct and beautiful of the small trees which are now flowering here in the Arboretum, although normally the flowers do not open before the 10th of May.

Malus floribunda, by many persons considered the most beautiful of Crabapples, was introduced into Europe by Von Siebold in 1853 from Nagasaki in southern Japan. The place where this little tree grows wild still remains unknown, and by some persons it has been considered a hybrid of Chinese origin; more probably, however, it originated on one of the high mountains of Kyushu. Japanese botanists and nurserymen confuse it with the Parkman Crab, and Wilson did not find it in Japanese gardens. It is a broad, round-topped tree-like shrub sometimes twenty-five feet tall, with stout branches and slender, arching and pendant branchlets. The clusters of flowers are white when fully expanded and are rose-red in the bud, and as they open in succession the two colors make a handsome contrast. The fruit is about the size of a pea, yellowish or yellowish-brown. On some plants it falls in early autumn and on others it remains on the branches during the winter or until devoured by birds who find it one of their most palatable winter foods. *Malus floribunda* rarely fails to produce abundant crops of flow-

ers and in this climate has proved to be one of the most satisfactory and reliable of all the arborescent shrubs or small trees which have been planted in eastern Massachusetts. A hybrid between *M. floribunda* and probably *M. robusta* appeared here among a lot of seedlings of *M. floribunda* in 1883 and has been named *M. arnoldiana*. It has the habit and abundant flowers of *M. floribunda*, but the flowers and fruit are nearly twice as large as those of that plant. It is a handsomer plant than *M. floribunda*, distinguished by its long arching branches, and one of the most beautiful Crabapples in the Arboretum. The first of the Asiatic Crabapples introduced into Europe, *Malus spectabilis*, has been cultivated by the Chinese from time immemorial. Like several other of these plants, it is not yet known in a wild state but is probably of hybrid origin. It is a tree from twenty-five to thirty feet high, with a wide vase-shaped crown made of numerous spreading and ascending branches and short branchlets. The flowers are pale pink, more or less semidouble and fragrant. The fruits are pale yellow subglobose and about three-quarters of an inch in diameter. *Malus spectabilis* is a perfectly hardy, free-flowering plant and well worth a place in gardens where sufficient space can be allowed it for free development. What is probably a hybrid of *Malus spectabilis*, *M. Scheideckeri*, and some unknown species, possibly *M. micromalus*, is a small pyramidal tree with small flowers produced in great abundance and well worth a place in a collection of these trees.

The Crabs mentioned in this Bulletin are the most important of those now in flower in the Arboretum. In a later issue some account will be given of the later-flowering species.

On April 23rd the first Azalea flowers in the Arboretum opened on the Korean *Rhododendron yedoense* var. *poukhanense*, better known as *R. poukhanense*, which last year was in bloom on the 10th of May. It is a very hardy shrub widely distributed in Korea from the neighborhood of Seoul southward, and grows generally in open Pine-woods and on grass-covered slopes where it forms dense mats rarely more than three feet high, although in more shaded positions it is occasionally as much as six feet tall. Here in the Arboretum in full exposure to the sun it forms dense mat-like bushes from two to two and a half feet tall and three feet or more in diameter. This Azalea is perfectly hardy in the Arboretum where it first flowered in 1914. The flowers are clustered, with a rose or rosy purple corolla, and are more fragrant than those of any other Azalea in the Arboretum collection. The color of the flowers does not harmonize with that of other Azaleas which bloom at the same time, and the plants are therefore best kept away from other Azaleas. *Azalea yodogava* (*Rhododendron yedoense*) which in recent years has been sent in large numbers from Japanese nurseries to the United States and Europe, is a double-flowered form of the Korean Azalea.

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MAY 5, 1921

Asiatic Azaleas. Of the thirty-four species of *Azalea* (*Rhododendron* subgenus *Anthrodendron*) of eastern Asia five species are thoroughly established in the Arboretum. These are in the order of their flowering, *R. yedoense*, *R. Schlippenbachii*, *R. reticulatum*, *R. obtusum* var. *Kaempferi*, and *R. japonicum*.

The yellow-flowered Chinese *R. molle* (*R. sinense* of some authors and not to be confounded with the plant known in gardens as *Azalea mollis* which is a hybrid), is in the Arboretum and occasionally flowers here, although it cannot be considered hardy in this climate. The Japanese *R. Tschonoskii*, with flowers more minute than those of other Azaleas, is an old inhabitant of the Arboretum. It has, however, no value as a garden plant and is only interesting as a botanical curiosity. There are several other Asiatic species of *Azalea* in the Arboretum nurseries and a few of them, judging by regions where they grow naturally, will perhaps prove able to adapt themselves to New England conditions. None of them, however, will be as valuable garden plants as the five species mentioned in the first paragraph of this Bulletin. Some of the species, however, which the Arboretum has introduced from southern Japan and Formosa may be expected to be valuable additions to the garden flora of the southern states. Mention of *R. yedoense* and its variety *poukhanense* was made in a recent issue of these Bulletins. It is of interest that the great rainfall and low temperature of April 30 and May 1 did not injure the flowers of this Korean plant which are in as good condition as they were a week ago.

Rhododendron Schlippenbachii. The pale pink fragrant flowers,

which are about three inches in diameter and marked on one of the lobes of the corolla with red-brown spots, are perhaps more beautiful than those of any other Azalea, certainly of any Azalea which has proved hardy in the Arboretum. *R. Schlippenbachii* is one of the commonest shrubs of Korea and often forms the dominant undergrowth in open woods. From Korea it crosses into northeastern Manchuria where it grows on the shores of Possiet Bay; it occurs, too, in two localities in northern Japan. Wilson found it extraordinarily abundant in Korea on the lower slopes of Chiri-san and on the Diamond Mountains, which were where he visited this region in June "a wonderful sight with literally miles and miles of the purest pink from the millions of flowers of this Azalea." In Korea this Azalea on the wind-swept grass-covered cliffs of the coast grow less than a foot high but flowers abundantly. In the forests of the interior it often grows to a height of fifteen feet and forms a tall and slender or a broad and shapely shrub. The leaves are large for an Azalea, being from three and a half inches to four inches long and sometimes nearly three inches wide, and are arranged in whorls of five at the end of the branches. This plant grows further north than any other Azalea, with the exception of the North American Rhodora. The thermometer in the region of the Diamond Mountains usually registers every winter a temperature of 35° to 40° below zero Fahrenheit. There is therefore no reason why this Azalea should not flourish in the coldest parts of New England. It has flowered now for several years in the Arboretum, and planted in an exposed sunny position has never suffered. Its hardiness and the beauty of its flowers make it one of the most valuable shrubs, if not the most valuable, which northeastern North America has obtained from Northeastern Asia. This Azalea is still rare in gardens, but large quantities of seeds collected by Wilson in Korea in 1917 and 1918 were distributed in this country and in England. The seedlings, however, only make one growth during the season and the young plants increase slowly in size. The time, however, is not far distant when this inhabitant of the Diamond Mountains will, during the early days of the month of May, be one of the chief ornaments of the gardens of New England.

Rhododendron reticulatum is the name now adopted for the Japanese Azalea better known as *R. rhombicum*. This is a common and widely distributed Japanese plant which sometimes forms a bushy tree from twenty to twenty-five feet in height, but is more often a shrub three or four feet tall. The flowers appear before the leaves and vary from rose-color to red-purple or magenta. They are handsome but of a color which makes it desirable to so place the plants that the flowers will not be contrasted with any but white flowers. This Azalea now on the lower end of Azalea Path has been growing in the Arboretum since 1893; it is perfectly hardy, but has not before been as full of flowers as it is this spring.

Rhododendron obtusum var. *Kaempferi*, or as it has usually been called in this country *Rhododendron* or *Azalea Kaempferi*, introduced by the Arboretum into gardens in 1892, is now gradually becoming known and appreciated in the north Atlantic states where it has proved

hardy and where it flowers abundantly every year. It is the only bright red-flowered Azalea which is hardy in the Arboretum, and although the flowers are less beautiful than those of *R. Schlippenbachii* and *R. japonicum* the plants when in bloom make a more brilliant and sensational display than any others which can be grown in this climate. The flowers are soon injured by a hot sun and the best results have been obtained with this Azalea with plants grown under the shade of trees or on the north side of Conifers, as at the northern base of Hemlock Hill in the rear of the Laurels (*Kalmia latifolia*). The plants are covered with opening flower-buds and before the end of this week will make on Azalea Path and Bussey Hill Road one of the great flower festivals of the Arboretum year.

Rhododendron japonicum is common and widely distributed over a large part of the main island of Japan where it grows on grass-covered slopes and among other shrubs. It was first raised here in 1893 from seeds collected by Professor Sargent on the hills above Nikko. It was, however, long mistaken here for another plant and has suffered from the confusion of names which at different times have been given to it. In recent years its value as a garden plant, however, has been recognized at the Arboretum; and it is now realized that it is the handsomest of the yellow or orange-flowered Azaleas, with the exception of its hybrids and of the Appalachian *R. calendulaceum*, and, with the exception of *R. Schlippenbachii*, the handsomest of the Asiatic Azaleas which can be grown in the northern states. There is a form of this plant with deep yellow flowers (var. *superba*) in the collection which promises to be a good garden plant here. The hybrid raised in Mr. Hunnewell's garden at Wellesley, Massachusetts, between *R. japonicum* and the Chinese *R. molle* (*R. sinense*) and called "Louisa Hunnewell" is the most beautiful of all yellow-flowered Azaleas, and the most beautiful hardy hybrid Azalea which has been raised in the United States. It is of the same parentage as that of the Azaleas which have been propagated in large numbers in Dutch and Belgian nurseries during the last thirty or forty years and sold under the name of *Azalea mollis*. The correct name for this hybrid is *Rhododendron Kosterianum* and it must not be confused with the true *Rhododendron* or *Azalea mollis* which is a yellow-flowered plant from the hills of eastern China, and, as we have already said, one of the parents of *R. Kosterianum*.

Chaenomeles. This is the generic name now given to the red-flowered Quince which was formerly called *Pyrus japonica*. This plant has been in American gardens for many years and at one time was one of the most popular garden and hedge plants in the country, especially in the middle and southern states where it is still common. It is not rare in New England, although perhaps less common here than southward. The flower-buds sometimes suffer here in severe winters, and the plants need constant attention to save them from the San José scale which commonly infests this Quince. Although first introduced into Europe from Japanese gardens, it is not a Japanese but a Chinese plant and is properly called *Chaenomeles lagenaria*. There is a collection of garden varieties of this Quince chiefly raised in Germany in the Shrub Col-

lection, and this spring the plants have been unusually full of flowers. The varieties differ in the color of the flowers and in the size and shape of the plants. The most conspicuous of these plants when it is in bloom is the var. *Simonii*, of dwarf habit and with intensely scarlet flowers. The white flowers of the var. *nevalis* attract attention, as do the cardinal red flowers of the var. *cardinalis*. The varieties of this Quince do not seem to be known to American nurserymen, and plants probably are difficult to obtain. Another species of the red-flowered Quinces is a native of Japan and a smaller and hardier shrub than the Chinese species, with smaller flowers and fruits, and often semiprostrate stems. Often called in gardens *Pyrus Maulei*, the correct name for this plant is *Chaenomeles japonica*. There is a dwarf variety of this plant (var. *alpina*) with smaller flowers and fruit which is an excellent subject for the rock-garden. *Chaenomeles japonica* has been growing in the Arboretum since 1893 when it was raised from seeds collected by Professor Sargent on the mountains of Hondo. A hybrid of the Chinese and Japanese species raised in Switzerland several years ago has received the name of *Chaenomeles superba*. There are several named varieties of this hybrid in the Arboretum collection differing in the color of the flowers. The varieties *rosea*, *perfecta* and *alba* are perhaps the most distinct and interesting.

Berberis Dielsiana, raised from seeds collected by Purdom in Shensi, is one of the new Barberries in the Chinese collection on Bussey Hill where it has already grown eight feet tall and comparatively broad. It is one of the species with flowers in drooping racemes, like those of the common Barberry. It is a handsome plant, and valuable for its early flowers which this year were opening the middle of April, and only a day or two later than those of another Chinese species, *Berberis dictyophylla* which has always been the earliest Barberry to flower in the Arboretum. *Berberis Dielsiana* first flowered in the Arboretum in 1916, and in that year the flowers opened the middle of May. This Barberry deserves the attention of persons interested in hardy early-flowering shrubs.

Daphne genkwa. A small plant of this Daphne by Hickory Path, near Centre Street, is now covered with its violet-colored flowers which open before the leaves unfold. Although first sent to this country from Japanese gardens nearly sixty years ago, this plant is still little known here. It is not very hardy and suffers here in cold winters; it flourishes, however, on the shores of Buzzards Bay in southern Massachusetts and it will probably grow well in the southern states. At the north, grown in a pot, it should make a good subject for conservatory decoration as it could easily be brought into flower at midwinter, and the unusual color of the fragrant flowers would make it popular.

Hawthorns are already in bloom, and Hawthorn-flowers will open in the Arboretum continuously during the next six or seven weeks. The first species to flower this year is as usual the European *Crataegus nigra*; it is closely followed by several American species of the large-growing, large-flowered species of the Molles Group, notably *C. mollis*, *C. Arnoldiana* and *C. submollis*.

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Some late-flowered Crabapples. The cool weather of late April and early May has favored the flowers of Crabapples, and although the petals have already fallen from the trees of *Malus robusta*, *M. sylvestris* and some of the forms of *M. baccata*, many of the earlier species are still in good condition and others are fast opening their flowers. A few of the late-flowering species and hybrids which deserve the attention of garden-makers and the lovers of handsome plants are:

Malus spectabilis, a tree which has been long cultivated in Chinese gardens, although it is still unknown as a wild plant. This tree, which is possibly a hybrid, was first sent to England from Canton in 1780 and probably was brought to the United States early in the nineteenth century. It is one of the largest of the Asiatic Crabs here, growing to the height of from twenty-five to thirty feet and forming a wide, vase-shaped crown of numerous spreading and ascending branches and short branchlets. The flowers are pale pink, semidouble and very fragrant. The abundant fruits are pale yellow, nearly globose and an inch in diameter. This is a hardy and long-lived tree, as in the neighborhood of Boston are plants which are probably seventy-five or eighty years old.

Malus Sargentii is a Japanese shrub only a few feet high, and much broader than it is tall, with wide-spreading prostrate branches. The flowers are in crowded clusters, saucer-shaped and pure white, and are followed by abundant wine-colored fruits which are covered with a slight bloom, and, unless eaten by birds, do not disappear until the

leaves begin to appear the following spring. The unusual habit of this plant makes it useful for covering slopes and banks, or to form an edging to beds of taller shrubs. With abundant space it may be expected to form a bush eighteen or twenty feet in diameter.

Malus Sieboldii is a Japanese species with the leaves at the end of vigorous branches deeply three-lobed. It grows in two forms; as a shrub only three or four feet high with wide-spreading and arching stems, and as a small tree (var. *arborescens*) with a well-formed trunk and horizontal branches which form a rather flat-topped head. This is the last of the Asiatic Crabapples in the collection to flower and only a few of the bright red flower-buds are open. The flowers are small, white, and produced in profusion every year. The fruit is not larger than a small pea, and is bright red on some plants and yellow on others. What has been considered a variety of *Malus Sieboldii* (var. *calocarpa*) is a larger growing plant with larger flowers which open ten or twelve days earlier and are rose pink, finally becoming white; the fruit is much larger, bright red, lustrous and persistent. This plant produces large crops of flowers and fruits every year and in both spring and autumn it is one of the handsomest of the Asiatic Crabapples. It is not known as a wild plant in Japan and is probably exceedingly rare in cultivation in western countries. For this beautiful plant the Arboretum is indebted to Dr. William Sturgis Bigelow of Boston who brought the seeds from Japan in 1889.

Malus sublobata. This is believed to be a hybrid and it has been suggested that it is the result of a cross between *Malus prunifolia rinki* and *M. Sieboldii*. The plants in the Arboretum are of very uncertain origin but it is probable that they were raised from seeds sent from Japan, although for several years and until the plant flowered they were supposed to be *Malus sikkimensis*. The Arboretum trees are already thirty feet high and, unlike other Crabapples, form a tall trunk covered with pale bark and a narrow head, and in shape are not unlike a young Ash or Tulip-tree. The large white flowers are chiefly produced on upper branches and are followed by bright clear yellow fruits about three-quarters of an inch in diameter. No other Crabapple in the collection produces such beautiful yellow fruit. For the beauty of its fruit, its unusual habit, vigor and rapid growth, *Malus sublobata* is well worth the attention of planters.

Malus Soulardii is believed to be a hybrid of the Apple-tree of eastern Europe (*M. pumila*) and of the wild Crab of the Mississippi valley, *Malus ioensis*, and trees of this hybrid are not rare in the woods in the region from Indiana to Iowa. In the Arboretum *Malus Soulardii* is a round-headed tree in shape like its eastern parent; the flowers are pink, and smaller than those of either parent; the fruit is green, depressed-globose, from an inch to two and a half inches in diameter, and without the waxy exudation which is found on the fruit of the Crabapples of eastern North America. The trees are covered with flowers this year. As a natural hybrid of much interest and as a flowering plant *Malus Soulardii* is well worth a place in collections of these trees. As fruit trees this hybrid and its American parent are worth growing, for jelly made from the fruit of the Iowa Crabapple

is superior in flavor, clearness and beauty to that which has been made from other Apples. A single plant will furnish a family with a year's supply of jelly, and will prove a good investment on any farm or in any garden. If the writer in a recent issue of a Boston newspaper who, in discussing Crabapple trees, was unable to find a good word for the fruit of *Malus ioensis* will visit the Arboretum in October he shall be supplied, in the interest of public education, with enough of these apples to test their value when made into jelly.

