

# ARNOLDIA



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## THE TREE LEGUMES IN THE ARNOLD ARBORETUM

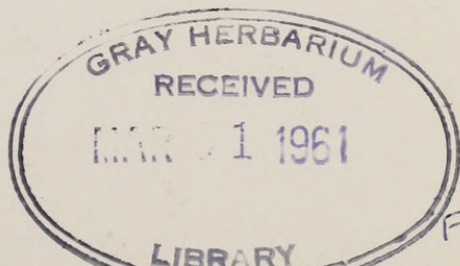
THE trees and shrubs in the Arnold Arboretum include, insofar as possible, specimens of all the woody plants known to be hardy in the Boston area. Many of these plants not only enhance the beauty of the garden, but are arranged in family or generic collections for greater ease in conducting scientific or horticultural studies. Several of these areas have become of special interest to visitors. The legumes seldom attract the casual visitor, who is lured to the garden by the breathtaking beauties of the lilacs and the Oriental cherries, but it offers much to those with time enough to examine it carefully. Located in the loop formed by the Meadow Road as it meanders down to the ponds and then turns to climb past the forsythias and the lilacs, this area contains seven genera and approximately forty-four species, varieties or cultivars.

### Cercis

In the spring the first of this group to flower and the one best known to Arboretum visitors is the red-bud or Judas tree, *Cercis canadensis*. The showy magenta flowers appear in umbel-like clusters along the bare branches. Often flower clusters can be found arising from buds on the trunk and from the base of the tree, as well. When the foliage appears, it, too, is very attractive. The simple, heart-shaped leaves are easily distinguished from the compound leaves generally associated with the legumes. Although the specific epithet indicates that this plant is native in Canada, it occurs there only in southern Ontario near the Great Lakes, but is more frequently found in the southeastern section of the United States as far north as Connecticut and reaching westward into southern Wisconsin.

### Cladrastis

In this collection the genus *Cladrastis* is represented by three species, all of which produce paniced racemes of white flowers during the early summer. The *Cladrastis* takes its name from the Greek *klados*, a branch, and *thraustos*, fragile,





since when the branchlets are bent even slightly they break under the strain. The most widely grown of this genus is *C. lutea*, the yellow-wood, a native of the area encompassed by Kentucky, Tennessee and North Carolina, which attains an average height of thirty feet. The pendulous panicles of this species, often sixteen inches long, consist of fragrant, pea-like white flowers. In addition to its showy flowers, the tree has clear yellow foliage in the fall while the light gray trunk gives it an attractive appearance in winter. One cultivar, known as 'Rosea,' has originated in the species. This is a tree growing on the grounds of the Perkins Institute for the Blind in Watertown, Massachusetts, which has pink flowers with golden yellow bases. No specimens of this selection are grown in the Arboretum at present, but as soon as the plants in the nursery reach the proper size, they will be added to the collection.

*Cladrastis sinensis* and *C. platycarpa* represent the east Asian members of the genus. Mature trees of the Asiatic species can be distinguished from the native by their upright inflorescences. The Arboretum's only specimen of *C. sinensis* is quite a recent, and as yet immature, addition to the group, but will soon contribute much-branched panicles of pinkish-white flowers to the summer scene. The flowers of *C. platycarpa* are not nearly so attractive as those of *C. lutea*, for they are neither so large nor so numerous and the brownish-green calyx covers a portion of the corolla, but they appear in late June or early July when few trees are in bloom.

### Maackia

The *Maackia*, named for the Russian naturalist Robert Maack, is less well known and less frequently planted than *Cladrastis*. All natives of Asia, the *Maackias* produce white flowers which are borne in dense, upright racemes, several of which usually unite to form a terminal panicle, and while the inflorescences and the individual flowers are smaller than those of *Cladrastis*, their flowering in late July or early August makes them a welcome addition to the garden. Of the two species in the Arboretum collection, *M. chinensis*, a native of central China, has 11-13 leaflets on each leaf and three-quarter-inch-long flowers, while *M. amurensis*, a native of Manchuria, has 7-11 leaflets, with flowers half an inch long. *Maackia amurensis* var. *bueggeri*, differing from the species in having more obtuse leaflets which are pubescent on the under side, is also found in the collection.

