A contest held to select the most beautiful flowering tree native to eastern North America (exclusive of southern Florida) would certainly bring forth a number of entrants, each staunchly supported by many admirers. A leading contender for the title would be the evergreen magnolia or bull bay, *Magnolia grandiflora*. The catalpa trees, *Catalpa speciosa* and *C. bignonioides*, would likely be nominated, along with the Franklin-tree, *Franklinia alatamaha*, the black locust, *Robinia pseudoacacia*, the Carolina silverbell, *Halesia carolina*, the sourwood, *Oxydendrum arboreum*, and the tulip-tree, *Liriodendron tulipifera*. A number of small trees would also have to be considered, including the flowering dogwood, *Cornus florida*, the eastern redbud, *Cercis canadensis*, the native crabapples, *Malus* species, the shadbushes, *Amelanchier arborea* and *A. laevis*, and the hawthorns, *Crataegus species*. All of these trees are outstanding ornamentals, being attractive not only when in flower but throughout most of the year, and they are all commonly cultivated in the eastern United States wherever they are hardy.

There is, however, another plant, rare in nature and in cultivation, that is worthy in every respect of being considered one of the most beautiful trees of eastern North America. This is the yellowwood, *Cladrastis lutea*, which was discovered in March of 1796 by André Michaux, as related in his Journal.

"The 2nd remained over in order to pull young shoots of a new Sophera I had remarked in the vicinity of Fleen's Creek about 12 miles from the Fort [Fort Blount, on the north bank of the Cumberland River near the present town of Gainesboro, Tennessee]. Snow covered the ground and I was unable to get any young shoots but Captain Williams, the young [officer] stationed in the Fort, cut down some trees and I found some good seeds.

"I also pulled up some roots of those trees to replant them in my garden in Carolina.

"The same day I had occasion to write to Governor Blount."

I do not know if plants were successfully propagated from these seeds and roots. André Michaux died of a tropical fever in Madagascar in 1802, but his son, François André, who had accompanied his father on many collecting trips in the Carolinas, continued to explore
the southeastern United States. In the year of his father's death, François also came across yellow-wood trees, as mentioned in his Travels.

"We found particularly, in these forests, a tree which, by the shape of its fruit and the disposition of its leaves, appears to have great affinity with the *Sophora japonica*, the wood of which is used by the Chinese for dyeing yellow. My father, who discovered this tree in 1796, thought that it might be employed for the same use, and become an important object of traffic for the country. He imparted his conjectures to Mr. Blount, then governor of this state, and his letter was inserted in the Gazette at Knoxville on the 15th of March 1796. Several persons in the country having a great desire to know whether it were possible to fix the beautiful yellow which the wood of this tree communicated to the water by the simple infusion, cold, I profited by my stay at Nashville to send twenty pounds of it to New York, the half of which was remitted to Dr. Mitchell, professor of chemistry, and the other addressed to Paris, to the Board of Agriculture, attached to the Minister of the Interior, in order to verify the degree of utility that might be derived from it. This tree very seldom rises above forty feet, and grows, in preference, on the knobs, species of little hills, where the soil is very rich. Several of the inhabitants have remarked that there is not in the country a single species of tree that produces so great an abundance of sap. The quantity that it supplies exceeds even that of the sugar maple, although the latter is twice its bulk. The epoch of my stay at Nashville being that when the seeds of this tree were ripe, I gathered a small quantity of them, which I brought over with me, and which have all come up. Several of the plants are at the present moment ten or fifteen inches high. It is very probable that this tree may be reared in France, and that it will endure the cold of our winters, and more so, as, according to what I have been told, the winters are as severe in Tennessee as in any parts of France."

The yellow-wood tree was not included by André Michaux in his posthumously published *Flora boreali-americanae* of 1803. However, his son did describe it in his *Histoire de arbres forestiers de l'Amérique septentroniale* of 1813, naming it *Virgilia lutea*. At that time, the genus *Virgilia* was used for a number of species that had been included previously in *Sophora*. (Today, *Virgilia* is restricted to one or two species of South Africa.) In 1824, C. S. Rafinesque published a new generic name, *Cladrastis*, for this tree, renaming the species *C. tinctoria*. The International Code of Botanical Nomenclature recognizes the principle of priority so that the proper scientific name of a plant is the combination of the earliest available legitimate specific epithet with the correct generic name. For many years, the accepted scientific name of the yellow-wood tree has been *Cladrastis lutea* (Michaux f.) K. Koch. However, Rudd (1971) adopts the name *C. kentukea* (Dum.-Cours.) Rudd. This specific name is based on a description published by Dumont de Courset in 1811 of a young, non-flowering plant cultivated in France. Although the description appears to correspond to the yellow-wood, there are differences, and I am hesitant to accept this name change.