Double-flowered Cherry-trees. Small plants of a few of the Japanese double-flowered Cherry-trees are blooming this year and show what may be expected of these trees in this climate. The handsomest of them and probably the ones which can be most successfully grown in this climate are forms of *Prunus serrulata*, which in Japan is a large timber tree, and has been growing for many years in the Arboretum (the Sargent Cherry). The handsomest of the double-flowering Cherries this year is the var. *albo-rosea*, the Shirofugen of the Japanese. This is a perfectly hardy plant with semidouble flowers and petals pink in the bud, but becoming white when the flowers open. This is the double-flowered Cherry which has been sent in considerable numbers to the United States by Japanese nurseries, and is not rare in American gardens where in colder parts of the country than eastern Massachusetts it is perfectly hardy. Other varieties of these Cherries which are blooming well this year are the var. *sekiyama*, the Kanzan or Kwanzan of the Japanese found by Wilson in gardens at Arakawa, near Tokyo, in the Province of Musashi; it has large, double, rich rose-colored flowers. By Wilson, who has seen them all, the Sekiyam is considered the handsomest of all the double-flowered Japanese Cherry-trees; and the var. *jugenzo*, better known in European gardens as "James H. Veitch" with rose pink flowers and young leaves of a deep bronze color, like those of *Prunus serrulata* var. *sachalinensis* of which it is also a form. These Cherry-trees are on the right hand side of the Forest Hills Road. The flowers are heavy and hang on long, slender stalks, and are easily broken off by heavy winds which have already done a great deal of damage to them this spring. They should be planted in a more sheltered place than the north side of the Forest Hills Road, and the duration of the flowers would be lengthened if the trees could be surrounded by a belt of conifers.

Diervilla florida. This Korean plant is one of the species which has played an important part in the evolution of the Diervillas or Weigelias of gardens, and many of its hybrids and varieties have been propagated by nurserymen. The wild type of the species, if it is still cultivated in Europe, is a rare plant, and the Arboretum is fortunate in having raised plants from the seeds collected by Wilson during his recent journey in Korea. These are now flowering for the first time and their pure pink flowers promise to make it one of the most attractive of all the Diervillas. It has bloomed three or four days earlier than its variety *venusta*, another Korean plant, which until this spring has been the first Diervilla in the collection to flower. This variety has generally been considered here the handsomest of all Diervillas, but the flowers are not as pure pink as those of the type.

Diervilla Middendorffiana var. *Maximowiczii* is flowering this year on Hickory Path near Centre Street. This is the Japanese variety of the yellow-flowered *Diervilla* of eastern Siberia and northern Japan, and a common shrub on the mountain slopes of central Hondo where it grows from five to fifteen feet tall. The large pale yellow or yellowish green flowers are attractive but not as showy as those of the species with more highly colored flowers. The Siberian form just lives here, and has resisted the efforts of more than twenty years to induce it to bloom in the Arboretum.

American Azaleas. These begin to bloom about two weeks later than the earliest Asiatic species, and of the sixteen species only seven with several varieties are hardy in New England. These in the order of their flowering are *Rhododendron canadense*, the Rhodora, *R. Vaseyi*, *R. roseum*, *R. nudiflorum*, *R. arborescens*, *R. calendulaceum*, and *R. viscosum*. The other species are confined to the extreme southern states; with one species endemic in Florida, another in Alabama, one in the Arkansas-Texas region, and one in California. It is interesting that eight species, one-half of all the species which have been found in America, grow in the state of Georgia which contains a larger number of species of these plants than any other region of equal extent. Plants of all the American species are in the Arboretum nurseries or have been raised here with the exception of *Rhododendron alabamense* of which seeds have not yet been collected; and some of the southern species, although not for northern gardens, like *R. prunifolium* with crimson flowers, the scarlet flowered *R. speciosum* and the yellow flowered *R. austrinum*, may be expected to become popular garden plants wherever they find a suitable climate. The handsomest of the species hardy at the north, and when in flower one of the most beautiful shrubs of the North American flora, is the Appalachian *R. calendulaceum* with its yellow or flame-colored flowers which do not open until the leaves are nearly fully grown. Another species of the southern Appalachian Mountains, *R. Vaseyi*, with pure pink flowers which have already opened has proved a good garden plant at the north. Of the species, however, with rose-colored or pink flowers *R. roseum* is even a handsomer plant than *R. Vaseyi*. Although first distinguished and named in France as early as 1812, it has always been confused in this country with other species until quite recent years, and has never received the attention which it deserves. It is a shrub from three to fifteen feet tall with rose-colored flowers which open after the leaves begin to unfold, and are more fragrant even than those of *R. viscosum*. This Azalea is common in southern New England and southward to Virginia; it grows in western New York, northeastern Ohio, southeastern Illinois and the adjacent part of Missouri, that is in regions of limestone soil, and the fact that it can grow in lime makes it possible to cultivate it in parts of the country where other *Rhododendrons* cannot grow. There is a group of these plants on the right hand side of the Meadow Road in front of the Lindens.

Lilacs are fast opening their flower-buds. There will not be as many flowers as usual this year on many varieties of the common Lilac, but the plants of the New Chinese species are well covered with buds.

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Among the Oaks. A walk at this time through Oak Path from a point on the Meadow Road nearly opposite the Centre Street Gate to its junction with Azalea Path on the southern slope of Bussey Hill will be found interesting and instructive. This walk passes by the first Oaks which were planted in the Arboretum. Beautiful views toward the west, including the Juniper Collection and Hemlock Hill, can be obtained from it, and before it joins Azalea Path it will pass by some of the handsomest Azaleas in the Arboretum.

Oaks have the reputation of growing slowly, and owing to this reputation are often neglected by planters. The Oaks which can be seen from Oak Path were planted in their present position from thirty to forty years ago when they were seedlings only a few inches high. The largest of them are taller with thicker trunks than other hardwood trees like Hickories, Walnuts, Elms, Maples, etc., planted at about the same time. The tallest of the Oaks planted in the Arboretum are Pin Oaks (*Quercus palustris*), and the tree with the thickest trunk is a hybrid between the White and the Burr Oaks called *Quercus Bebbiana*.

The Arboretum is too far north to make possible here a very large collection of Oaks, and of the fifty-five species which are trees in the United States it has been found possible to grow here successfully only the following: *Quercus borealis* and its variety *maxima*, *Q. Shumardii* var. *Schneckii*, *Q. ellipsoidalis*, *Q. palustris*, *Q. georgiana*, *Q. velutina*, *Q. ilicifolia*, *Q. rubra*, *Q. marilandica*, *Q. Phellos*, *Q. macrocarpa*, *Q. lyrata*, *Q. stellata*, *Q. alba*, *Q. bicolor*, *Q. montana*, and *Q. Muehlenbergii*, only seventeen species. Among the species which are shrubs

and not trees there are in the Arboretum only *Q. prinoides* and a few of the Rocky Mountain species which grow very slowly and give little promise of success. Some of the handsomest of the American Oaks, including all the species confined to the southern states, to the Pacific coast region, and to Arizona and New Mexico, cannot be seen growing in the Arboretum. No evergreen Oak can support this climate, and the Oaks of western Europe are usually short-lived in eastern America. The deciduous leaved Oaks of Japan, Korea, and northern and western China grow well in the Arboretum, and some of the species produce good crops of fruit. The largest Asiatic Oaks in the Arboretum are plants of *Quercus variabilis* and *Q. dentata* on Oak Path near its southern end. The principal collection of Asiatic Oaks, however, is on the southern slope of Bussey Hill, between Azalea Path and the Bussey Mansion. In the mixed plantation near the summit of Peter's Hill are many Oak-trees, including large plants of the Japanese species. Scattered through the Oak-plantations are several hybrids of American species, and no opportunity is lost to increase the number of these hybrids which are now known to occur between various species growing in different parts of the country. All of these hybrids are interesting, and some of them are handsome trees, like *Quercus Comptonae*, for example, a hybrid of *Quercus lyrata* and the southern Live Oak, (*Quercus virginiana*), one of the most splendid Oak trees of America but unfortunately of too tender blood to bear the rigor of a northern winter.

The early spring is one of the seasons when our northern Oaks can be studied to good advantage, for the color of the very young leaves and the amount and character of their hairy covering is different on each species. These characters are constant from year to year, and it is easier to distinguish, for example, a Black Oak (*Quercus velutina*) from a Scarlet Oak (*Q. coccinea*) by the unfolding leaves than it is by the mature leaves, which on some individuals of these species are hardly distinguishable. The young leaves of Oak-trees, apart from their scientific interest, appeal to persons interested in the beauties of nature, for some of them are exquisite in color, and more beautiful even than in the late autumn when the leaves of several of our Oaks are brilliant features of the American forest.

Cornus florida, which adds so much to the woodland beauty of eastern North America from southern New England to Texas, was covered here last autumn with inflorescence-buds which appear during the summer on short stems at the end of the branchlets between the upper pair of leaves, and consist of a cluster of minute flower-buds enclosed in four scales which are brown and more or less hairy during the winter; in spring the stalk of inflorescence lengthens from a quarter of an inch to an inch and a half, and the scales which have protected the flower-buds open and expand, turn pure white and form a flat corolla-like cup from three to four inches in diameter. The enlarged pure white scales which surround the flower-clusters are the conspicuous part of the inflorescence, for the flowers themselves are minute and yellow-green. On many of the trees this spring in the neighborhood of Boston the white scales are discolored by dirty red-brown streaks which make the trees seen from a short distance appear pink. The

cause of this discoloration is not evident, although it may have been caused by the cold of Easter Monday following several days of unseasonably hot weather. At that time, however, the inflorescence-buds of *Cornus florida* had scarcely begun to swell. Whatever the cause of the injury its occurrence this year, when there is an unusual bloom, is doubly unfortunate, for the Flowering Dogwood often loses its flower-buds entirely in New England as we are close to the northern limit of the range of distribution of this tree, which further south flowers more profusely and develops larger bud-scales. Forms of this tree with the scales which surround the flower-clusters varying in color from light to dark red (var. *rubra*) occasionally occur in southern woods, and some of these forms have been propagated by nurserymen and are popular garden plants, especially in the neighborhood of Philadelphia, where there are many specimens of the "Red-flowered Dogwood." Several plants of this variety are now blooming by the shores of Jamaica Pond in Boston where they are flowering more abundantly than usual, for the flower-buds of this variety appear to be less hardy than those of the typical form. This is unfortunate, for when the red and white-flowered trees are planted together in masses they produce when in flower a brilliant effect. There is a form of *Cornus florida* with pendulous branches, and another on which the flowers are called double from the presence of an inner row of white inflorescence-scales. These abnormal forms, however, have little to recommend them to the lovers of handsome trees. *Cornus florida* is as handsome in the autumn as it is in the spring, for the upper surface of the leaves turns bright red, the lower surface retaining its pale summer tint, and the abundant clusters of scarlet lustrous fruits are conspicuous and beautiful. Not less beautiful in autumn are two trees with bright yellow fruit which have recently been found, one near Oyster Bay, Long Island, and the other in North Carolina.

Cornus Nuttallii. This inhabitant of the coniferous forests of the coast region of the Pacific states is a near relative of *Cornus florida* and a much larger and handsomer tree, and the largest probably of all the Dogwoods, as specimens one hundred feet high occur in the Redwood forests of northwestern California. The cup under the flower-clusters formed by the scales is sometimes six inches across and therefore larger than that of any of the other Flowering Dogwoods. These scales do not, like those of *Cornus florida*, enclose during the winter the whole inflorescence but surround only its base. The unprotected flower-buds are therefore more liable to injury from cold than those of the eastern tree, and it would hardly be possible to obtain flowers anywhere in the eastern states, even if the tree could be kept alive. In England it has proved difficult to grow, although small trees have occasionally flowered there and in France.

Cornus kousa is the "Flowering Dogwood" of Japan and China, differing from the American tree in the coalition of the fruits into a solid mass, and in the inflorescence-scales which do not enclose the bud even in part, but stand out below it at right angles to the stem. They enlarge and turn creamy white before the flower-buds open, and are sharp pointed with edges which do not overlap and are smaller than those of

the eastern American tree. *Cornus kousa* blooms three or four weeks later than *Cornus florida*, and the flower-buds have not been injured here in the coldest winters. The leaves turn scarlet in the autumn when the plants are conspicuous from the red clusters of fruit hanging on long stalks. This small Japanese tree is still too seldom seen in our gardens. The best specimen in the neighborhood of Boston is in Mt. Auburn Cemetery in Cambridge; on a Long Island estate there is a grove of perhaps a hundred trees which in the autumn when covered with fruit make a wonderful display of color. The form of *Cornus kousa* discovered by Wilson in western China has now flowered in the Chinese Collection on Bussey Hill for three or four years and promises to be even a handsomer plant than the Japanese type, for the scales of the inflorescence are broader and closer together, and so form a more complete involucre cup. The Arboretum plant has already produced fertile seeds and this beautiful tree will probably in a few years be more common in American gardens.

Azaleas. The large orange red flowers of *Rhododendron (Azalea) japonicum* are fast opening, and although the plants on the lower side of Azalea Path are not as full of flowers this spring as usual there are flowers enough to show their beauty. *Rhododendron japonicum* is a common shrub on grass-covered foothills of the mountains of central Japan where it is a vigorous shrub from three to six feet high with stout erect stems and clustered flowers from an inch and a half to two inches in diameter which open as the leaves unfold. More beautiful is the hybrid Azalea Louisa Hunnewell (*Rhododendron Kosterianum* var. *Louisa Hunnewell*) which was raised at Wellesley by crossing *R. japonicum* with *R. molle* (the *R. sinense* of many authors), and is the handsomest of the hybrid Azaleas. A number of plants of this hybrid are now in flower on the lower side of Oak Path near its junction with Azalea Path, and opposite a group of plants of *Rhododendron japonicum*. On the lower side of Oak Path, near the junction with Azalea Path, plants of a hybrid between *Rhododendron obtusum amoenum* (the well known *Azalea amoena* of gardens) and *R. obtusum Kaempferi* (*Azalea Kaempferi*) are now in bloom. This hybrid was raised at the Arboretum several years ago by Jackson Dawson and has been named *Rhododendron Arnoldianum*. The plants are dwarf in habit and the flowers on the different plants vary in color between that of the flowers of the two parents. A few of the plants in this group are worth propagating for the edges of beds and for the rock garden.

Two American Azaleas. Plants of *Rhododendron nudiflorum* and *R. roseum* are in bloom on the lower side of Azalea Path, and the groups of these plants which are now side by side afford opportunity for the study of these two New England Azaleas. The flowers of *R. nudiflorum*, which are pale pink and open a few days earlier than those of *R. roseum*, have not the fragrance which adds so much to the value of the rose-colored flowers of *R. roseum*. The fact that this plant can grow in soil strongly impregnated with lime will make its cultivation possible, it is hoped, in parts of the country where, on account of lime in the soil, no other *Rhododendron* can be kept alive.

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Cotoneasters. The Cotoneasters with deciduous leaves discovered by Wilson in western China now form one of the interesting groups in the Arboretum, and among them are some of the handsomest shrubs of recent introduction, suitable for the decoration of northern gardens. Several of them are plants of exceptionally good habit with gracefully arching branches; the leaves on the different species vary in size, color, and texture, and on several of the species assume brilliant autumn colors; the flowers are small in small clusters, but are produced in the greatest profusion; and in autumn the branches are covered with red or with black fruits. The flowering time of these plants extends through several weeks; and Cotoneaster-fruits enliven the collection from September to December.

For the information of persons who may want to make a selection of these Cotoneasters for their gardens they may be grouped as follows:

1. Prostrate or semiprostrate shrubs with wide-spreading branches, small red flowers and fruit, and small, thick, dark green leaves persistent in this climate until the beginning of winter and further south until early spring. The best known plant of this group, *Cotoneaster horizontalis*, was sent by a French missionary to France many years ago from western China. It sometimes grows from two to three feet high and possibly ten feet in diameter, and is well suited for covering banks; it is sometimes used in rock gardens and as a cover for low walls. Two varieties of this plant, var. *Wilsonii* and var. *perpusilla*, discovered by Wilson are handsome plants; the former is inclined to grow taller than the type, but the var. *perpusilla* is a much dwarfer

and more compact plant. *C. adpressa* of this group is one of the handsomest of the Cotoneasters for the rock garden or for the edges of beds of taller shrubs.

2. Large shrubs with white flowers and red or orange-red fruits. In this group are *Cotoneaster multiflora calocarpa*, *C. racemiflora* and its variety *soongorica*, *C. gracilis* and *C. hupehensis*. These are perhaps the handsomest Cotoneasters which can be grown in this climate. The first is the earliest of the Cotoneasters to bloom, and its flowers in compact clusters have covered for more than two weeks now its gracefully arching branches on which the blue-green leaves are fast expanding. The orange-red fruit arranged in compact clusters ripens in September. Of the two forms of *C. racemiflora* the var. *soongorica* is the handsomer and perhaps the handsomest of the Arboretum Cotoneasters, and one of the handsomest shrubs of recent introduction. In habit and in the color of the leaves it resembles *C. multiflora calocarpa*, but the flowers are larger and the fruit is more brilliantly colored. *C. hupehensis* is a tall, broad, fast-growing shrub with dark green leaves, with larger flowers than those of the other species arranged in many-flowered compact clusters which cover the branches. The fruit is scarlet and lustrous, but in the Arboretum is only sparingly produced and is covered by the leaves. Seen from a distance when in flower this Cotoneaster looks-like a large well-flowered Spiraea.