### Sophora

*Sophora japonica* is one of the most beautiful of all the leguminous trees. The origin of the generic name is somewhat obscure, but it appears to have been taken from the Arabic *Sophira*, the name for a tree bearing pea-shaped flowers. Neither the common name, Japanese pagoda tree, nor the scientific name is accurate in designating the area in which the plant is native, since it comes from China and Korea. One of the specimens growing in the Arboretum collection is the picturesque 'Pendula,' having stiff, drooping branches. The flowering period of late August



and early September is the most valuable attribute of *Sophora japonica*, although one should not discount the dense, deep green foliage which remains on the tree until late in the fall, forming an interesting contrast with the yellow Maackias and the neighboring *Nyssa sylvatica*, its flaming reflection igniting the nearby pond. The pea-like flowers, white or on occasion slightly pinkish, are borne in loose terminal panicles. This species does not have the distressing attribute of producing nectar containing an insecticidal agent, as does some members of this genus. During their flowering season the ground around those plants producing this substance is littered with dead and dying bees. The fruit produced is a pod unlike those of other legumes, being constricted between the seeds and thus giving the effect of a chain of beads.

### The Robinia

The *Robinia*, named for the French herbalists Jean and Vespasien Robin, has the largest representation of any genus in the legume collection. The taxonomy of this group is very much confused because some of the early botanists failed to recognize the large number of hybrids which exist both in nature and in cultivation. In some cases more than one specific name has been applied to the selection from a hybrid swarm. All species within this genus have some ornamental value; most are cultivated for their showy, often fragrant flowers and some for their growth habit or foliage. The white-to-pink-to-magenta flowers appear in early June.

Some excellent specimens of *Robinia pseudoacacia*, the black locust, are in the Arboretum collection. A native from Pennsylvania to Georgia and westward to Iowa, Missouri and Oklahoma, this is the species most commonly found in gardens. It has become naturalized in many more northern areas, being found now as far north as southern Canada. Glabrous seed pods and branches distinguish this from other members of the genus. Many variations have arisen in this species and these have been propagated by cuttings or grafts and widely distributed to the nursery trade. The typical form is a tree up to 80 feet tall, having compound leaves with 7-19 leaflets and bearing white flowers. Twelve selections from this species are grown in the Arboretum collection.

*Robinia pseudoacacia* 'Microphylla' differs from the typical form in having smaller, narrower leaflets which give the plant an airy delicacy.

The selection or cultivar *Robinia pseudoacacia* 'Unifolia' occasionally has only one, but generally 2-7 leaflets on each leaf. These leaflets are larger than those of the typical form. Other selections with the same leaf variation but having in addition a variation in habit are *R. pseudoacacia* 'Dependens' with pendulous branchlets and *R. pseudoacacia* 'Erect,' a columnar form.

A number of plants have been selected which lack stipular spines. *Robinia pseudoacacia* 'Inermis' differs from the typical form only in lacking stipular spines while *R. pseudoacacia* 'Umbraculifera' is an unarmed selection whose branches



form a dense, subglobose head. The tree in the Arboretum collection is small and planted so that it will have its globose head near the ground. Usually these plants are seen in formal gardens or on narrow streets as grafts on high trunks of the typical form. The selection rarely produces flowers, being grown only for its interesting shape. *Robinia pseudoacacia* 'Bessoniana' closely resembles the preceding selection, but differs in having more slender branches and a less dense, ovoid head.

A number of plants have been selected and grown because of the interesting patterns formed by their branches and foliage. The densely covered branches of *Robinia pseudoacacia* 'Annularis' have contorted branchlets and leaves. This growth pattern results in a reduced branch spread and a narrow crown.

*Robinia pseudoacacia* 'Rectissima' is a fastigiate form with stiffly ascending branches. *Robinia pseudoacacia* 'Cylindrica' produces short, lateral, ascending branches which cause the tree to have a narrow crown.

Several selections have been made because of flower characteristics. *Robinia pseudoacacia* 'Semperflorens' is characterized by the sporadic production of flowers throughout the summer.