Yellow-wood is a moderate-size deciduous tree, with mature plants reaching a height of 50 feet (Cover, Figures 1 and 4). The trunk,
Fig. 1. a–c, *Cladrastis lutea* in winter: a, grove of four trees on the Tree Legume slope in the Arnold Arboretum; b, base of tree with short trunk and several main branches; c, smooth, beech-like bark of a main branch. Photos: K. R. Robertson (from colored slides).
often 2 or 3 feet in diameter, is short and soon forks into a few wide-spread branches, and the tree has a graceful, broad rounded top. The record tree in Morristown, Pennsylvania is 58 feet tall with a crown spread of 70 feet and a trunk circumference of 16 feet. The heart-wood is a clear yellow when first cut, partly changing to a light brown. The hard, heavy, strong, and close-grained wood takes a good polish, and early pioneers used it to make gunstocks and small articles of furniture. Fortunately for the sake of the species, but not for cabinetmakers, the trunks of wild trees fork too closely to the ground for the species to be harvested commercially for lumber. Also, the wood tends to crack and check unless carefully dried. The bark (Figure 1c) is smooth and silvery-gray, much resembling that of beech trees. As a result, yellow-wood trees in parks and arboreta usually bear the marks of young lovers and others who like to carve their initials on trees. The root system, deep and extensive, does not interfere with neighboring trees or a lawn (although it possibly might clog underground drainage systems) and enables well established yellow-wood trees to endure periods of drought. Branches of the yellow-wood are brittle (the generic name comes from the Greek _klados_, branch, and _thraustos_, fragile), and the crotch of the tree trunks also are weak; thus, yellow-wood trees, particularly old ones, are susceptible to damage by strong winds. Young yellow-wood trees may be pruned to a single upright bole that is considerably more resistant to wind damage.

The winter buds are very distinctive (Figure 2a). They are in superimposed clusters of usually three sessile, densely pubescent buds that are nearly encircled by a prominent C- or V-shaped leaf scar (the bud cluster was entirely enclosed by the base of a petiole of the previous year). A true terminal bud is lacking (although the last axillary bud is often produced very near the tip of the twigs) and branching is thus sympodial, with the twigs often being slightly zig-zagged. In midspring, the uppermost bud of the more apical bud clusters (Figure 2b, c) and also some of the lower axillary clusters enlarge and quickly send out the growth of the year. Since the new shoot with its leaves and inflorescence is largely preformed in the winter bud, growth and expansion is quite rapid. Each new shoot on mature trees is only a few inches long and is terminated on flowering branches by the very long inflorescences. The leaves expand to their full size quickly, but the flowers do not open until early summer; thus there is a period of several weeks when the pendulous inflorescences, hanging below the foliage, give yellow-wood trees an unusual, rather graceful appearance (Figure 2d). The leaves of _Cladrastis lutea_ are arranged alternately along the branches, are pinnately compound with an odd number, usually seven (five to eleven), of leaflets per leaf, and are mostly 10 to 15 inches long at maturity. The lateral leaflets are broadly elliptic or ovate in outline, with acuminate tips, tapering or slightly rounded bases, and entire margins; the terminal leaflet is more
Fig. 2. Cladrastis. a–h, C. lutea: a, winter twig — note superposed buds surrounded by leaf scar, b, tip of twig in early spring with two leaves and inflorescence emerging; c, branch later in spring with expanding leaves and young inflorescences; d, fully expanded leaves and pendulous inflorescences, the flowers not yet open; e, inflorescence with open flowers, f, lower part of flowering tree; g, large tree in full flower; h, tip of summer twig with bases of two leaves, the base of the leaf to the right pulled away from the twig to show how it encloses the winter buds; i, Fruits of C. platycarpa. Photos: K. R. Robertson (from colored slides).
or less rounded-rhomboid in outline with a cuneate base and an abruptly acuminate tip and is shorter and broader than the lateral ones. The upper lateral leaflets are usually 4 to 6 inches long and 2 to 3½ inches wide at maturity, with the lower lateral leaflets being somewhat smaller. A characteristic feature of leaves of Cladrastis is that the lateral leaflets are arranged alternately along the rachis of the leaf (Figure 4b). This feature, plus the relatively large size of the leaflets, could cause the casual observer to think that the leaves were simple instead of being compound (the first leaves produced by seedlings are, in fact, simple). Stipules and stipels are absent. In autumn, the leaflets turn a clear bright yellow. As mentioned earlier, the base of the petiole is swollen and completely encloses the winter buds (Figure 2h).