3. In this group may be placed the species with red flowers and red fruit, *C. bullata*, *C. bullata* var. *macrophylla* and var. *floribunda*, *C. Dielsiana* and its variety *elegans*, *C. Zabellii* and its variety *miniata*, *C. Franchetti* and *C. obscura*. *C. divaricata* and *C. Dielsiana* are perhaps the best garden plants in this group. They are large shrubs with wide-spreading, slightly drooping branches, small dark green lustrous leaves, and small inconspicuous flowers and fruit. *C. Franchetti* has not proved perfectly hardy in the Arboretum.

4. In this group are placed the species with red flowers and fruits such as *C. nitens*, *C. acutifolia* and its variety *villosula*, *C. ambigua*, *C. foveolata* and *C. moupinensis*. *C. nitens*, though its flowers and fruits are small, is perhaps the handsomest of the group for none of the Chinese Cotoneasters have more gracefully spreading branches and more lustrous leaves. By some persons it is considered one of four or five of the handsomest of the Chinese Cotoneasters which can be successfully grown in this climate. *C. moupinensis* and *C. foveolata* are the tallest of the Chinese Cotoneasters with larger leaves than the others. They are coarse and not very attractive shrubs, but the brilliant colors of the leaves of *C. foveolata* in autumn make it worth growing in large shrubberies.

Several species of Cotoneaster which do not come from China are established in the Arboretum. The best of these for this climate are perhaps the red-fruited European *C. tomentosa*, *C. integerrima*, a black-fruited Siberian shrub and one of the handsomest species, and the Himalayan red-fruited *C. macrophylla* with stems only a few inches high and gray-green leaves. The last and the Chinese *C. adpressa* are the best of the hardy species for the rock garden for which they are well suited.

Viburnum prunifolium, which is known popularly as the Black Haw, is a common shrub in the middle Atlantic states where in early spring, on rocky hillsides and along roadsides and the borders of woods, it rivals in the beauty of its flowers the Flowering Dogwood (*Cornus florida*) which naturally grows in open woods and not in such exposed situations as the Black Haw. *Viburnum nudiflorum* is a large arborescent shrub or a small tree rarely thirty feet high, with a short trunk usually less than a foot in diameter, rigid spreading branches beset with slender spine-like branchlets, ovate to suborbicular, thick, dark green and lustrous leaves which, handsome through the summer, are splendid in the autumn with their dark vinous red or scarlet colors. The white flowers in slightly convex clusters have been produced here this spring in the greatest profusion; in the autumn they will be followed by red-stemmed drooping clusters of dark blue fruits covered with a glaucous bloom, and from half an inch to three-quarters of an inch long. The Black Haw, which is one of the handsomest of the small trees of the eastern United States, takes kindly to cultivation and is quite hardy north of the region of its natural distribution which is in southern Connecticut. It has generally escaped the attention of American nurserymen who in recent years have made better known our northern arborescent *Viburnum Lentago*, the Sheepberry or Nannyberry, a usually larger and for some persons a handsomer plant. The flowers, which are arranged in larger and rather flatter clusters, are pale cream color and not white, but the fruit is as handsome as that of the Black Haw and rather larger. The leaves, too, are large, equally lustrous, and also assume brilliant autumn colors. This *Viburnum* can grow in the shade of larger trees or in open situations which it prefers, and has proved to be one of the handsomest and most useful of the plants which have been largely used in the Arboretum in border and other mixed plantations. The plants here are now covered with flower-buds which will open in a few days. More beautiful than the Black Haw or the Nannyberry, the common tree *Viburnum* of the southern states, *V. rufidulum* is perhaps the handsomest of all the *Viburnums* with deciduous leaves. When it has grown under the most favorable conditions this *Viburnum* is a tree often forty feet high, with a tall stout trunk and branches which spread nearly at right angles from it; the leaves are thick, dark green and lustrous on the upper surface, with winged stalks covered, as are the winter-buds, with a thick felt of rusty brown hair; the flowers are creamy white and the fruit is dark blue covered with a glaucous bloom. This *Viburnum* has been growing in sheltered positions in the Arboretum for many years, but it is only a shrub and does not flower here every year. The plants on Hickory Path near Centre Street are now well covered with flower-buds.

Viburnum rhytidophyllum. This evergreen species discovered by Wilson in western China has attracted a great deal of attention in Europe; there are fine specimens of it in Raleigh, North Carolina, and it flourishes in the neighborhood of Philadelphia. It has lived for several years in the Arboretum, but the cold of ordinary winters destroys most of the leaves and kills the flower-buds. Favored by an exceptionally mild winter, the plants on the upper side of Azalea Path are now

covered with the uninjured leaves of last year and flat clusters of white flowers. These are less interesting than the leaves which are six or seven inches long, pointed, dark green, deeply wrinkled above and covered below with a thick coat of pale brown or nearly white felt. The fruit, which is red, has not yet been produced in the Arboretum.

Viburnum ichangense, which first flowered in the Arboretum in 1916, has not before been as full of flowers as it is this spring. It is a native of central China where it is a shrub sometimes ten feet high with small, narrow, pointed leaves and small clusters of slightly fragrant flowers followed by black fruits. As it grows in the collection of Chinese plants on Bussey Hill it is a narrow, almost pyramidal shrub six feet tall, with slender, erect stems, clothed to the ground with lateral branchlets which are covered with leaves and flower-clusters. In habit unlike other *Viburnums* in the collection, the Ichang species is an attractive plant which promises to be useful for northern gardens.

The last of the Asiatic Crabapples are two still little known and related species from western China, *Malus toringoides* and *Malus transitoria*, which are now in flower on the southern slope of Bussey Hill, the latter for the first time in the Arboretum. *Malus toringoides* is a small tree with gracefully drooping branches which form a broad head, deeply lobed, pointed, dark green leaves, white flowers and small, pear-shaped, red fruits. It was discovered by Wilson in western Szechuen near the Thibetan border, and is a perfectly hardy, handsome tree which in its native country sometimes attains the height of thirty feet. *Malus transitoria*, found by Purdom in Shensi, is, as it has grown in the Arboretum, a densely branched shrub rather than a tree, with smaller leaves and flowers than those of *M. toringoides*.

A few American Crabapples. All the species of eastern North America have large pale pink or rose-colored, fragrant flowers which do not open until the leaves are partly grown, and green, fragrant fruits covered with a waxy exudation peculiar to them. Several species have been distinguished in recent years; they are all now in the collection but several of them are still too small to flower. *Malus glaucescens*, noticed first in the vicinity of Rochester, New York, best distinguished by the pale under surface of the leaves is the first of these trees to flower. *Malus platycarpa* from the southern Appalachian Mountains, with larger fruit than that of the other species, is in bloom opposite the upper end of the Meadow Road, in the old Crabapple Collection, and near it are large specimens of *Malus ioensis*, the common Crabapple of the middle west. With it is growing the Bechtel Crab, (var. *plena*), its variety with double rose-colored flowers which look like small Roses. There are large plants of the Bechtel Crab also in the Peter's Hill Group. The trees are now in bloom, and, judging by the number of persons who stop to examine and admire them, they are the most popular plants in the Arboretum. The Bechtel Crab is now found in many American nurseries.

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Rhododendrons with evergreen leaves are widely scattered over temperate regions of the northern hemisphere and extend into the tropics in southern and southeastern Asia. Several hundred species are now recognized, the largest number on the eastern Himalayas and on the mountains of southwestern and western China where botanical explorers have recently found innumerable new and often handsome species. One or two species grow in northern China, two in central Japan, one in the Pacific states, and five in the Atlantic states of North America; two species grow on the mountains of central Europe and four in the Caucasus. The number of species which can be successfully grown in the Arboretum is only nine; four from eastern North America, one from Japan, one from China, one from the Caucasus and two from Europe. Of these several are rare in American gardens, in which hybrids are generally cultivated. Eastern North America is not a Rhododendron country. A few of them grow better on Long Island than they do in New England; they might grow more successfully in Pennsylvania and Delaware where they have not been very largely planted, or in some favored valley of the Piedmont region of Virginia or North Carolina; further south the summer sun is too hot for many of the species. On the northwest coast of this continent in western Oregon, Washington and southern British Columbia the soil, moisture and temperate climate are favorable to broad-leaved Evergreens, and it is in that region that it seems possible to establish a collection of Rhododendrons which might equal and perhaps surpass the great collections of southwestern England, in the best of which several hundred species now flower every year. In the United States Rhododendrons have

been more largely planted and better cared for in the neighborhood of Boston than in other parts of the country; and judging by the best collection in America, at least, of the so-called Catawbiense hybrids on which incessant care, intelligence and money have been expended continuously for seventy years the results which can be obtained from the cultivation of these plants in New England are not great in comparison with the results obtained in regions better suited to their requirements.

Rhododendrons usually grow on mountain slopes where, although the atmosphere is saturated with moisture, their roots are in well drained soil, and where they are often protected in winter by snow. Here in New England they grow best when planted on the north side of evergreen trees, protected from the stimulating effect of the hot sun of March which excites growth and increases the danger from late frosts. Planted in such a position at the base of Hemlock Hill in the Arboretum there are good plants of Catawbiense hybrids. Rhododendrons are not particular about soil provided it is well drained and is free of lime. A few of the new Chinese species grow naturally in limestone soil, but none of them are hardy in the eastern states. For the Rhododendrons which can be grown here lime is fatal, and persons who go on year after year trying to overcome this peculiarity of nearly all plants of the Heath Family are throwing away their labor and money. Rhododendrons suffer from insufficient moisture at the roots and cannot be safely planted within reach of the roots of vigorous trees which deprive them of it. In recent years Rhododendrons in the neighborhood of Boston have been injured by the lace wing fly, an insect brought from the south on collected plants of *Rhododendron maximum*, which discolors and kills the leaves and finally, if unchecked, the plants. This insect can be killed by any contact spray, but as they remain on the lower side of the leaves it is not always easy to reach them on large plants. Shade is unfavorable for their increase and they are more numerous on the southern than on the northern side of plants, and on plants growing in the open. Three or four broods are hatched in one season, and this means that the plants must be constantly watched and sprayed several times during the summer.

The species of Rhododendrons which have proved hardy here are the eastern American *R. maximum*, *R. catawbiense*, *R. minus* and *R. carolinianum*, the European *R. ferrugineum* and *R. hirsutum*, the Caucasian *R. Smirnowii*, the Chinese *R. micranthum* and the Japanese *R. brachycarpum*. The four American species are perfectly hardy and can be grown without difficulty. *R. maximum* is the largest of these, becoming sometimes a small tree in the sheltered valleys of the southern Appalachian mountains. It has beautiful, dark green, lustrous leaves pale on the lower surface, and clusters of pink and white flowers which do not open here until July and are a good deal hidden by the branches of the year which have nearly finished their growth before the flowers appear. *R. catawbiense* is a round-topped shrub with beautiful foliage and lilac purple flowers of a distinctly disagreeable color. It grows on the southern Appalachian Mountains, sometimes covering near the summits of the highest peaks, at altitudes of between five or six thousand feet, thousands of acres with impenetrable thickets; it occurs, too, sparingly in the Piedmont region of North Carolina,

and on the mountains of northern Alabama. *R. carolinianum* and *R. minus* are southern Appalachian species; the former is a dwarf compact shrub with leaves covered below more or less thickly with rusty brown scales, and compact clusters of small pure pink flowers which open in early spring. It grows apparently equally well in full exposure to the sun and in the shade of Pines and other trees. There is a white-flowered form with thinner, less rusty brown leaves, which is still rare in gardens and appears rather less hardy than the pink-flowered type. *R. minus* grows from low altitudes, as at the locks on the Savannah River above Augusta, Georgia, up to altitudes of thirty-five hundred feet on the Blue Ridge of North Carolina. It is a shrub sometimes ten or twelve feet tall, with leaves covered below with glandular scales and pink flowers, which in northern gardens do not open until the end of June, and after the shoots of the year have nearly attained their full growth. A fine variety of this species (var. *Harbisonii*) from northern Georgia with larger flowers is not yet in cultivation. The two European species *R. hirsutum* and *R. ferrugineum* are dwarf shrubs with small pink or carmine flowers, the former with branches covered with hairs and leaves glandular hispid on the lower surface, the latter with glabrous branchlets and leaves covered below with rusty brown scales. Of the two *R. hirsutum* has taken more kindly to cultivation, at least in the Arboretum. It can grow in soil impregnated with lime. *R. Smirnowii*, a native of the Caucasus, is said to become a tree sometimes twenty-five feet high; in the Arboretum, where it is hardy, it is a shrub four or five feet high, with oblong, acute leaves dark green above and covered below with a thick, yellowish or tawny felt which also covers the branchlets, and protects the leaves from the attacks of the lace wing fly. The flowers are bright pink and beautiful. Of the hundreds of species of Rhododendron which grow in China only the northern *R. micranthum* has up to this time showed itself able to support the New England climate. It is a straggling shrub with small leaves and small compact clusters of small white flowers which give to the plant the appearance of a *Ledum*. The Japanese *R. brachycarpum* is a handsome shrub with leaves which resemble those of *R. catawbiense*, and rather compact clusters of large pale pink or pale straw-colored flowers. This species, it is said, did not reach England until 1888; it was sent to the United States in 1862 by Dr. R. H. Hall, and flowered in Mr. Francis Parkman's garden in Boston a few years later. The original plant was presented by Mr. Parkman to the Arboretum where it bloomed for several years but was finally lost in transplanting. This hardy Rhododendron will, it is hoped, soon become common in gardens as Wilson has sent large supplies of seeds from Japan. Of these hardy species of Rhododendron the handsomest are *R. maximum*, *R. Smirnowii* and *R. carolinianum*, and for general cultivation here the two American species are the most desirable and the most easily obtained. In the next issue of these Bulletins some of the hardy hybrid Rhododendrons will be discussed.

Horsechestnuts. Many Horsechestnuts and Buckeyes are now in bloom in the collection of these trees and shrubs on the right hand side of the Meadow Road. Of the European Horsechestnuts (*Aesculus hippocastanum*) it is not necessary to speak, for one of the most splen-

did trees in the world it is known to all American tree lovers, at least in the northern and eastern states, where it has been growing for more than a hundred years, and noble specimens can be seen in Salem, Massachusetts, and other seaboard towns. The red-flowered Horsechestnut-tree (*Aesculus carnea*), with flowers which vary on different trees from flesh color to red, is supposed to be a hybrid between *A. hippocastanum* and one of the American red-flowered species, probably *A. Pavia*, which originated in Belgium many years ago. The handsomest of these hybrids, that is the one with the darkest red flowers, was raised in France and is known in nurseries as *A. Briottii* (*A. carnea* var. *Briottii*). There are small but well flowered specimens of this variety in the collection. Of the American species the first to bloom is the form of the Ohio Buckeye on which the leaves are composed of seven instead of five leaflets (*A. glabra* var. *Buckleyi*), a rare tree most abundant in Jackson County, Missouri. The flowers on the typical *A. glabra* open a little later and are followed by those of the variety from southern Missouri and Arkansas (var. *leucodermis*) distinguished by its smooth pale bark. The largest trees in the Arboretum of the Ohio Buckeye are on the left hand side of the South Street Gate and are still covered with flowers. The yellow-flowered *A. octandra* of the southern Appalachian forests is now in bloom. This is the largest of the American species. Hybrids of this tree and *A. Pavia* first raised in Europe more than a hundred years ago, to which the general name of *A. hybrida* should be given, are conspicuous from their red and yellow flowers. A number of these hybrids are now flowering in the collection and show much variation in the size and habit of the plants, and in the size and color of their leaves and flowers. Many of these hybrids are good garden plants. *A. georgiana*, the common Buckeye of the southern Piedmont region, which is sometimes a shrub and sometimes a slender tree up to thirty feet in height, with flowers in crowded clusters, red and yellow on some plants, bright red on others and yellow on others, shows again its value as a garden plant here at the north. Even more beautiful are the scarlet flowers of another southern plant, *A. discolor* var. *mollis*, one of the handsomest of the American plants introduced into gardens by the Arboretum. *A. arguta*, a little Texas shrub of the Ohio Buckeye Group is covered this year with long narrow clusters of bright yellow flowers marked with rose color at the base of the petals.

Symplocos paniculata is interesting as the only representative of a Family of plants which can be successfully grown in the Arboretum. It is a native of Japan and western China, and grows also on the Himalayas. The Arboretum plants are of the Japanese form which was introduced into the Parsons Nursery at Flushing, Long Island, at least fifty years ago. Although a distinct and beautiful plant, it appears to be still very little known in gardens, and in England where it flowers freely it does not, it is said, produce fruit. In this country it is believed that it will not grow in soil impregnated with lime. In the Arboretum *Symplocos paniculata* is a shrub twelve or fifteen feet tall and broad, branched to the ground, with dark green leaves, axillary clusters of small white flowers which are followed in the autumn by beautiful blue fruits about a third of an inch in diameter. The unusual color of the fruit is the chief attraction of this shrub. The Arboretum plants are now covered with flowers.

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Hybrid Rhododendrons. It is to the hybrids and not to the species of Rhododendrons that our gardens are most indebted. The history of many of these hybrids is obscure, and the records of their breeding have been so badly kept that it seems practically impossible to obtain the information about them needed to continue intelligently the breeding of Rhododendrons with the view of obtaining hardier races for New England gardens. The plants which have been imported from Europe in the last seventy years in numbers running up into the hundreds of thousands are practically all the so-called Catawbiense Hybrids. These hybrids were obtained in the first place apparently by crossing *Rhododendron catawbiense* with *R. ponticum*, a Caucasian species not hardy here, and with *R. maximum*. Later the red-flowered Himalayan *R. arboreum* was crossed either with *R. catawbiense* directly or with its hybrids. Probably other Indian species were used in these crosses, which appear further to have been more or less crossed among themselves. Several hundreds of these hybrids have received names, but only a comparatively small number have proved hardy in this country, those in which *R. catawbiense* and *R. maximum* preponderate being naturally the hardiest, although a few of the hybrids with red flowers showing the influence of *R. arboreum* are hardy here.