Rose colored flowers distinguish *R. pseudoacacia* 'Decaisneana' from other members of the species.

*Robinia hispida* is represented in the collection by several plants. The species is a small tree or shrub growing to a height of 10 feet, having hispid stems, branches and peduncles and with profuse rose-colored to pale purple flowers, many of which are nearly an inch long. Spreading rapidly by root sprouts, this species can be a problem to keep under control.

Closely related to *Robinia hispida* is *R. fertilis*. Both occur in much the same area of southeastern United States. In fact, *R. fertilis* is considered by some to be a variety of *R. hispida*. The distinction usually made between the plants is that *R. hispida* has leaflets which are suborbicular to oval, rounded at the apex, and glabrous, while the leaflets of *R. fertilis* are elliptic-ovate to oblong-ovate, acute to obtusish, and slightly pubescent beneath.

*Robinia neo-mexicana*, the New Mexico locust, is a small tree which may occasionally grow to a height of 25 feet. This is a common, often abundant species of the canyons and coniferous forests from southern Colorado to southern Nevada, western Texas, New Mexico, Arizona and northern Mexico. It is distinguished from the other species in the collection by the presence of numerous short hairs on the branches and leaflets which cause them to have a grayish appearance. There are no specimens in the Arboretum collection labeled '*Robinia luxurians*,' although it is cited as a parent of some of hybrid selections, but according to Kearney and Peebles' Flora of Arizona, which covers the area in which *Robinia neo-mexicana* and *Robinia luxurians* are native, the latter is considered "a scarcely worthwhile variety" of *R. neo-mexicana*.

Two small trees approximately seven feet tall represent *Robinia hartwigii*. The





**PLATE I**

*Albizia julibrissin* var. *rosea*. Above: Habit of flowering tree. Below: Close-up of flowering branch.



flowers are pale pinkish-purple and appear after most of the other species have ceased flowering. It may be distinguished from other small-tree species by its branches, peduncles, and petioles, which are covered with short hairs and in addition bear stalked glands.

*Robinia leucantha* is represented in the collection by a small tree approximately 8 feet tall. There is a distinct possibility that this species result from hybridization between some of the species which occur in Georgia where this plant was discovered. Its outstanding characteristics are its glabrous leaves and branchlets and its white flowers. Further study is needed to show the relationship of this plant to others in the genus.

Many species of *Robinia* have been found to hybridize readily with other members of the genus in gardens and in the wild. Some of these hybrids have characteristics which make them desirable from a horticultural point of view. Unfortunately botanists have often failed to realize just how readily these species hybridize and with insufficient evidence, have described new species.

The following are all reputed hybrids and are listed under the formula of the hybrid.

Perhaps the cross between *Robinia pseudoacacia* and *R. hispida* has produced more hybrid species than any other. *Robinia kelseyii* has been accepted as a distinct species by a number of botanists but appears to be a selection from the above cross. It is intermediate between the two parental species in such respects as habit, color of flowers and vestiture of leaves and twigs. *Robinia margaretta* is presumed to have originated from such a cross and resembles *R. pseudoacacia*, though it differs in having pinkish flowers, slightly glandular rachis, pedicels and calyx, and a rather rough pod. *Robinia* 'Idaho,' which flowers two or three weeks later than most trees in the collection, is a selection from the hybrid population and is notable for its very bright purplish-pink flowers.

The cross between *Robinia kelseyii* (*R. pseudoacacia*  $\times$  *R. hispida*) and *R. pseudoacacia* is a type of hybrid known as a backcross. Two plants in the collection represent selections from this hybridization. *Robinia slavinii* is a small tree which has rosy-pink flowers and shows some pubescence on the branchlets and petioles. *Robinia hilleri* is a selection made by Hillier & Sons, Winchester, England. The tree in the collection is 15 feet tall and produces lilac-pink flowers.

*Robinia holdtii* is a hybrid of *R. neo-mexicana* (*R. luxurians*)  $\times$  *R. pseudoacacia*. The tree in the collection is 12 feet tall, and bears pinkish flowers which are borne in somewhat less dense racemes than those of the previous hybrids.