Some of the Rhododendrons which have proved hardy here are evidently hybrids of the pale yellow-flowered *Rhododendron caucasicum*, a shrub which grows at high altitudes on the mountains of the Caucasus and of Asia Minor. These hybrids, or those of them which have been successfully grown in the Arboretum, are low shrubs with compact clusters of pink, white or red flowers which open from two to three

weeks earlier than those of the Catawbiense Hybrids. There is much confusion in regard to the history of many of these plants and their breeding. The most satisfactory of them here is called Boule de Neige. Judging by the name, it was raised in France or Belgium. Only the name appears in the most elaborate work on Rhododendrons which has been published, and nothing now appears to be known about its breeding. Boule de Neige has white flowers faintly tinged with pink when they first open and is one of the best Rhododendrons which can be planted in New England. The Arboretum will be glad of information about its history. Other good plants here of the Caucasian race are Mont Blanc, with deep rose-colored flower-buds and expanding flowers which soon become pure white. This is a taller and not as wide-spreading a plant as Boule de Neige. Sultana and Cassiope are dwarf white-flowered plants of less vigorous growth and dwarfer habit than Mont Blanc. A plant of *R. coriaceum*, not rare in English nurseries, has been in the Arboretum for many years, and although it flowers a week or two later than the plants already mentioned it appears to be of Caucasian blood. *R. venosum* with bright rose-colored flowers, usually found in nurseries under the erroneous name of *R. Jacksonii*, is a hybrid of *R. caucasicum* and *R. arboreum* raised in England in 1829. It is highly thought of in England, where it has been much planted, but in the Arboretum is less hardy than the other Caucasian hybrids. A plant which has been growing in Mr. Hunnewell's garden at Wellesley for at least fifty years is evidently a hybrid of *R. caucasicum*. The original specimens were imported from England and are now round-topped bushes about six feet high. For at least thirty years they have never suffered from heat or cold, and have never failed to flower freely. The leaves show the influence of *R. catawbiense*, but the size of the flower-clusters point to *R. caucasicum*. The early flowers, for this is one of the earliest of the hardy Rhododendrons to bloom in this climate, show also the caucasicum influence. Whatever its name or parentage this is a valuable plant, for it is certainly one of the hardiest hybrid Rhododendrons which have been planted in this country. In the Arboretum collection there are only small specimens.

In England several hybrids of *Rhododendron Smirnowii* have been raised. Some of these which originated at Kew have been tried in the Arboretum but without much success. Of more promise are a number of plants raised at Holm Lea by Charles Sander by crossing *R. Smirnowii* with a Catawbiense Hybrid. They have now flowered in the open ground for several years and appear perfectly hardy. The flowers are large, in large compact clusters and vary from clear pink to deep rose color. The leaves are longer than those of either parent, but are without a trace of the felt which covers the lower side of the leaves of *R. Smirnowii*. We have here perhaps an early-flowering race which may add greatly to the possibilities of Rhododendron cultivation in this country.

By crossing *Rhododendron Fortunei* from southern China with some of the Indian species some of the handsomest of all Rhododendrons have been obtained in English gardens. These are not hardy in this climate, but hybrids of *R. Fortunei*, crossed probably with hybrid Cataw-

biense forms imported several years ago from Edinburgh and later from Paul of Cheshunt, England, have proved hardy and should receive more attention than they have in this country. In their slightly fragrant flowers with an often six- or seven-lobed corolla they show the Fortunei influence and in the size and color of the flowers resemble the well known *R. Pink Pearl* which is not hardy here.

A hybrid to which the name *R. Holmleanum* will be given raised by Charles Sander at Holm Lea by crossing the Chinese *R. discolor*, which is closely related to *R. Fortunei*, with a Catawbiense Hybrid has flowered under glass for two years and will flower this year in the open ground in the Arboretum where it has not been injured by the past mild winter. This hybrid has pale pink flowers in large compact trusses, and if it does not prove permanently hardy here it will be a useful plant for the conservatory. At least three hardy dwarf Rhododendrons were obtained many years ago in England by crossing the European species with the dwarf species of the southern Appalachian Mountains. The handsomest of them is perhaps *Rhododendron myrtifolium*, the hybrid between *R. minus* and *R. hirsutum*, a dwarf compact plant which is covered every year in June with small clusters of pale rose-colored flowers. The hybrid between *R. ferrugineum* and *R. minus* has recently been distinguished as *R. laetevirens*, the name *Wilsonii* under which it has been grown in English nurseries properly belonging to another plant. The third of these hybrids, *R. arbutifolium*, is believed to be the result of crossing *R. carolinianum* with *R. ferrugineum*. The American parents are handsomer plants and better worth a place in the garden than these hybrids which have suffered from the influence of the European species. There are in the Arboretum collection several plants of a hybrid between *R. Metternichii* and a hybrid Catawbiense raised by Anthony Waterer at Knap Hill. These plants have large, dark green leaves which are larger than those of *R. catawbiense* and of many of its hybrids, and flowers which vary on different individuals from pink to rose color. The plants are hardy and vigorous, but the flowers are not superior to those of some of the hardy forms of the Catawbiense Hybrids. *R. Metternichii*, which is a native of mountain slopes in central Japan, has flowered in one Massachusetts garden but has proved difficult to grow in the Arboretum.

Sorbus Folgeneri. Plants of the group of *Sorbus* with simple leaves have not been particularly successful in the Arboretum, especially the European species. There is not a specimen of the European White Beam (*Sorbus Aria*) in the collection and of the many varieties there is only the variety *Decaisneana* with larger leaves which has been growing here since 1883, the original plant having been replaced several times by plants propagated from it. There is a large and healthy specimen of the English Service tree (*Sorbus domestica*) near the Forest Hills entrance but it has never flowered. Of *Sorbus intermedia* of central Europe there is a large specimen in the mixed plantation near the summit of Peter's Hill. The section of the genus *Sorbus* differing from the White Beam in its smaller flowers and fruits, to which the name *Micromeles* has been given, is represented in the Arboretum by *Sorbus alnifolia*, a widely distributed tree

in eastern Asia which was raised here in 1893, and seems perfectly at home in the Arboretum where it has grown to be thirty feet high and forms a shapely pyramidal head densely clothed in dark green leaves which turn orange and red in the autumn; the white flowers are produced in many-flowered clusters and are followed by small red or red and yellow fruits. This is one of the most successful of the deciduous-leaved trees introduced into the Arboretum from Japan. There is a specimen close to the Wisteria trellis on the right hand side of the Forest Hills Road, and a larger one in the mixed plantation near the summit of Peter's Hill. Handsomer is *Sorbus Folgeneri*, one of Wilson's introductions from western China which is now in flower in the collection of Chinese trees on the southern slope of Bussey Hill. It is a tree which Wilson saw in China sixty feet high with a trunk girth of twelve feet. The leaves, which taper to the ends, are green and lustrous above and covered below with white tomentum which is also found on the young branches. The flowers in lax clusters are white and from a quarter to a half of an inch across, and are followed by egg-shaped, bright red fruit about half an inch long. In the Arboretum *Sorbus Folgeneri* is now only about twelve feet high, with gracefully spreading and arching branches and a clean stem only a few inches in diameter. Although *Sorbus Aria* is not in the Arboretum, the interesting hybrid of that tree and the North American *Aronia arbutifolia* is established in the Shrub Collection where it is named *Sorbaronia altina*; it is also known as *Sorbus alpina* and is a plant of more interest to botanists than to gardeners.

Deutzia hypoglauca. Many of the Deutzias recently introduced from western China give little promise of value in this climate, and some of the handsomest of these plants, like *D. longifolia*, *D. Vilmorinae* and *D. discolor*, are usually killed to the ground every year in the Arboretum. The specimen, however, found by Purdom in northern China to which the name *hypoglauca* has been given has been growing and flowering here for several years and is a good addition to the short list of the entirely hardy species and hybrids of Deutzia which are suitable for New England gardens. Another north China species *D. grandiflora*, is also hardy here. It is a dwarf shrub with larger flowers than those of other Deutzias. Unlike those of other species they are solitary or in two- or three-flowered clusters, and open as the leaves unfold and before the flowers of other Deutzias appear. More satisfactory, however, for New England gardens than any of the species of Deutzia are plants of the Lemoinei hybrids raised by Lemoine at Nancy by crossing *D. gracilis* and *D. parviflora*, another north China plant. The original hybrid is a vigorous shrub often four or five feet tall and broad. It never fails to cover itself every May with pure white flowers, and, like all the Lemoinei hybrid Deutzias, is easily increased by cuttings. There are several compact forms of this hybrid in the collection. Of these the most beautiful perhaps is called *Boulevard Neige*. Not quite as hardy is Lemoine's hybrid called *D. rosea*, obtained by crossing *D. gracilis* with the Chinese *D. purpurea*. There are several named varieties of this hybrid; they are small compact plants with white flowers more or less tinged with rose.

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Hickory-trees. No trees give more character to the flora of eastern North America than the Hickories; the trees of no other genus of plants of the United States produce food so valuable to man, and among them are individuals which are not surpassed in majestic beauty by any deciduous-leaved tree of the northern hemisphere. It was long believed that eastern North America was the sole possessor of Hickory-trees, but recently a species has been found in southern China, with Sassafras, Tulip-tree and Kentucky Coffee-tree another interesting link between the floras of eastern North America and eastern continental Asia. The American Hickory-trees fall naturally into two groups. In the first group the trees, with one exception, have close bark, winter-buds covered with scales which do not overlap and fruit furnished with wings at the junction of the divisions of the thin husk. The shell of the nut of the species of this group, with one exception, is thin and brittle, and the kernel is bitter in some of the species and sweet in others. In the second group some species have scaly and others close bark, winter-buds covered with overlapping scales, and fruit without wings or with only slightly developed wings. The shell of the nut of the different species is thick or thin but is not brittle, and the kernel is always sweet. To the first group belongs the Pecan (*Carya pecan*), a tree of the lower Mississippi valley, eastern Texas and northeastern Mexico which on deep rich bottom land sometimes reaches the height of one hundred and eighty feet and forms a tall massive trunk six feet in diameter, and a broad crown of slightly pendulous branches. In beauty few trees surpass the Pecan, and no tree which grows beyond the tropics equals it in the abundance and value

of its nuts, which now raised in southern orchards of selected varieties have become an important article of food and have given rise to a large and rapidly increasing industry. Only one species of this group, the Bitternut or Pignut (*Carya cordiformis*) grows at the north. This is a fast growing tree often a hundred feet high, with a tall trunk, spreading branches which form a broad head, slender branchlets and bright yellow winter-buds. The fruit is globose or slightly longer than broad, and more or less covered with yellow scurfy scales, and the small thin-shelled nut contains a seed covered with a bitter skin which protects it even from the nut-hunting boy. One of the interesting trees of this group, the Nutmeg Hickory (*Carya myristicaeformis*), is a rare and local tree in South Carolina, Alabama, Mississippi, Louisiana, southern Arkansas and eastern Texas. It owes its name to the oblong red-brown nuts marked by longitudinal bands of small gray spots. From the other species of this group it differs in the thick hard shell of the nut, which makes the species intermediate between the trees with bud-scales which do not and which do overlap. In the first group only the southern Water Hickory (*Carya aquatica*) has scaly bark. An inhabitant of deep river swamps often inundated during a considerable part of the year from southern Virginia and southern Illinois southward, the Water Hickory is a slender tree often a hundred feet tall, with much compressed, broad-winged, clustered fruits broadest above the middle and flat, four-angled, dark red-brown, longitudinally wrinkled nuts with intensely bitter seeds. The other species of the first group, *Carya texana*, is a rare and local tree of eastern Texas, southern Arkansas, and western Mississippi. Popularly called the Bitter Pecan, it differs chiefly from the real Pecan in its much flattened fruit and nut, and intensely bitter seed.

The trees of the second group differ in the thickness of the branchlets, in their scaly or close bark, in the thickness of the husk of the fruit and of the shell of the nut. The most valuable trees of this group are the species with bark which separates on old trunks into long, broad, loosely attached scales, popularly known as Shellbarks or Shagbarks. As a nut tree the most valuable of these, and after the Pecan the most valuable nut tree in America, is *Carya ovata*, a common and widely distributed species, ranging with *Carya cordiformis* further north than the other species. This tree is distinguished by its leaves with unusually five leaflets, its large globose fruit with a thick husk splitting freely to the base, and by its small, white, compressed, angled, thin-shelled nut with a comparatively large seed of excellent flavor. The Big or Bottom Shellbark (*Carya laciniosa*) is a taller tree often a hundred and twenty feet tall, and an inhabitant of deep, often inundated bottom-lands. Rare east of the Appalachian Mountains, it is very abundant in the valley of the lower Ohio River and in central Missouri. From other Hickories it can be distinguished by the orange color of the year-old branchlets and by its large winter-buds often an inch long and two-thirds of an inch thick. The leaves are composed of from four to nine, usually seven, leaflets, and the fruit, which is the largest produced by any Hickory-tree, is usually oblong with a thick freely splitting husk and more or less compressed, prominently

angled, reddish brown nut up to two inches in length and an inch and a quarter in width, with a thick, hard shell and a comparatively small sweet seed. Of the species with close bark the best known, perhaps, is the tree always called "Hickory" by persons living in the region where this tree is common, but in books generally called Mockernut or Bid Bud Hickory (*Carya alba*). Less common at the north, this is the most generally distributed Hickory-tree of the south where it grows usually on dry ridges and less commonly on alluvial land. The fruit is oblong and often broadest above the middle, or subglobose with a thin husk splitting finally to the middle or to the base and a globose or oblong, often long-pointed, reddish brown nut with a thick hard shell and a small sweet seed. Common northern Hickory-trees are *Carya ovalis* and *C. glabra*, both with several distinct kinds of nuts. The former has slightly scaly bark, ellipsoid, globose or pear-shaped fruit with a generally thin husk which splits freely to the base or nearly to the base, and a thin-shelled nut too small to be of much value. The bark of *Carya glabra*, usually incórectly called Pignut, is close and smooth; the branchlets are very slender, and the fruit is pear-shaped, much compressed and often gradually narrowed below into a stalk-like base; the husk is very thin and remains closed until after the fruits have fallen, or opens tardily for about a third of its length; the nut is small, globose or short-oblong, compressed, and very thin-shelled, with a sweet seed. Southward a form of this tree (var. *megacarpa*) has stouter branches, larger buds and larger fruit, with a thicker husk. Of the other species, which are all southern, the most widely distributed is the variety of *C. Buckleyi* with pear-shaped fruit (var. *arkansana*). This is the common Hickory of the Ozark region of Missouri and Arkansas, and of Texas where it is the common and often the only Hickory from the coast to the foot of the Edwards Plateau.

Hybrid Hickories. A few hybrid Hickory-trees are now known, mostly between species of the two groups, *Carya cordiformis* and *C. pecan*, being usually one of the parents of these hybrids, the exception being *C. Dunbarii*, a hybrid of *C. laciniosa*, and *C. ovata* from the valley of the Genessee River in New York. In the Arboretum collection are now growing *Carya pecan*, *C. texana*, *C. cordiformis*, *C. myristicaeformis*, *C. ovata*, *C. ovata fraxinifolia*, *C. ovata Nuttallii*, *C. carolinae-septentrionalis*, *C. laciniosa*, *C. alba*, *C. pallida*, *C. glabra*, *C. glabra megacarpa*, *C. ovalis*, *C. ovalis obcordata*, *C. ovalis odorata*, *C. ovalis obovalis*, *C. Buckleyi* var. *arkansana*, and the hybrid *C. Brownii*, and its variety *varians*, *C. Laneyi*, and its variety *chateaugayensis*, *C. Schneckii*, *C. Nussbaumerii* and *C. Dunbarii*. There are also in the collection small plants of a number of named forms of *C. ovata* selected for the size and good quality of their nuts to which nut-growers in the northern states are now paying much attention. The fact that such southern species as *C. texana*, which grows where sugar is one of the principal crops, and *C. myristicaeformis*, which grows only where cotton is successfully cultivated, have proved hardy here indicates that it may be possible to establish the other southern Hickories in the Arboretum.

Laburnum alpinum. The large plant of this *Laburnum* near the upper entrance to the Shrub Collection from the Forest Hills Road has this year been covered with its long racemes of clear yellow flowers and has shown, as it has for many years, the value of this shrub for northern gardens. *Laburnum alpinum*, which is a native of the elevated regions of southern Europe, is usually spoken of as the "Scotch *Laburnum*" probably because it is a favorite in the gardens of north Britain. In those of New England it is still extremely rare, although it is the handsomest large shrub with yellow flowers which is perfectly hardy here. It is harder than *Laburnum vulgare*, or, as it is now called, *Laburnum anagyroides*, the small tree with shorter racemes of flowers which has been a good deal planted in the eastern states and which at the north is not always hardy, although occasionally good specimens are to be seen in the neighborhood of Boston. There are several garden forms of this *Laburnum* which have not, however, ever grown well in the Arboretum. A better plant for New England than *Laburnum vulgare* is its hybrid with *L. alpinum*, known as *L. Watereri* or *L. Parksii*. This is a hardy small tree and when in flower the handsomest tree with yellow flowers which can be grown in this climate. It flowered well this year in the Arboretum two weeks ago but the flowers have now faded.

A new Azalea. Several plants have been flowering during the past week of a handsome *Azalea* which is believed to be a hybrid between two American species, *Rhododendron arborescens* and *R. calendulaceum*, to which the name *R. Anneliesæ* (see *A Monograph of Azaleas*) has been given. These plants were raised accidentally at the Arboretum from seeds probably of *R. calendulaceum* sown in 1896. They have been growing with that species and are now plants from four to six feet tall, and are valuable because they flower later than most forms of *R. calendulaceum*. From that species they chiefly differ in the more glabrous under surface of the leaves, in their sparsely hairy branchlets, and in the long corolla-tube of the more fragrant flowers which in the type plant are pale pink marked with a large yellow blotch, but in other individuals are orange-red and clear yellow. In shape and color the leaves resemble those of *R. arborescens*, but differ from those of that species in the presence of hairs on the underside of the midrib; from *R. arborescens*, too, it differs in the color of the flowers and in the hair near the base of the style.

Late Lilacs. *Syringa Sweginzowii*, one of the last to bloom and for some persons the most attractive of the species of Lilac recently introduced from China, has been covered as usual with its narrow clusters of long-tubed fragrant flowers, which flesh color in the bud become nearly white after opening. This species flowers freely as a small plant. Belonging to the group of species of which *Syringa villosa* is the best known and the most valuable, *S. reflexa* and *S. Sargentiana* are blooming sparingly this year. The two species are large, vigorous and hardy shrubs, with the large, dark green leaves of *S. villosa*.

The Laurels (*Kalmia latifolia*) at the northern base of Hemlock Hill are now in bloom, and the last and greatest flower show of the Arboretum year is at its height.

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Philadelphus. The importance of this genus of shrubs for the decoration of northern gardens during the last weeks of June and the early days of July has been greatly increased by the discoveries of travelers in eastern Asia and by the successful work of plant-breeders. There is a large number of these plants in the Arboretum where they are arranged in the Shrub Collection and in a large group on the right hand side of the Bussey Hill Road and opposite the Lilacs. Known as Syringas or Mock Oranges in popular language, these names are unfortunate and confusing, for *Syringa* is the botanical name of the Lilac and Mock Orange is the popular name of *Prunus caroliniana*, a southern Cherry which is much planted in the southern states as an ornamental tree and in making hedges. The species of *Philadelphus* grow naturally in southeastern Europe and the Caucasus, in the United States on the southern Appalachian Mountains, in Arkansas, western Texas, on the southern Rocky Mountains, and in the northwestern states, in Japan, Korea, northern and western China, and on the Himalayas. The species and hybrids are, with few exceptions, hardy in Massachusetts. They need rich, well-drained soil, and the presence of lime in it has no bad effects on them. Better than most shrubs they can support shade, and their ability to grow and flower under trees makes them valuable as undergrowth in border plantations.

The first of the Syringas to find its way into gardens, the Mock Orange of all old gardens, *Syringa coronarius* from eastern Europe, was first cultivated in England before the end of the sixteenth century, and was probably one of the first garden shrubs brought to America by the early settlers. It is a medium sized shrub often as broad as

high, with exceedingly fragrant flowers faintly tinged with yellow. This plant has been somewhat neglected in recent years for species and hybrids with larger and showier flowers. This is unfortunate, for no other *Syringa* equals the old-fashioned Mock Orange in the delicate perfume of its flowers. Varieties with yellow leaves, with double flowers and with narrow willow-like leaves are in the Arboretum collection but none of them have any particular value as garden plants. Among the American species best worth the attention of gardeners are *Philadelphus inodorus*, *P. pubescens*, perhaps better known as *P. latifolius*, and *P. microphyllus*. The first is a native of the Appalachian Mountain Region and grows to the height of six feet; it has arching branches and large, solitary, pure white cup-shaped, scentless flowers. By some persons it is considered the most beautiful of all the species of *Syringa*. *P. pubescens* is also a plant of the southern Appalachian Mountain Region. It sometimes grows to the height of twenty feet; the branches are stout and erect, the leaves are broad, and the slightly fragrant flowers are arranged in leafy, erect racemes. This plant is more common in gardens than *P. inodorus*, and although it makes a great show when in bloom it is less beautiful. *Philadelphus microphyllus*, which rarely grows more than three feet tall, has slender stems and leaves and flowers smaller than those of any other *Philadelphus* in cultivation. What the flowers lack in size, however, they make up in fragrance which is stronger than that of the flowers of any other *Syringa*, and perfumes the air for a long distance.

The most distinct and perhaps the handsomest of the Asiatic species in the Arboretum is *Philadelphus purpurascens*, one of Wilson's discoveries in western China. It is a large shrub with long, gracefully arching stems from which rise numerous short branchlets spreading at right angles; on these branchlets the flowers are borne on drooping stalks; they are an inch and a half long with a bright purple calyx and white petals which do not spread as they do in most species but form a bell-shaped corolla. This is one of the handsomest of the shrubs brought from western China to the Arboretum. *Philadelphus pekinensis* is another Chinese species well worth a place in the garden. It is a tall broad shrub with arching stems, small dark green leaves and fragrant flowers slightly tinged with yellow. *P. pekinensis* has been growing in the Arboretum for many years and has proved a reliable and free flowering plant. Another old inhabitant of the Arboretum, *P. Falconeri*, which is certainly Asiatic and probably Japanese, has narrow lanceolate leaves and fragrant flowers in from one- to six-flowered racemes, and is distinct in the shape of the leaves and in the long narrow petals of the flower. The origin and history of this plant is not known.

Hybrid *Philadelphus*. More beautiful than the species are some of the hybrid *Syringas*. The first of these to attract attention was raised in France before 1870 by a Monsieur Billard and is sometimes called "Souvenir de Billard," although the correct name for it is *Philadelphus insignis*. This hybrid is one of the handsomest of the tall growing *Syringas*; it has large, snow-white flowers in long clusters, and its value is increased by the fact that it is the last of the whole group to flower.

The largest *Syringa* in our northern gardens, where plants thirty feet high and correspondingly broad are sometimes found, appears to be a hybrid between *P. coronarius* and some unrecognized species. To this plant, whose history is unknown, the name of *Philadelphus maximus* has been given. Another hybrid called *Philadelphus splendens* appeared in the Arboretum several years ago and is supposed to be a hybrid between two American species, *P. inodorus* and *P. pubescens*. It is a large and shapely shrub with pure white, only slightly fragrant flowers an inch and three-quarters in diameter and borne in erect clusters. This hybrid is a free-flowering plant and when the flowers are open it is the showiest plant in the *Syringa* Group.

These early hybrids are the result of natural cross fertilization, and the systematic breeding in the genus dates from the time that Lemoine first crossed the Rocky Mountain *P. microphyllus* with *P. coronarius* and produced a plant to which he gave the name of *P. Lemoinei*. Lemoine then crossed his *P. Lemoinei* with *P. insignis* and produced a race to which the general name of *P. polyanthus* has now been given. Well known forms of this plant are "Gerbe de Neige" and "Parvillon Blanc." To another race of the Lemoine hybrids the name of *Philadelphus cymosus* has been given. This race was obtained by crossing *P. Lemoinei* and *P. pubescens* or some related species. "Conquête" is considered the type of this group. Other well known plants which are said to belong here are "Mer de Glace," "Norma," "Nuée Blanche," "Rosace," "Voie Lactée" and "Perle Blanche." Another race of hybrids with double racemose flowers raised by Lemoine and of doubtful origin is called *P. virginalis*. The type of this group is Lemoine's "Virginal." Other plants referred to it are "Argentina," "Glacier," and "Bouquet Blanc."

Late Viburnums. The Arboretum in late June owes much beauty to several species of *Viburnum* which have been planted generally in roadside and border plantations. The handsomest of these plants is *Viburnum cassinoides*, an American species which, although it grows naturally in cold northern swamps, is improved by cultivation and in ordinary garden soil is a handsomer and more shapely plant than in its natural form where it often makes straggling stems from fifteen to twenty feet tall. The beauty of this *Viburnum* is in its ample, thick and lustrous leaves which vary greatly in size and shape on different plants, in its broad convex clusters of pale cream-colored flowers, and in its large and showy fruit which when fully grown is yellow, then pink and finally blue-black, the three colors often appearing at the same time in the same cluster. Not often before has this *Viburnum* been as thickly covered with flowers as it is this year. The fruit is larger than the bright blue fruit of the other summer-flowering American species, *Viburnum dentatum*, *V. venosum* and *V. Canbyi* which bloom in the order in which they are mentioned here; and few plants respond more to generous treatment with vigorous growth, improved habit and handsomer foliage. The largest as well as the latest flowering of these plants, *V. Canbyi*, will not be in bloom for two or three weeks. *Viburnum dentatum*, a Japanese red-fruited plant, also flowers a little later than *Viburnum cassinoides*. It is a large, broad, and perfectly hardy shrub with wide flat clusters of flowers which are followed by

bright red lustrous fruits more brilliantly colored and handsomer than those of any other hardy red-fruited *Viburnum* with the exception of the European *Viburnum Opulus* and the American *V. americanum*, the so-called Highbush Cranberry, which were in bloom several weeks ago.

A Dwarf Spruce. In the May 7th issue of *The Gardeners' Chronicle* of London there is a figure and description of a little conifer which is called *Picea albertiana*, although some doubt is thrown on the accuracy of the name. *Picea albertiana* is a form of the White Spruce found only in the Gaspé Peninsula of eastern Canada and in the valleys of the Black Hills of South Dakota and of the Rocky Mountains of northern Wyoming, Montana and northward, and chiefly distinguished from the common White Spruce of the east by its shorter and broader cones. As this tree grows or grew a few years ago on the borders of streams and lakes or in groves surrounding mountain meadows in northern Montana, it is one of the splendid trees of the continent, rising to the height of one hundred and fifty feet with a trunk from three to four feet in diameter and a narrow pyramidal head of slightly pendulous branches. A plant of a dwarf variety of this Spruce a few inches high was found by Professor Jack near Laggan, in Alberta, in 1904, and from this plant has been raised all the specimens in cultivation. They are all conic in shape and very compact, and the largest of them, in Massachusetts at least, are not much more than two feet high. *Picea glauca* is now the recognized name of the White Spruce and this dwarf, the plant figured in *The Gardeners' Chronicle*, has been named *Picea glauca* var. *albertina conica*. It is certainly one of the most distinct of dwarf Spruces, and as it can be easily and quickly propagated from cuttings there is no reason why it should not be within the reach of every one interested in rock gardens for which it is well suited.

A handsome climbing plant. Mr. H. H. Richardson exhibited on June 4th, before the Massachusetts Horticultural Society, a flower-covered branch of the Southern Cross Vine which has been growing for several years in the open in his garden in Brookline. It is claimed that the Cross Vine has flowered in a Rhode Island garden but its beautiful red and yellow, tubular, two-lipped flowers have not been seen in Massachusetts outside of Mr. Richardson's Brookline garden where several plants are clinging to the trunks of trees and are now fully twenty feet high. This vine climbs by the aid of tendrils by which it attaches itself to the rough bark of trees, but as the tendrils are not furnished with such adhesive disks as occur on some forms of the Virginia Creeper the vine is unable to attach itself to a wall. The adopted name for this plant is now *Anisostichus capreolata*; it has been more often called *Bignonia capreolata*. It grows in rich soil and is common southward from southern Virginia and southern Illinois to Florida and Louisiana, often climbing into the tops of the tallest trees which it enlivens in very early spring with its abundant and showy flowers. The common name of this plant is due to the cross which can be seen in a transverse section of the stem. The Cross Vine, although it may not flower for every one, is one of the interesting additions which have been made recently to the garden flora of Massachusetts.

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Beech Trees. The Arboretum is fortunate in having in its collection eight of the ten species of Beech-trees which have been discovered up to the present time and are recognized by botanists. They are *Fagus grandifolia* of eastern North America, *F. ferruginea* of Europe, *F. orientalis* of southwestern Asia, *F. longipetiolata*, *F. Engleriana* and *F. lucida* of western China, and *F. Sieboldii* and *F. japonica* of Japan.

Fagus grandifolia differs from the other species so far as they are known here in the habit of sometimes producing stems from the roots; these often grow into small trees which form dense thickets round the parent trunk. The bark of all the species is smooth and pale, but that of the American tree is paler, a least, than that of the European tree, and the pale blue-gray bark of the stems and large branches make this tree in winter one of the most beautiful inhabitants of the forests of eastern North America. The American Beech is a common tree from eastern Canada to Florida and eastern Texas, and to Minnesota and Oklahoma. At the north it grows on uplands and mountain slopes, and often forms pure forests of considerable extent; southward the Beech varies from the northern tree in its thicker, less coarsely toothed leaves, and in the shorter and less crowded prickles on the fruit (var. *caroliniana*), and often grows on the bottom lands of streams or the borders of swamps. At the north the Beech is rarely more than seventy or eighty feet tall, but at the south it is taller and in the Mississippi valley on the rich loess of northern Louisiana and western Mississippi it is often a magnificent tree a hundred and twenty feet high with a tall trunk from three to four feet in diameter, and a fit associate of the great evergreen Magnolia (*M. grandiflora*) which also

grows in this soil to its greatest size. Planted by itself in the open ground the American Beech does not grow well, and rarely makes a handsome specimen, but does best when many trees are planted so close together that the lower branches are killed and tall trunks formed.

Fagus sylvatica, the European species, is distributed over a large part of Europe except in the extreme north, growing to great perfection in England, Denmark, parts of Germany, and on the mountains of the Balkan Peninsula, often forming pure forests and growing to a height of more than a hundred feet. It is a hardy and handsome tree in New England, where it seems to be perfectly at home, and grows faster and makes a handsomer specimen tree than the American species. There is no record, unfortunately, of the date of the introduction of this tree into the United States, but judging by the size of some of the trees here it must have been at least a hundred years ago. The finest European Beeches in the neighborhood of Boston are on Longwood Mall, a strip of turf extending east from Kent Street and between Chatham and Beech Streets in Brookline. This Mall was laid out by David Sears at the time he was engaged in developing his Longwood property seventy-five or eighty years ago, and it is probable that these Beech-trees were planted at about that time. There are sixteen of these trees, thirteen with green leaves and three of the purple-leaved variety. They are all in good health and are short-stemmed specimens from sixty to seventy feet tall with wide-spreading branches which on some of the trees sweep the ground. These trees now belong to the Town of Brookline, to which Longwood Mall and three other squares in the Longwood district were left by Mr. Sears. Several varieties of the European Beech have been found in Europe and are propagated and sold by nurserymen. The best known of these varieties is the so-called Purple Beech with leaves which are pale red in spring and deep red-purple at maturity. The Purple Beech was found growing naturally in the forest in three or four places in central Europe, and the first account of it was published as long ago as 1630. Seedlings of the Purple Beech sometimes have purple leaves; such seedlings often differ in shades of color, and to some of these trees names have been given. The Purple Beech is better known and more generally planted in this country than the typical green-leaved form, and for many years now has been a favorite with tree-planters in the northeastern states. The Copper Beech (var. *cuprea*) which is probably a seedling of the Purple Beech, has paler copper red leaves than those of that tree. An interesting form (var. *pendula*) of the European Beech is a comparatively low tree with horizontal or slightly pendulous branches from which hang almost vertically the secondary branches, the whole forming a tent-like head almost as broad as high. This tree was at one time somewhat planted in this country, and the largest specimen known here is the tree growing on what was once part of the Parsons Nursery in Flushing, Long Island. This tree is said to be one of the finest specimens in existence. A picture of it can be found in Wilson's *Romance of Our Trees*. There are other forms of the European Beech with pendulous branches differing somewhat in habit from the var. *pendula* to which names have been given (vars. *bornyensis*, *remillyen-*

sis, *pagnyensis*, *miltonensis*, etc.) The Fern-leaf Beech (var. *heterophylla*) is distinguished by its variously shaped leaves, which on the same branch are long and narrow, and usually more or less deeply lobed, pinnate or lacinate. Various names (vars. *asplenifolia*, *incisa*, *laciniata*, *salicifolia* and *comptoniaefolia*) have been given to forms of this variety, but the variation is often so slight that it seems wise to call all the forms of the European Beech with cut or lacinate leaves var. *heterophylla*. The largest specimen of this tree in the United States grows on Bellevue Avenue in Newport, Rhode Island, on the grounds of the Redwood Library and Reading Room. A form of the European Beech (var. *fastigiata*) on which all the branches grow erect and form a narrow pyramidal head promises to be a handsome and useful addition to the trees with this habit, like the fastigate Red and Sugar Maples, the fastigate European Oak and the fastigate Tulip-tree, European Hornbeam, etc. The original fastigate Beech is growing at Dawyck in Peeblesshire, Scotland, and is a comparatively recent addition to the Arboretum collection. In the variety *rotundifolia* of the European Beech we have a handsome tree, probably always of small size, with nearly round leaves closely set on the branches and usually not more than an inch in diameter, a good tree to plant where there is not room for the large-growing Beech-trees. The least attractive of all the forms of the European Beech, the var. *cristata*, is a tall narrow tree with short-stemmed leaves, deeply lobed and more or less contorted, interesting as a monstrous form but of no value among ornamental trees.

Fagus orientalis is a native of southwestern Asia where it is distributed from Asia Minor to northern Persia. From the European Beech it differs chiefly in the lower prickles of the fruit which are changed into oblong linear lobes. The plants which have been grown in the Arboretum for eight years have not suffered from cold or heat, but are still too young to give an idea of the value of this tree in the United States.

Chinese Beech-trees. These do not occur north of the central provinces where three species have now been found, *Fagus longipetiolata*, *F. Engleriana*, and *F. lucida*. The first Wilson found to be the common Beech of central and western China, where it grows with Oaks, Maples and other deciduous leafed trees. This Beech is usually a small tree fifty or sixty feet tall, but in western Szech'uan, where Wilson saw the largest specimens, it is a stately and handsome tree with a single trunk rarely divided near the base and covered with very pale gray bark. *Fagus Engleriana* is common on the high mountains of northwestern Hupeh and eastern Szech'uan where it often forms pure forests. Wilson found that the trunk of this tree almost invariably divides at the base into several diverging stems which do not attain much thickness or any great height, the tallest of which there is a record being not over seventy feet high, trees of half that height or less being more common. *Fagus lucida* is distinguished from the other Chinese species by the duller gray bark of the trunk which does not separate at the base and by its thick and spreading branches which form

a broad flattened or somewhat rounded head. It is a tree sometimes seventy-five feet tall, with a trunk up to three feet in diameter. This tree is common in some parts of Hupeh and Schez'uan in mixed woods, and with *F. Engleriana* sometimes makes pure forests. The young plants of these three Chinese Beeches brought by Wilson to the Arboretum in March, 1911, have been growing in the open ground since their arrival. As they have in these ten years experienced the two severest winters of which there is a Massachusetts record, it is fair to suppose that they are hardy, although only time can show if they are capable of growing here into large and healthy trees.