*Robinia ambigua* 'Bella-rosea' is a selection from the hybridization of *R. pseudoacacia* with *R. viscosa*. The selection is notable for its larger and more deeply colored flowers.

#### Albizia<sup>1</sup>

<sup>1</sup> The correct spelling of this generic name is *Albizia* not "Albizzia" as in general usage. Article 73 of the International Code of Nomenclature states, "The original spelling of a



An exotic which has its origin in the area stretching from Persia to central China is the *Albizia*, named for the Italian nobleman F. degli Albizzi. *Albizia julibrissin* var. *rosea*, the silk tree, is an exceptionally hardy clone which is able to survive the rigorous New England climate prevailing in the Arboretum. This species is the sole representative of the subfamily Mimosoidea, which contains such interesting genera as *Mimosa* and *Acacia*, both of which are well known to travelers in the American tropics.

The leaves of the *Albizia* are finely bipinnately divided and have a definite fern-like appearance. The folding of the leaflets at night in so-called "sleep movements" is also distinctive. The tree is among the last in this area to come into leaf in late spring and because of this, trees have been presumed dead and destroyed by gardeners not acquainted with its habits. The deep pink or reddish staminal filaments of what would otherwise be inconspicuous flowers, resemble dainty fans held up above the delicate, deep green foliage. These appear in early July and continue until early September. Only the variety *rosea* is hardy in the Boston area. Care should be taken, also, against introducing to this area plants grown in the South since there is a blight prevalent among southern plantings which has done much harm.

Trees of this species are very fast-growing, often reaching a height of 20 feet and a spread of 30 feet.

#### **Gymnocladus and Gleditsia**

The remaining genera in the Arboretum collection are considered primarily as shade trees. *Gymnocladus dioicus*, the Kentucky coffee-tree, dominates the lower portion of the collection. As is true of all members of this species, its branches appear fluted because of the gray outer bark which splits and rolls back. This character can be easily recognized even in the dead of winter. The flowers, opening in mid-June, are regular, approximately half an inch in diameter and, being greenish-white, do not contrast sufficiently with the foliage to attract much attention. The fruit is a short, broad pod containing a thick pulp in which the seeds are embedded. *Gymnocladus dioicus* is native to the area bounded by New York State and Pennsylvania in the east, Minnesota and Nebraska in the west, and Oklahoma and Tennessee in the south. The common name comes from the attempt by the early settlers in Kentucky and Tennessee to use the beans as a coffee substitute. The attempt was not completely successful and was abandoned as soon as coffee became readily available.

The diseases affecting some of the genera long used as shade and street trees have been the means of arousing interest in various species of *Gleditsia*. The only

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name or epithet must be retained, except that typographic orthographic errors should be corrected." The name was spelled uniformly in the original publication (Duraz., Mag. Tosc 3 (4): 10, 11, 13, illus. 1772) as *Albizia* even though Durazzini states that the name honors "Il Sig. Cavalier Filippo degl 'Albizzi." For further study see E. Little, Amer. Midl. Nat. 33: 510. 1945.



species widely grown and the one from which a large number of selections have been made is *G. triacanthos*, the honey locust. The typical form of the species is represented in the collection by mature trees approximately 60 feet tall. It is easily recognized by the large, much-branched thorns borne on the trunk and main branches. These are rigid and sharp enough to puncture an automobile tire. The flowers are small and inconspicuous, adding little to the desirability of the tree. The fruits are often more than 10 inches long and remain on the tree until blown off by the strong mid-winter winds. These pods, tobogganning over the snow in January or February, may be carried considerable distances from the parent tree.

It would appear from the description of the typical form that the poor qualities of this tree more than outweigh its virtues as a disease-free, robust shade tree. However, there exists in nature a population (*Gleditsia triacanthos* forma *inermis*) without thorns. Although trees of this form are of a more slender habit when young, they eventually grow to be much like the typical form in height. It is from this *G. triacanthos* forma *inermis* population that the many widely advertised cultivars have been selected. Some are excellent shade trees and are to be highly recommended. The selections cited here are those present in the Arboretum collection and are not to be considered superior or inferior to any selections not mentioned.