The Japanese Beech-trees are better known in the Arboretum, as *Fagus Sieboldii* was first raised here in 1893 from seed brought from Japan by Professor Sargent, and *F. japonica* was raised here only a few years later. The former is one of the great trees of Japan, often growing to the height of ninety feet and forming a trunk three feet in diameter. It is perhaps the commonest deciduous-leaved tree on the mountains of Hondo, where at altitudes between three and four thousand feet toward the upper limits of deciduous-leaved trees it forms nearly pure forests, or is mixed with Oaks and Chestnuts, and occasionally with Firs and Spruces. Northward, as on the shores of Volcano Bay in Hokkaido, it grows at sea-level, but southward it is found only on mountain slopes. *Fagus Sieboldii* has proved to be perfectly hardy in the Arboretum where it makes a handsome tree with pale bark; it has not yet produced fruit here. *Fagus japonica*, which grows on the mountains of central Hondo up to altitudes of five thousand feet, is much less abundant and less widely distributed than *F. Sieboldii*. It is a small tree with a trunk dividing near the ground into two or three large stems. This tree is growing well in the Arboretum. The plants, however, are still small with stems which do not yet show a tendency to divide.

In the Arboretum collection are now established *Fagus grandifolia* and its southern variety *caroliniana*, *F. sylvatica* and its varieties *macrophylla* (*latifolia*), *purpurea*, *purpurea f. pendula*, *heterophylla*, *pendula*, *remillyensis*, *fastigiata* (*dawyckii*), *rotundifolia*, *grandidentata*, *zlatia* and *cristata*, *F. orientalis*, *F. longipetiolata*, *F. Engleriana* and *F. lucida*, *F. Sieboldii* and *F. japonica*. The two Beech-trees not in the Arboretum and not yet introduced into cultivation are *Fagus Hyatae*, which is known to grow only on a single mountain in the Head Hunters country of Formosa which Wilson could not visit when he explored that island, and *F. multinervis* confined to Dagelet Island, a small isolated island in the Japan Sea fifty miles from the east coast of central Korea. The seedling plants collected by Wilson during his visit to Dagelet in June, 1917, died before they reached the Arboretum.

Several interesting forms of the European Beech have not been planted in the Arboretum because there is no room for them in the space which can be devoted to the Beech Collection, and unless more room can be obtained for them the trees in this collection will never appeal to the imagination or create the enthusiasm which the Beech-trees on Longwood Mall in Brookline create—trees in which that town may well take pride.

ARNOLD ARBORETUM
HARVARD UNIVERSITYBULLETIN
OF
POPULAR INFORMATION

JAMAICA PLAIN, MASS.

JUNE 30, 1921

A few late-flowering shrubs. As the summer advances the number of trees and shrubs in flower in the Arboretum rapidly diminishes and in the last week of June their number is not large. Some of the most interesting of them are

Rhododendron maximum, with its pink and white flowers an inch long, in dense sixteen- to fourteen-flowered umbels four or five inches in diameter and overtopped by the fully grown branches of the year developed from buds in the axils of leaves just below the inflorescence bud. This growth of the branches before the opening of the flower-buds occurs in most late flowering *Rhododendrons* and hiding, in part at least, the flowers obscures their beauty. *Rhododendron maximum*, nevertheless, is a handsome and useful plant, with leaves larger and handsomer than those of any other *Rhododendron* which is hardy in this climate. Rare at the north where it grows in cold deep swamps in a few isolated stations in Nova Scotia, Ontario and New England, it is very abundant on the Appalachian Mountains from Pennsylvania to Georgia, making great impenetrable thickets along all the mountain streams and occasionally growing to a height of thirty or forty feet and forming a trunk a foot in diameter. When cultivated this *Rhododendron* grows well in any soil which is not impregnated with lime; it will grow, too, in comparatively dense shade and when fully exposed to the sun. When exposed to the sun, however, it is often badly injured by the lacewing fly. Several hybrids between *R. maximum* and *R. catawbiense* hybrids have been raised. One of the earliest and the best known of these hybrids, *R. delicatissimum*, is a handsome plant with pink and white flowers which open two or three weeks before those of *R. maximum* and are not hidden by young branches. *Rhodo-*

dendron Wellsianum, another hybrid of the same parentage or perhaps a seedling with nearly white flowers opening from pale rose-colored buds, and marked by a conspicuous yellow blotch on the upper lobe of the corolla, is a handsome plant which was raised by Anthony Waterer at the Knaphill Nurseries; it has not always proved perfectly hardy, although this year it has bloomed well and rather later than *R. delicatissimum*. Hybrids of *R. maximum* with hybrids of *R. catawbiense* raised at Holm Lea by Charles Sander have handsome rose or rose pink flowers, but have often lost their flower-buds in severe winters.

Rhododendron minus, better known perhaps as *R. punctatum*, which has flowered unusually well this year, is still little known in American gardens. It is a plant of the southern Appalachian Piedmont region, and ascends on the Blue Ridge of the Carolinas to an altitude of at least three thousand feet. The small, pale, rose-colored flowers are produced in small clusters which, like those of *R. maximum*, are overtopped by the shoots of the year which begin to grow before the flower-buds open. This Rhododendron varies greatly in size, the largest plants growing at nearly the highest altitudes where individuals seven or eight feet high, and often forming in thickets, are not uncommon. Less attractive perhaps than *R. carolinianum*, with which it grows on the southern mountains, *R. minus* is well worth a place in the gardens of a region in which so few species of Rhododendron can be successfully grown as in Massachusetts. In northern Georgia there is a form of this plant (var. *Harbisonii*) with larger leaves and larger flowers in larger clusters which may be expected to make a handsome garden plant. It is not yet in cultivation.

Zenobia pulverulenta is flowering unusually early this year. A native of the coast of North Carolina, where it grows along the borders of swamps, this plant, which is one of the most beautiful shrubs of the American flora, is perfectly hardy in Massachusetts where it has flowered in the Arboretum for many years. *Zenobia* is related to the *Andromedas* and is chiefly distinguished by its open campanulate flowers and four-awned anthers. The leaves are deciduous, thickly covered with a glaucous bloom, and the ivory white flowers, which are about half an inch long and broad, are borne on slender arching stems and are arranged in axillary clusters forming terminal racemes from twelve to eighteen inches in length and arching from the upper part of the branches of the previous year. The form of *Zenobia* (var. *nitida*) with green leaves, that is destitute of the glaucous bloom, is a more common plant in North Carolina and is equally hardy in the Arboretum. *Zenobia* is occasionally seen in English gardens. Is there an American nursery in which this beautiful plant can be found?

Pieris (Lyonia) mariana is another late flowering *Andromeda*-like plant of the coast region of the eastern states from Rhode Island southward to Florida and Texas. Not as handsome as *Zenobia*, with green leaves and smaller white flowers in shorter erect clusters, this *Pieris* is well worth a place in the garden where it is not particular about soil and grows nearly as well in dry gravelly sand as in rich loam. It is one of the common plants on the sandy plains of Long Island.

Sambucus canadensis. As the flowers of the Laurel (*Kalmia latifolia*) begin to fade those of the Elder of the eastern states (*Sambucus canadensis*) begin to open. This, *Cornus amomum*, and *Rosa virginiana* (or *lucida*) are the last of the native shrubs to make a conspicuous display of flowers in the Arboretum. Plants of the Elder which have sprung up naturally along Bussey Brook are now in bloom, and flowering plants are conspicuous by the small ponds near the junction of the Meadow and Forest Hills Roads. Few native shrubs make a greater show than this Elder with its broad heads of white flowers and lustrous black fruits. In low half swampy ground close to the shore of Massachusetts the Elder and the wild Rose (*R. virginiana*) often grow and flower together, and it is hard to believe that a more beautiful arrangement of summer flowers can be made in New England. In the Shrub Collection there is a form with dull yellow fruit (var. *chlorocarpa*), one with the leaflets deeply divided into narrow segments (var. *acutifolia*), and one with the flower-clusters four or five times larger than those of the wild plant and such large, heavy clusters of fruit that the branches barely support them (var. *maxima*).

Spiraea Veitchii. This Chinese species, introduced by Wilson from western China, is the last of the white-flowered Spiraeas in the Arboretum collection to bloom and one of the handsomest plants of the genus. It is a shrub seven or eight feet high with numerous erect stems, remarkably slender for the stems of such a large plant, and gracefully arching branches which are covered from end to end with broad flower-clusters raised on erect stems. For this climate this *Spiraea* ranks with the very best plants introduced from China in recent years.

Cornus amomum. Attention is called again to the Silky Cornel because it is one of the best of all shrubs to plant in this climate near the banks of streams and ponds where a large mass of foliage to spread out over the surface of water is desired. Examples of this use of this shrub can now be seen at two of the small ponds near the end of the Meadow Road where this Cornel is now covered with flowers. These will be followed in autumn by bright blue fruit; in the winter the purple stems are attractive. The Silky Cornel is a good plant, too, to place in front of groups of trees and shrubs, but it must have room for the free growth of its wide-spreading branches, for when crowded by other plants the branches become erect, and all the character and beauty of the plant is lost. A space of not less than twenty feet in diameter is necessary for the development of a handsome plant of the Silky Cornel.

Cornus arnoldiana. This plant, evidently a natural hybrid between two American species, *Cornus obliqua* and *C. racemosa*, which appeared several years ago in the Arboretum, is a large shrub with erect stems and characters intermediate between those of its parents; flowering a little later than *C. racemosa*, it has been covered with flowers this year. The fruit, which is usually less abundant than the flowers, is white or bluish white. Interesting to students of plants, as are all natural hybrids, *Cornus arnoldiana* is not superior as a garden plant to *C. racemosa* except perhaps in its greater size.

Rosa mundi, or more properly *Rosa gallica* var. *versicolor*, is the semidouble Rose with petals irregularly striped with white and dark rose color which is occasionally found in old New England gardens where it is generally called the York and Lancaster Rose, as it is also usually called in England. It is a handsome and interesting plant which should find a place in collections of old-fashioned Roses, but it is not the real York and Lancaster Rose which is a variety of *Rosa damascena* (var. *versicolor*). The petals of this Rose are in the same flower entirely white, entirely red and sometimes half red or rose color and half white. Flowers with petals of the two colors are well shown in the pictures of this Rose published early in the last century. The York and Lancaster Rose appears to have become extremely rare in gardens even in English gardens, but it has flowered abundantly this year in the Arboretum. The confusion in regard to these two Roses is likely to be increased by the fact that although one of them is a variety of *R. damascena* and the other of *R. gallica* they both have the same varietal name *versicolor*.

The Apothecary Rose is one of the names which was formerly given to a form of *Rosa gallica*, variously known as var. *officinalis* and var. *provincialis*. It is a dwarf plant growing from twelve to eighteen inches tall and spreading freely by underground shoots, and as it is able to maintain itself in sod it is gradually spreading from gardens and becoming naturalized. The foliage is dark green and the large, partly double, red flowers are extremely fragrant. This Rose occurs in a few of the old gardens of Massachusetts and New Hampshire, but is little known to rosarians of the present century. How long it has been in this country no one knows, although tradition makes the Huguenots responsible for its introduction. Formerly this Rose and other forms of *Rosa gallica* were cultivated in Europe on a large scale commercially to supply the petals which are slightly tonic and astringent, but were employed in medicine chiefly on account of their color and as a vehicle for the exhibition of more active medicines.

The last *Viburnum* of the season, *V. Canbyi*, is now in flower. It is the largest and handsomest of the blue-fruited species of eastern North America, with larger leaves and flower-clusters and larger fruit than those of the related species. In the Arboretum *Viburnum Canbyi* has grown into densely branched round-topped bushes from ten to twelve feet high and broad, and is one of the handsomest of the summer-flowering shrubs in the collection. Large specimens can be seen in front of the Administration Building and at different points along the drives.

The first *Hypericum*, *H. Buckleyi*, has already opened its flowers in the Shrub Collection. It is a rare plant found only on a few of the high mountains of North Carolina, but is perfectly at home in the Arboretum where it has been growing for many years. It forms a dense mat of slender branches less than a foot high, covered with small leaves and, usually early in July, with small bright yellow flowers. This *Hypericum* is an excellent plant for the rock garden and for a ground cover or the borders of shrubberies.

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JAMAICA PLAIN, MASS.

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Corylus. American nut-growers are beginning to turn their attention to the cultivation of Hazel-nuts (*Corylus*) and inquiries about these plants are now often sent to the Arboretum. *Corylus* is one of the widely distributed genera of the Northern Hemisphere with species in eastern and western North America, Japan, Korea, Manchuria, and northern and western China, on the Himalayas and the Caucasus, and in western Asia and Europe. Most of the species are shrubs, but a few of them are trees of considerable size. The following species and varieties are established in the Arboretum: *Corylus americana*, *C. Avelana* and its varieties *contorta*, *pendula* and *quercifolia*, *C. californica*, *C. chinensis*, *C. Colurna*, *C. heterophylla* and its variety *sutchuenensis*, *C. maxima* and its var. *atropurpurea*, *C. rostrata*, *C. Sieboldiana* and its var. *mandschurica*, and *C. tibetica*. Three of these species are trees, *C. Colurna*, *C. chinensis* and *C. tibetica*. *Corylus Colurna*, the Turkish Hazel or Constantinople Nut, is a native of southeastern Europe and Asia Minor, and is a tree sometimes seventy or eighty feet high with a tall straight trunk from two to three feet in diameter. This handsome tree was cultivated in western Europe as early as the middle of the seventeenth century, but it is not known when it was first brought to America where it is not common and where so far as the Arboretum knows there are no large specimens. The nuts are thick-shelled, not often more than half an inch in diameter and enclosed in a husk an inch and a half across, open at the end, terminating in numerous, narrow, pointed lobes, and covered with down mixed with gland-tipped bristles. Three or four of the fruits are borne together in close clusters. *Corylus chinensis* is a native of central and western China

where Wilson saw trees of this Hazel up to one hundred and twenty feet in height with trunks from two to five feet in diameter. The nuts are small and thick-shelled and are contained in husks less deeply lobed at the apex than those of *C. Colurna* and arranged in compact clusters. The third arborescent species in the collection, *C. tibetica*, is a small tree from twenty to twenty-five feet high, or a large bush common in woods in central and western China. From the other species, with the exception of the related *C. ferox* of the Himalayas, it differs in the fruit which is covered with slender spines and arranged in compact, globose, spiny clusters which resemble a Chestnut burr.

The other species in the collection are large or small shrubs. The two eastern American species, *Corylus americana* and *C. rostrata*, are common and widely distributed woodland plants often spreading over a considerable area. The former is a shrub from three to eight feet high with glandular bristly branches and an egg-shaped, thick-shelled nut enclosed in a husk nearly twice its length and irregularly toothed at the apex. *C. rostrata* is a smaller shrub rarely more than six feet high, with branches which are not furnished with bristles and an egg-shaped, thick-shelled nut about half an inch long and enclosed in a husk contracted into a long narrow beak extending an inch or more above the nut. *C. californica* is common in the coast region of the Pacific states from Washington to California where it sometimes grows to a height of twenty feet, and, while it differs in the leaves, resembles the eastern *C. rostrata* in the beaked husk of the fruit which is, however, stouter than that of the eastern plant, and often open at the mouth.

Only the two European species, *C. Avellana* and *C. maxima*, and possibly some of their hybrids, produce nuts of commercial value as human food. The hazel or hazel-nut is produced by *Corylus Avellana*. This is widely distributed in Europe and extends into northern Africa and western Asia, and sometimes grows to a height of twenty feet and usually forms large thickets by shoots produced from the root. The nut is thin-shelled, about three-quarters of an inch in length, and about as long as its husk which has divided, often toothed lobes. As the stems are very pliable and easily trained this shrub was used to form pleached or shaded walks more commonly found in European gardens a century ago than they are today. The large dark leaves cast a dense shade and no plant with a little training is better suited to protect a walk from the sun. There are several forms of this plant selected and cultivated for their nuts which vary in size and in the thickness of the shell; and a number of varieties differing in habit or in the color and size of the leaves from the type are sometimes found in collections of ornamental plants. In the Arboretum collection are now found only the var. *pendula* with distinctly drooping branches, the var. *contorta* with curled and twisted branches, and the var. *quercifolia* with lobed leaves. These plants are curiosities, without real value as garden plants. Other varieties not in the collection are var. *aurea* with yellow leaves, var. *atropurpurea* with purple leaves, and var. *laciniata* with deeply lobed leaves. From a Hazel of southwestern Asia which is sometimes considered a variety of *C. Avellana* (var. *pontica*) and sometimes a species (*C. pontica*) the Cobnuts of commerce are at least partly obtained. This plant has not yet proved hardy in the Arboretum. A larger and more robust plant than *C. Avellana* is the Hazel of south-

ern Europe, *C. maxima*. This is a vigorous and hardy shrub with large leaves and a large oblong nut enclosed in a husk produced in a long narrow tube and nearly twice the length of the nut. It is this plant and its selected forms which produce the filberts of commerce, which are also probably obtained from hybrids of *C. maxima* and *C. Avellana*. A variety of *C. maxima* with very dark red-purple leaves is the largest and most vigorous of all purple-leaved shrubs. Of the shrubby Asiatic species in the collection *C. heterophylla* of Japan or eastern China is an oriental representative of *C. Avellana*, from which it may be distinguished by the more regular dentation of the husk. The still little known var. *sutchuenensis* of this species from western China is growing well in the Arboretum but has not yet produced fruit. *C. Sieboldiana* with the long beak to the fruit is related to the American *C. rostrata*; it is a shrub which often grows to the height of fifteen feet and differs from the Korean and Mandshurian Hazel (var. *mandshurica*), often considered a species (*C. mandshurica*) in its much shorter tube of the husk. In the collection there is also a plant for which the Arboretum is indebted to Dr. R. T. Morris of New York and which is believed to be a hybrid of *C. americana* and *C. Avellana* var. *pontica*. This hybrid, which was raised artificially by Dr. Morris, has not flowered in the Arboretum. The Arboretum still needs the following species: *Corylus ferox* and *C. Jacquemontii* of the Himalayas, *C. hallaisensis* of southern Korea, and *C. colchica* of the Caucasus. It lacks, too, many varieties of *C. Avellana* and several of its supposed hybrids.

Coluteas, or Bladder Sennas as they are popularly called, are shrubs of the Pea Family with deciduous pinnate leaves, small leaflets, long-stemmed racemes of yellow or dark orange-red flowers and large inflated reddish brown pods. The flowers open in succession from June until August, and the pods from the early flowers are fully grown when the late flowers are still opening, the flowers and fruits together making an attractive appearance, as can be seen in the Shrub Collection where three species are now covered with flowers and fruits. They are *C. arborescens*, a native of the Mediterranean region and southeastern Europe, with dull green leaves and bright yellow flowers; *C. cilicica*, a native of Asia Minor, with blue-green leaves and yellow flowers; and *C. orientalis*, a native of southeastern Europe and Asia Minor, with glaucous leaves and reddish brown flowers. There is a dwarf compact form of *C. arborescens* (var. *bullata*) in the Arboretum, but the other species and a supposed hybrid (*C. media*) between *C. arborescens* and *C. orientalis* have not succeeded here.

Shrub. This is the old and usually accepted popular name for the plants of the North American genus *Calycanthus*, famous for the fragrance of the flowers of at least one of its species. One of the three or four species, *C. occidentalis*, a native of California, although it has often been planted in the Arboretum has not proved hardy here. Two of the eastern species are now covered with flowers in the Shrub Collection where, helped by the mild winter, they are in unusually good condition. The best known species, at least in gardens, *Calycanthus floridus*, to which the name Shrub properly belongs on account of the delightful fragrance of the red-brown flowers, is better worth a place in the garden than the other species of the genus, although in Massachusetts the

branches sometimes are severely injured by the cold of severe winters. Housewives of earlier generations carefully gathered the flowers to place among their linen which was pleasantly perfumed in this way; and the plants which produced these flowers were cherished for this purpose. From the other species *C. floridus* is distinguished by the thick coat of pale down on the lower surface of the leaves. The flowers differ somewhat in color: on a plant once cultivated by the Berckmans in their nursery at Augusta, Georgia, the flowers were yellow, and in the Arboretum collection are plants which have sometimes been referred to the rather obscure *C. Mohrii* on which the flowers are paler brown than those of the common form. These Arboretum plants were raised from seeds collected in the neighborhood of Stone Mountain, Georgia. *C. Mohrii* is said to grow in southern Tennessee and northern Alabama, and is a plant which needs investigation. The other Calycanthus now in the collection, *C. fertilis*, is distinguished by the absence of down on the lower surface of the leaves and by less fragrant or nearly scentless flowers. *C. fertilis* is a variable plant: on what is considered the type the lower surface of the leaves is pale and glaucous; on another form (var. *ferax* or *laevigatus*) the leaves are green on the lower surface; another form (var. *minus*) only differs from the last in its smaller size and smaller flowers and fruits. This dwarf form is the most northern of these plants as it has been found on the mountains of Pennsylvania; and on the Blue Ridge of North Carolina it is common up to altitudes of from three thousand to three thousand five hundred feet. The other species and varieties are plants of lower altitudes, and the most northern station for *C. floridus* known to the Arboretum is on the cliffs of the Coosa River near Rome in northwestern Georgia. The other genus of this Family, *Chimonanthus*, from southern China, is found in most tropical and semi-tropical gardens where it is valued for its very fragrant early flowers.

American Hydrangeas. Of the four Hydrangeas of eastern North America the handsomest is *H. quercifolia*, with branches densely covered with rusty tomentum, deeply lobed leaves up to eight inches in length, and flowers in elongated pyramidal clusters. This shrub is a native of the extreme southern states and the stems are often killed nearly to the ground here in severe winters; this summer the plant in the Shrub Collection is in better condition than usual and is now carrying one cluster of flowers. *H. arborescens* and *H. cinerea* with flat flower-clusters are common woodland shrubs southward, and are of no great value as garden plants. There are monstrous forms of the two plants on which all the flowers are sterile, forming nearly globose white heads. This form of *H. arborescens* (var. *grandiflora*) has become in recent years a popular plant with American nurserymen, by whom it is sold in great numbers. The handsomest of the entirely hardy American species, *H. radiata*, is a native of the elevated regions of North and South Carolina. It is distinguished by its broad leaves which are dark green above and snow white below, and by its broad flat clusters of flowers surrounded by a ring of large, white, sterile flowers. In cultivation this Hydrangea is a broad and shapely shrub and one of the handsomest of midsummer flowering plants in the Arboretum. Once it was fairly common in cultivation, but from what nurserymen can it now be obtained and how many gardeners of the present day have ever seen it?

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JAMAICA PLAIN, MASS.

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Linden Trees. Midsummer is the time when the fragrant flowers of Linden-trees open and scent the air with their fragrance. *Tilia*, the name of the Linden, is one of the widely and generally distributed genera of the trees of the northern hemisphere; it is absent, however, from western North America, and no Linden has yet been found in the forests which cover the Himalayas. Eastern North America with fifteen species is richer in Lindens than all the rest of the world, and in eastern North America Lindens are found from New Brunswick westward to Lake Winnipeg and southward to northern Florida and northeastern Mexico. To the two species which grow in Canada another is added in New York and Pennsylvania; southward in the forests which cover the high slopes of the Appalachian Mountains and in those of the coast region of the Carolinas and Georgia the number increases. Lindens are common in all the Gulf states, and abound in eastern and southern Texas where five species and several varieties occur and where Lindens grow by the scanty streams, and under the bluffs of the Edwards Plateau, a region in which Lindens would hardly be expected to flourish.

The ability of the southern species to grow in New England has still to be demonstrated in the Arboretum, and only three northern and one southern Appalachian species are established here. These are *Tilia glabra*, more often called *Tilia americana*, *T. neglecta*, *T. heterophylla* var. *Michauxii*, and *T. monticola*. *Tilia glabra* is a splendid great tree in the forests of the north where it was once abundant, with individuals more than a hundred feet high with trunks from three to four feet in diameter. Such trees are no longer common, for the wood of the northern Linden, usually known in commerce as white wood, has

been in popular use for many years and a large part of the trees of merchantable size have been cut. This Linden has been a good deal planted as a shade tree in New England, but the leaves are too often disfigured, especially in dry summers, by the attacks of the red spider. *Tilia neglecta*, which finds its northern station in the valley of the St. Lawrence River in the neighborhood of Montreal and is not rare in the northern states and along the Appalachian Mountains to North Carolina, is easily distinguished from *Tilia glabra* by the short persistent gray down on the lower surface of the leaves, the lower surface of the leaves of *T. glabra* being green and lustrous and destitute of hairs with the exception of those forming the large tufts in the axils of the principal veins. Although for many years confounded with *T. glabra*, *T. neglecta* does not appear to have been often planted as a shade tree in this country. In the Arboretum it is growing rapidly and now gives every promise of success. The other northern Linden, *T. heterophylla* var. *Michauxii*, is one of several species with leaves covered below by a permanent coat of white tomentum. This is a common tree from Pennsylvania and western New York to southern Indiana and Illinois, Missouri and southward along the Appalachian Mountains to North Carolina and northeastern Mississippi. This handsome tree is growing well in the Arboretum and is well worth a place in collections of ornamental trees. It grows less rapidly, however, and is not as handsome as the other hardy American Linden, *T. monticola*, a tree with leaves often seven or eight inches long and, like the last, covered below with white tomentum. The flowers, too, are larger than those of other Lindens. The leaves, hanging on long slender stems and swayed by the slightest breeze as they turn their snow-white lower surface to the eye, make in contrast with the dark Hemlocks among which this Linden often grows one of the beautiful features of the splendid forests which still cover the slopes of the southern mountains.

The studies of Linden-trees at the Arboretum have shown that the European species grow more rapidly and give every promise of being better trees in this climate than the American or Asiatic species. This is unusual, for of other European trees only the Beech and the white Willow grow better here than their American relatives, and except Lindens all eastern Asiatic trees are more at home in eastern North America than the trees of Europe. The five European species, *Tilia platyphyllos*, *T. cordata*, *T. vulgaris*, *T. tomentosa* and *T. petiolaris*, and several varieties of the first, are growing here in a satisfactory manner. The first of these trees is easily distinguished by the hairs which cover the lower surface of the yellow-green leaves and the young branches. This tree is the first of the European species to flower. It has long been cultivated in the eastern states; indeed it appears to be the common European Linden sold by American nurserymen, although as an ornamental tree it is the less desirable of the European Lindens. *Tilia cordata*, distinguished by its small cordate leaves pale and glaucous on the lower surface, is the last of the Lindens to flower. It is a beautiful tree which also in Europe grows to a large size; it is not very often seen in this country. A better tree here than either *T. platyphyllos* or *T. cordata*, *T. vulgaris* is now generally believed to be a natural hybrid of these species. The leaves are dull green on the upper surface, paler on the lower surface, and without hairs with the

exception of those in the tufts in the axils of the veins below. This tree, which is not rare in the northern and middle states, is one of the best trees to shade the streets of northern cities. The largest and handsomest Linden-trees in the neighborhood of Boston are of this hybrid.

The two Lindens of eastern Europe, *T. tomentosa* and *T. petiolaris*, are distinct and handsome trees with leaves silvery white on the lower surface, and can be easily and successfully grown in southern New England. *T. tomentosa*, which is common in the forests of Hungary, in this country forms a broad, compact, round-topped head with erect branches and large leaves erect on short stalks. *T. petiolaris* is a more beautiful tree with pendulous branches which form a narrow head and leaves drooping on long slender stems. It has proved to be one of the handsomest exotic trees which can be planted in the eastern states. It is occasionally seen in the neighborhood of Boston, but it is more common southward, especially in Newport, Rhode Island, where there are a number of noble specimens.

It is too soon to speak with much knowledge of the value of the Asiatic species as ornamental trees in this climate. Most of them have been introduced in recent years, and the oldest Asiatic Linden now in the Arboretum, *Tilia japonica*, was raised here from seed only planted in 1893. A comparatively large tree in Japan, the Arboretum species are now from twenty to twenty-five feet high, and are attractive trees with gracefully drooping branches and open habit. The leaves unfold earlier in the spring than those of any other Linden in the collection, and are small, cordate at base and pale on the lower surface, like those of the small-leaved European Linden (*T. cordata*) to which the Japanese tree bears some resemblance. The Arboretum trees have now flowered every season for several years, and the flowers are large, bright yellow, and like those of other Lindens, very fragrant. For its flowers, which appear when few trees bloom in this climate and are beautiful and conspicuous, this Linden should be better known. An earlier Asiatic Linden to reach the Arboretum, where it was first raised in 1883, was the north China *T. mongolica*. This was a small tree, at least in this country, with small, nearly triangular, lustrous leaves. When only a few years old it began to flower and produce fertile seeds. It proved, however, to be short-lived here and soon disappeared, to be replaced by what are still young plants of a later generation or of different introduction. All the other Asiatic species are or have been in the collection at different times. They are all hardy enough, but at best grow slowly, and appear to lack vigor of constitution. Of the species lately introduced *T. Oliveri* now appears the most promising.

Hybrid Lindens. As in many other genera of plants, the union of two species has produced Lindens superior to the parents. As has already been stated, *Tilia vulgaris*, which is believed to be a natural hybrid, is a better tree, at least in this country, than either of the parents. The Crimean *Tilia euchora*, with dark green, lustrous leaves, is believed to be a natural hybrid between *T. caucasica* and *T. cordata*. This handsome tree is hardy in the Arboretum but does not grow as well here as in western Europe where it is often recommended as a street tree. One of the handsomest Linden-trees in the Arboretum collection, *T. spectabilis*, is believed to be a hybrid of *T. glabra* and

T. petiolaris. It is a fast growing tree with leaves as large or larger than those of its American parent but silvery white on the lower surface like those of *T. petiolaris*. What is believed to be a variety of this hybrid (var. *Moltkei*) originated many years ago at the Spaeth Nursery near Berlin. It is a tree of denser habit and greener leaves than *T. spectabilis*, and in the Arboretum it is a handsomer and faster-growing tree than the native species.

Heather. Of the true Heaths only the red and white-flowered forms of *Erica carnea* are perfectly hardy here. This is a native of the mountains of central Europe, and an evergreen plant only a few inches high which spreads gradually into a broad mat. It is one of the first plants to flower in the Arboretum, and this year was in full bloom on the 15th of March. This is one of the best small evergreen shrubs for a sunny Massachusetts rockery. *Erica tetralix* and *E. vagans*, two handsome European species, have sometimes lived for two or three years at a time in the Arboretum, but have not proved very hardy in any of the positions where they have been planted. The Arboretum two years ago established in its propagating department at the corner of Centre and Prince Streets a collection of dwarf shrubs planted in frames and protected from the heat of the summer sun by lath shades raised high enough to permit a person to walk under them and to insure a free circulation of air. In these frames it has been found possible to grow successfully a number of shrubs which require partial shade and daily summer watering, and are too small and often too delicate to be properly protected in the open ground in a public garden of the size and character of the Arboretum. In this collection are now established such difficult plants as *Salix herbacea* and *S. uva-ursi*, *Linnaea borealis*, *Epigaea repens*, *Cassiope hypnoides*, *Loiseleuria procumbens*, *Kalmia microphylla*, *Rhododendron indicum*, *Vaccinium praestans*, and some three hundred other interesting dwarf shrubs which have never before been successfully cultivated in the Arboretum. In this collection it is now believed possible to maintain *Erica tetralix*, *E. vagaris* and possibly other dwarf species, and here will probably grow the so-called Irish Heath (*Daboecia*) which has not yet proved hardy here. The Heather (*Calluna*) is fortunately hardy in nearly all its forms, and an important plant for the New England summer garden or to naturalize in open New England woods. There is a good collection of these varieties of *Calluna* in the Shrub Collection. The first of them to flower this year (var. *rubra*) with gray leaves and crimson flowers is already in full bloom. The flowers of some of the white-flowered forms, of which there are several, are beginning to open, and now for several weeks the *Calluna*-collection will be an interesting feature of the Shrub-Collection. These plants in their compact habit and abundant bloom show the advantage of a severe pruning of the old wood in early spring before the plants start to grow. Unless this is done they become thin and bare, and are often short-lived. *Calluna* should be planted in not too rich, thoroughly drained soil and in full exposure to the sun.

The next of these Bulletins will appear during the month of August.

ARNOLD ARBORETUM
HARVARD UNIVERSITYBULLETIN
OF
POPULAR INFORMATION

JAMAICA PLAIN, MASS.

AUGUST 2, 1921

Summer Flowering Trees. Here in the north not many trees except Lindens can be grown which flower in summer. These are all valuable, however, for they add interest and variety to parks and gardens at the season when the flowers of trees and shrubs are not abundant. All the summer flowering trees here are interesting, and the flowers of some of them are conspicuous. After the Lindens the first of these trees to open its flowers is the Sorrel-tree (*Oxydendrum arboreum*). This tree is the only representative of a genus of the Heath Family and one of the few genera of eastern America trees which is not represented in eastern Asia. The Sorrel-tree is a common tree of the forests of the Appalachian Mountains from southwestern Pennsylvania southward; it grows also but less abundantly from southern Ohio and Indiana to northern Florida, southern Alabama and Mississippi and in eastern Louisiana. Growing under the most favorable conditions the *Oxydendrum* is a tree from fifty to sixty feet high, with a tall straight trunk sometimes twenty inches in diameter. The leaves are dark green, very lustrous and seven or eight inches long, and the bright scarlet of their autumn color is not surpassed by that of any other American tree. The leaves are pleasantly acidulous, a character to which the tree owes its vernacular name. The white flowers, which are shaped like those of an Andromeda, are erect on the branches of spreading or drooping clusters, and these are followed by pale capsular fruits which are conspicuous in contrast with the brilliant colors of the autumn foliage. Here in the north the Sorrel-tree begins to flower when only five or six feet high, and it is not probable that it will ever grow here to the size this tree attains in the rich "coves" found on the lower slopes of the high southern mountains in which several of

the trees of eastern North America grow to their greatest size. The Arboretum Sorrel-trees are planted among the Laurels (*Kalmia*) at the northern base of Hemlock Hill, and during the last two weeks have been covered with flowers.

Koelreuteria paniculata. This Chinese tree, which has been in bloom during the last ten days, is when in flower the most conspicuous of all the summer flowering trees which are hardy in this climate. It is a round-headed tree rarely more than thirty feet high, with large, compound, dark green leaves and large erect clusters of golden yellow flowers which are followed by great clusters of bladder-like pale fruits. This tree, which is hardy in Massachusetts, has been a good deal planted in this country, especially in the gardens of the Middle States. The *Koelreuteria* often appears in American nursery catalogues under the name of "Japanese Lacquer-tree," although it is not a native of Japan and has not lacquer-producing sap.