*Gleditsia* 'Elegantissima,' the oldest in date of origin of these selections, is unarmed and of a dense, bushy habit. Another selection here is *G.* 'Moraine,' a patented plant which does not bear fruit. This plant flowered heavily this spring, but since they were all staminate or male flowers, no fruits could be formed. This has less dense foliage than the typical form, giving the plant an attractive, lacy appearance. *Gleditsia* 'Seiler' is another of the sterile forms but the Arboretum specimen has not reached sufficient size to indicate the growth habit. *Gleditsia* 'Sunburst' was selected because the terminal leaflets on each branchlet remain a bright yellow throughout the summer. The specimen in the collection is not particularly attractive, but this may be due to any one of several reasons. Probably one should match the environment of a flourishing specimen if one wished to plant this selection in his grounds.

The hybrid species *Gleditsia*  $\times$  *texana* is a hybrid of *G. triacanthos*  $\times$  *G. aquatica* and can be distinguished from the preceding species by its straight pods and from the following species by the number of leaflets, which generally exceed twenty per leaf. This tree bears thorns similar to *G. triacanthos*.

Two Asiatic species, *Gleditsia japonica* and *G. sinensis*, are also represented. Both species bear spines and pods and in general resemble *G. triacanthos*, although they never reach the height of that species. *Gleditsia sinensis* is distinguished from other members of the genus in the collection by its terete spines and flat pods. *Gleditsia japonica* has twisted pods and flattened spines and is distinguished from the honey locust by its obtuse leaflets and glabrous ovary.





## PLATE II

Above: *Gymnocladus dioica*. Leaf and fruit on 1-inch grid. Below: Inflorescence of *Robinia kelseyi*.



## Laburnum

The description of tree legumes in the Arboretum would be incomplete without some mention of *Laburnum*. None of this genus are planted in the basic collection, but several may be found in other parts of the Arboretum. *Laburnum alpinum*, the Scotch laburnum, can be distinguished from other members of the genus by its glabrous leaves and branchlets. A form known as *L. alpinum* 'Fragrans' has been selected for its fragrant flowers. *Laburnum anagyroides* is distinguished by its pubescent leaves and branchlets, while *L. anagyroides* var. *alschingeri* has silky leaflets which are bluish-gray beneath. The flowers are borne on nearly upright racemes. A hybrid of *L. alpinum* and *L. anagyroides* is *L. × watereri*, commonly called the golden chain tree. In most characters it is intermediate between the parent species. An excellent specimen is growing near the road just below the crest of Bussey Hill.

BURDETTE L. WAGENKNECHT





**PLATE III**

*Gleditsia triacanthos*. Above: Habit of mature trees. Below: Foliage and fruit on 1-inch grid.



### Key to the Genera of Tree Legumes

1. Leaves simple . . . . . Cercis.
1. Leaves compound . . . . . 2.
  2. Leaves bipinnately compound . . . . . 3.
  2. Leaves pinnately compound . . . . . 4.
3. Flowers in dense heads, stamens numerous, longer than corolla, filaments pink . . . . . Albizia.
3. Flowers in terminal, loose panicles, stamens 6-10, shorter than corolla, filaments greenish white . . . . . Gymnocladus.
4. Flowers not papilionaceous . . . . . Gleditsia.
4. Flowers papilionaceous . . . . . 5.
5. Leaflets three, flowers yellow, in pendulous racemes . . . Laburnum.
5. Leaflets more than three, flowers not yellow . . . . . 6.
  6. Flowers in simple racemes. . . . . Robinia.
  6. Flowers in panicles . . . . . 7.
7. Flowers appearing in August, legume constricted between the seeds . . . . . Sophora.
7. Flowers in June or July, legume flat, not constricted between seeds . . . . . 8.
  8. Winter buds free, scaly, leaflets opposite . . . . . Maackia.
  8. Winter buds enclosed in the petioles, leaflets alternate . Cladrastis.





Wagenknecht, Burdette L. 1961. "The Tree Legumes in the Arnold Arboretum." *Arnoldia* 21(3), 19–30.

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