Maackia. Two species of this genus of the Pea Family were in flower during the last days of July. The better known of these trees, *M. amurensis*, is a native of eastern Siberia. It is a small tree with a slender trunk with smooth, lustrous, red-brown bark, small erect and spreading branches which form a rather flat-topped obconic head, and long, erect, narrow, terminal spikes of small white flowers. Botanically and geographically interesting, the chief value of this *Maackia* from the garden point of view is found in the fact that its flowers open at a time when flowers can only be seen here on a few trees. A second species, *Maackia hupehensis*, discovered by Wilson in central China, has been covered with flowers which are pale yellow and borne in rather shorter spikes. In early spring the silver gray hairs which thickly cover the unfolding leaves make this little tree conspicuous and interesting. The bark of *M. hupehensis* is dull grayish green and less beautiful than the bark of the Siberian tree.

Another eastern Asiatic tree of the Pea Family will bloom during the present month. This is the *Sophora* which, first sent to Europe from Japan where it had been cultivated perhaps for a thousand years, is called *japonica*, although it is not a Japanese tree but a native of northern China and Korea. Growing in Peking where this *Sophora* has been much planted, it is a large tree with a massive trunk often three feet in diameter covered with gray, deeply furrowed bark, and a round-topped head of large spreading branches, which seen from a little distance looks like that of a great Oak. Such trees have not grown in Europe where the *Sophora* was brought from Japan some hundred and fifty years ago, or in the United States where it has never been much planted and where no remarkable specimens exist. The leaves and young branches are green, and the small, pea-shaped, creamy white flowers are produced in great numbers in narrow terminal clusters erect on the branches, and are followed by nearly round pods much constricted between the seeds, as are the fruits of the other species of the genus *Sophora*. What is probably the largest and handsomest specimen of this tree in eastern Massachusetts is growing in the Public Garden of Boston. The Arboretum collection contains a specimen of the form of this tree with long drooping branches (var. *pendula*) which rarely if ever flowers, the form with erect branches (var. *pyramidalis*),

and the form with flowers tinged with pink (var. *rosea*). The *Maackias* and *Sophoras* are growing on the slope on the right hand side of Bussey Hill Road above the path which connects that road with the Meadow Road.

The *Aralia* Family supplies northern plantations with three handsome trees which flower in August. The most interesting of these three trees, possibly because it is still the least known in this country, is *Acanthopanax ricinifolium*, an inhabitant of the forests of Japan and Korea where it sometimes grows to the height of seventy or eighty feet and forms a massive trunk and great wide-spreading branches armed, like the stems of young trees, with numerous stout prickles. To the shape of the leaves, which somewhat resemble those of the plant which produces the fruit from which castor oil is obtained, this *Acanthopanax* owes its specific name. The leaves, which are nearly circular and more or less deeply five- or seven-lobed, and fifteen or sixteen inches in diameter, hang on long slender stalks. The small white flowers are arranged in compact, long-stemmed clusters which form a compound flat terminal panicle which varies from twelve to eighteen inches in diameter and is well raised above the leaves. In the early autumn the flowers are followed by small black and shining fruits. Of the trees growing in the Arboretum this *Acanthopanax* most departs in appearance from the trees of New England; and no other tree here is regarded with more curiosity. The largest specimen is growing by the side of the pond on the right hand side of the Meadow Road near its junction with the Bussey Hill Road; there is another large specimen in the mixed border plantation in the rear of the group of *Viburnums* near the junction of the Bussey Hill and Valley Roads. These trees have not before been more thickly covered with clusters of flower-buds.

Aralia spinosa is a common tree, growing usually in the neighborhood of streams in the region from western Pennsylvania to Missouri, and southward to northern Florida, Louisiana and eastern Texas. It is a slender tree thirty or thirty-five feet high with a stem rarely more than eight inches in diameter and wide-spreading branches furnished, like the young trunk, with stout scattered prickles. The leaves, which are clustered near the end of the branches, are from three to four feet long and about two and a half feet wide, on stems from eighteen to twenty inches in length which clasp the branches with their enlarged base, and are usually armed with slender prickles. The small, greenish white flowers appear in August in many-flowered umbels arranged in broad compound panicles three or four feet long which rise above the leaves singly or two or three together from the end of the branches. The small black fruit ripens in early autumn. This *Aralia* is now thoroughly established at the northern base of Hemlock Hill in the rear of the plantation of Laurels (*Kalmia*) and is spreading to a considerable distance from the original plant by means of underground stems from which new plants rise.

Aralia chinensis, so closely related to the American *Aralia* that it has sometimes been considered a geographical variety of that tree, appears in the Arboretum collection in several varieties. The best known of these varieties, a native of Manchuria and eastern Siberia (var. *mandschurica*), is a hardier plant at the north than the American spe-

cies and has been much more generally planted. In commercial nurseries it is often sold under the name of *Dimorphanthus mandshuricus*. Japanese and Chinese varieties of this *Aralia*, although less hardy than its Siberian representative, can be seen in the group of these plants near the junction of the Meadow and Bussey Hill Roads.

Rhus javanica, an eastern Asiatic Sumach which is perhaps better known as *Rhus Osbeckii* or *R. semialata*, is a good August flowering tree in New England. In this country it is rarely twenty feet high, with spreading branches which form a broad round-topped head of handsome, light green, pinnate leaves with a broad-winged petiole and rachis. The flowers are white in erect, long-branched, pyramidal clusters, ten or twelve inches long and standing well above the leaves. The fruit is globose, about a quarter of an inch in diameter, red, and in compact clusters. The leaves of few trees or shrubs turn in the autumn to a more brilliant scarlet. For its showy August inflorescence and the splendor of its autumn foliage this Sumach should find a place in the planting lists for northern gardens.

Evodias are small summer-flowering Asiatic trees of the Rue family, widely distributed in eastern Asia and found also in Madagascar and Australia. The species have pinnate leaves, white or pinkish unisexual flowers in small clusters terminal on the shoots of the year, and dry capsular fruit. Like the *Phellodendrons* to which *Evodia* is related, they are protected from the attacks of insects by the pungent aromatic oil with which the leaves abound. *Evodia* has been growing in the Arboretum since 1905 when Professor Jack brought the seeds of *E. Daniellii* from Korea. This handsome tree has flowered now for several years in the Arboretum. *E. hupehensis*, a common inhabitant of the forests of western Hupeh where Wilson found it growing to a larger size than the other Chinese species of this genus, is also established and flowers in the Arboretum.

Stewartia pseudo-camellia, another summer-flowering tree, was among the first plants to reach the United States direct from Japan, and before 1870 was distributed from the Parsons Nursery at Flushing, Long Island. It produces its pure white, cup-shaped flowers, which resemble those of a single *Camellia*, in August; the autumn color of the leaves is dark bronze purple, distinct from that of any other plant in the Arboretum and handsome and interesting; the smooth pale gray bark which separates in large pale plates adds, too, to the interest of this tree. There are two specimens on the upper side of Azalea Path.

A handsome dwarf Conifer. Among a large number of seedlings of the Carolina Hemlock (*Tsuga caroliniana*) raised at the Arboretum from seeds planted in 1881 two individuals are dwarf in habit. The smaller of these plants is now only ten feet high with a spread of branches of twelve feet, and the other is thirteen feet high with a spread of fifteen feet. They show no tendency to form a leader, and look as if they would continue to grow more rapidly in breadth than in height. In their wide-spreading and gracefully drooping branches they are more beautiful even than the well-known weeping form of *Tsuga canadensis* which has usually been considered the handsomest of dwarf conifers.

These Bulletins will now be discontinued until the autumn.

ARNOLD ARBORETUM
HARVARD UNIVERSITYBULLETIN
OF
POPULAR INFORMATION

JAMAICA PLAIN, MASS.

NOVEMBER 1, 1921

Conifers, especially Junipers of abnormal form, and dwarf and other small growing plants, have not before been planted in such numbers in the eastern states, where they are usually crowded together in beds without much regard to harmony of arrangement. Such beds of Conifers are found on each side of the entrance to many suburban and other estates, and against the base of houses small and large. The plants in these little plantations are attacked by numerous disfiguring insects and must often be changed, and, as is always the case in mixed plantations, some of the plants grow more rapidly than others and eventually destroy their weaker neighbors.

The statement that the climate of eastern North America is not adapted to the successful growth of Conifers is shown by the collection of these plants in the Arboretum which is believed to be the richest in the United States. There are now recognized twenty-eight genera of Conifers. Representatives of only fourteen or one-half are in the Arboretum collection and several of these are kept alive with difficulty. These genera are all of the Northern Hemisphere. No tree of the six genera which are found south of the equator is hardy at the north in our eastern states. The Japanese *Thujopsis* has never grown in the Arboretum, in which four genera of southern China, *Glyptostrobus*, *Keteleeria*, *Taiwania* and *Fokienia* will always be unrepresented. More serious is our inability to grow here successfully some of the most important Conifers of western America, for the Sequoias, and no species of *Cupressus* are hardy here; the western *Tsugas* and *Chamaecyparis* are kept alive here with difficulty; the beautiful *Abies venusta* cannot survive a single New England winter, and the noblest Fir-trees in the

world, *Abies nobilis* and *A. magnifica*, occasionally exist here for a year or two but will never become a conspicuous feature in our northern plantations. There are from one hundred and sixty to one hundred and seventy species in the genera of Conifers which can be grown here, and in addition to the species a large number of varieties and forms, especially in *Juniperus*, *Chamaecyparis* and *Picea*. Of the genera which are more or less hardy here one hundred species can be kept alive in the Arboretum often for many years, but many of them present a sorry appearance after a severe winter and are of more interest to students of trees than to lovers of beautiful plants.

This short review of the Conifers shows that a comparatively small number of these plants can be depended on to become permanent ornaments to northern gardens and that the best of them here, with the exception of native species, are inferior in size and beauty to these plants in regions suited to their best growth, like the west coast of Scotland, the Italian lakes, and northwestern North America.

In northeastern North America many shrubs with deciduous leaves grow better and produce more abundant crops of flowers and fruit than anywhere in the world, and such plants can well and economically replace the dwarf and other Conifers which of late have been so largely used in the northern and middle states. If Evergreens are essential there are several dwarf hardy Rhododendrons which form a more compact setting for a building than the mixed plantation of little Conifers, and among other broad-leaved Evergreens suitable for the purpose there is the Laurel (*Kalmia latifolia*), the handsomest broad-leaved Evergreen plant which can be grown in the eastern states, the Inkberry of our coast region, and the *Andromeda floribunda* of the southern Appalachian Mountain forests.

The exceptionally mild winter of 1920-21 and the unusually heavy rainfall of the past summer have improved the appearance of the Arboretum Conifers which are now looking unusually well, but as at least from seventy-five to one hundred years are needed to properly test the value of any tree of large size transferred to a region where it does not grow naturally we can only feel sure that such native Conifers as the White Pine (*Pinus Strobus*), the northern Hemlock (*Tsuga canadensis*), the so-called Red Cedar (*Juniperus virginiana*), the Arborvitae (*Thuja occidentalis*), and the White Cedar (*Chamaecyparis thyoides*), are really the trees for permanent New England plantations.

Of the White Pine and the Hemlock nothing need be said here; their place is among the noble Conifers of the world and they are familiar to all the tree lovers of northeastern America. As a timber-tree only the long-leaved Pine of the south (*Pinus palustris*) is more valuable than the White Pine. The Red Cedar is a widely distributed tree ranging from Nova Scotia to eastern Texas. In this great region it varies in size and habit, and at the north is rarely more than thirty or forty feet high and usually of narrow pyramidal habit, while in the south its head is more often broad and round-topped; it grows, too, to a large size in the south sometimes, and specimens once existed in the valley of the Red River one hundred feet high. Largely used now, especially in the middle states, for the decoration of gardens this Juniper is more valuable as a timber than as an ornamental tree for in gardens it too often suffers badly from the red spider and other disfiguring insects. But as a timber tree the Red Cedar among American trees is in a class by itself.

The bright red, fragrant wood in contact with the soil resists decay for many years; its fragrance makes it the best American wood for chests and the lining of closets used for the summer storage of woollens as the odor of the wood is repellent to moths. There are a number of forms of the Red Cedar in the Arboretum collection and several of them are now found in commercial nurseries. The handsomest of these are forms with silvery gray foliage, with gracefully pendulous branches, and some of the forms of dwarf habit, especially the plant now sold in nurseries as *Juniperus Kosteriana*. The Arborvitae produces durable fence posts but is not large enough to be profitably sawed into lumber. No tree, with the exception perhaps of the Japanese species of *Chamaecyparis* (*Retinospora*), produces so many distinct seedling forms. There are at least fifty of these in the Arboretum collection, varying from large or small, dense ball-shaped plants to tall narrow pyramids; there are forms with yellow leaves and with pendulous, and with slender, whiplike branches. As a garden plant the most valuable of them all is perhaps the tall slender pyramid raised many years ago by Robert Douglas of Waukegan, Illinois, and generally known as "Douglas's Pyramidal Arborvitae." This appears to be the best substitute in northern gardens for the pyramidal Italian Cypress. There are two good specimens of this pyramidal Arborvitae in the Arboretum collection. The eastern America *Chamaecyparis* is a handsome slender tree with gray-green foliage and durable wood often used for fence posts, but in beauty and importance as a timber tree is far below in value the western American and Japanese species. It is established in the Arboretum but has grown slowly here and has sometimes suffered during severe winters, although it is common in swamps within twenty miles of Boston and formerly grew naturally within three or four miles of the Arboretum. Although it has not been cultivated as long as the White Pine, the Hemlock and the Arborvitae, the Red or Norway Pine (*Pinus resinosa*) may be expected to become a permanent tree in north-eastern plantations. In youth it is a beautiful tree with long dark green leaves, and the handsomest of the hard wood Pines which can be grown in this climate. This Pine once grew naturally in the neighborhood of Boston, and its adaptability to the soil of the Arboretum is shown by the numerous seedlings which spring up here naturally and grow rapidly. The other New England Conifer, the Pitch Pine (*Pinus rigida*), becomes sometimes a picturesque tree, but probably will never be much planted except on the sands of Cape Cod where it grows better than most trees under such difficult conditions and produces quickly good crops of valuable fuel. There are four other eastern Pines in the Arboretum, the northern *Pinus Banksiana*, the short-leaved southern Yellow Pine (*Pinus echinata*), one of the valuable timber trees of the country, the Appalachian *Pinus pungens* and the Virginia Jack Pine (*Pinus virginiana*). The last and *Pinus Banksiana* will probably be permanent trees here but they have no particular value beyond the fact that they can grow rapidly in the poorest soil. *Pinus pungens*, too, grows on sterile hillsides from Pennsylvania to Georgia and is the least valuable of these American conifers. The short-leaved Yellow Pine has been growing in the Arboretum for more than thirty years. It has grown very slowly, and even the trees raised from seeds collected on Staten Island, New York, lose their leaves in severe winters.

Seventy-five years have not been required to show that some com-

monly cultivated Conifers have no real permanent value in northeastern North America. The Colorado Blue Spruce, for example, was first raised from seeds in the Harvard Botanic Garden during the winter of 1863, the year after its discovery by Dr. Parry. One of the original seedling plants now fifty-eight years old is growing here on the south slope of Bussey Hill in good soil and has had good care; it has lost most of its lower branches, others are half dead, and it is hard to imagine a more miserable looking object. For several years it has been allowed to live as a warning to planters of this tree which is perhaps the most popular Conifer in eastern America where it is planted every year by tens perhaps hundreds of thousands. Millions of dollars have been spent for this tree which has always sold at a high price, but it is not probable that in fifty years one per cent. of all the planted trees will be alive. The unusual blue color of the leaves and the juvenile habit of this Colorado tree attract planters who rarely look many years ahead or avail themselves of information to which they might have access if they cared for it.

Three European Conifers which have been largely planted in the northeastern states in the last sixty or seventy years have not proved permanently valuable here. These are the so-called Norway Spruce (*Picea Abies* or *excelsa*), the Scotch Pine (*Pinus sylvestris*) and the Austrian Pine (*Pinus nigra*). They are all hardy here and valuable timber trees in their native countries. The Norway Spruce is a handsome tree here in youth but at the end of forty or fifty years begins to die at the top and soon becomes unsightly. This tree is not planted as generally here now as it was but its introduction into this country must be considered a misfortune. The two Pines have not been so often planted although some American foresters are raising and planting the Scotch Pine in large numbers. The seedlings grow rapidly and are easily transplanted. From thirty to forty years, however, appear to be the length of life of this tree in most parts of the eastern states. It is possible, of course, that planted as forest trees it may last longer, but this fact should be known before large forest plantations are made of it, that is in eighty or one hundred years from this time. The Austrian Pine has been less commonly planted. It grows well while young, but too often dies without apparent cause at the end of thirty or forty years. As an ornamental tree it is in every way inferior to the native Red or Norway Pine.

Of the Conifers of other regions that have not yet been thoroughly tested here, that is which have been growing in New England for less than fifty or sixty years, those which give the greatest promise of permanent usefulness in this climate are the Hemlock of the Carolina Mountains which has been growing in the Arboretum for forty years and is now perhaps the most beautiful of all the Conifers in the collection, the Chinese Pseudolarix, the Japanese *Abies homolepis*, the White Fir of the southern Rocky Mountains (*Abies concolor*), the Colorado form of the Douglas Spruce discovered in 1862, two Japanese Spruces, *Picea bicolor* and *P. Glehnii*, the western White Pine (*Pinus monticola*), the Idaho form of the western Arborvitae (*Thuja plicata*), and the Balkan Spruce (*Picea omorika*). Time, however, only can tell, what the value of these trees may be when they have reached maturity.

These Bulletins will now be discontinued until next spring.

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Synonyms are in *italics*

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