The white flowers, opening in June, are borne in long, many-flowered, pendulous, Wisteria-like panicles that terminate the growth of the current year (Figure 2e, f). Flowers are produced in abundance usually every second or third year, but in a good year, the trees are spectacular! (see Figure 2g.) The papilionaceous (pealike) flowers show that Cladrastis is a member of the pea subfamily of the legume family (Leguminosae subfamily Faboideae). The sepals are united into a green tube with five calyx teeth. The five petals are of three different sorts (Figure 3). The upper “banner” petal is outermost and, in bud, encloses the two lateral “wing” petals and the two inner “keel” petals. All the petals are clawed below, and they fit together so that the banner petal, which has a yellow area toward the base of the blade, is very conspicuous and attracts insect pollinators, while the all white wing and keel petals function as a landing platform for insects. The flowers are quite fragrant, particularly in the evening. The ten stamens are enclosed by the keel petals. In Cladrastis, the filaments of the stamens are all free from one another. This feature indicates that this genus is allied with Sophora, pagoda trees, Mackia, and numerous other genera. As in nearly all Leguminosae, the pistil is of one simple carpel. The cylindrical ovary is shortly stalked below and tapers above into an elongate style that is tipped by a small stigma.

The fruit of Cladrastis lutea is a flattened legume, somewhat like that of redbud (the genus Cercis), up to 4 inches long and mostly ¾ inch wide (Figure 4c). There are one to several seeds in each fruit, and the fruits are often slightly constricted laterally between the seeds (perhaps the best botanical description would be “flattened tortulose”). The fruits mature in size by August and in September are brown and dry. They remain on the trees for a short period after the fall of the leaves, but they soon fall to the ground. The fruits on the trees, both during the summer and after the leaves have fallen, detract from the appearance of the trees, but at least they do not remain on the trees during winter. After the fruits have fallen to the ground, the fruits either dehisce or they decay over winter to release
Fig. 3. Cladrastis lutea. Original drawing by C. E. Faxon from which the engraving for Tab. CXIX in Vol. 3 of Sargent's Silva was made. Shown in the illustration are: a flowering branch, the petals of a flower (lower left), a diagram of a flower, a stamen, a vertical section of a flower and an ovary, and an ovule (all to the lower right). From the Library of the Arnold Arboretum.
Fig. 4. Cladrastis lutea. a, grove of trees on Tree Legume slope in summer; b, mature leaves; c, fruit. Photos: K. R. Robertson.
the seeds. The seeds are olive-brown and beanlike, slightly laterally flattened, and about ¼ inch long and ⅛ inch wide; the hilum is quite off-center.

*Cladrastis lutea* is endemic to the eastern United States, occurring from Brown County, Ohio and Brown County, Indiana west through southern Illinois to southwestern Missouri, northern and central Arkansas, and extreme eastern Oklahoma, south through central Tennessee to central and southern Alabama, and east to the mountains of eastern Tennessee, North Carolina, and extreme northern Georgia. However, this overall distribution does not really reflect the distribution of *C. lutea* since the species occurs disjunctly in numerous scattered localities (Figure 5). Wild yellow-woods are found in two quite different habitats: cliffs along river systems and openings in hardwood or hemlock forests of moist coves. Cove forests are most common in the southern Appalachian Mountains, and yellow-wood trees of these forests are tall with erect, flat crowns and trunks that fork fairly close to the ground. Toward the western and southern part of their range, yellow-wood trees occur primarily at the brink of cliffs, along ledges on cliffs, or sometimes toward the base of cliffs. Yellow-wood trees of the cliff habitat are small and have trunks that fork about half way up (much of the above information from Pittillo, 1963). Steyermark has noted that thousands of these rare trees have been destroyed by the construction of dams (Bull Shoals, Taneycomo, and Table Rock) along the White River and its tributaries of northern Arkansas and southwestern Missouri. Because of its rare occurrence, scattered distribution, and presence in areas subject to flooding by man-made dams, yellow-wood has been included in the Federal list of endangered plant species.

Yellow-wood is not for mass planting as a yard or street tree; it is, instead, for the discriminating gardener who will give it a prominent place among other rarities. Such a person will be rewarded. In winter, the beech-like bark and overall appearance of the tree is very attractive. In late spring, the tree is truly spectacular when in full bloom (heavy flowering occurs only every other year or so). The rounded shape of the crown, the rich green color and medium texture of the foliage, and the short trunk make the yellow-wood a nice tree during the summer. In autumn, the leaves turn a rich yellow. In short, the yellow-wood has something ornamental to offer at all seasons. The only unattractive period is when the fruits mature and, for a short time, hang on the trees in the fall. Perhaps someday plant breeders will develop a sterile form that does not set fruit and that might flower more regularly every year. Yellow-wood is hardy nearly throughout the eastern United States and southern Canada. It is not bothered by insect or fungal pests, is tolerant of most soil types, and can withstand moderate drought once it is established.

Yellow-wood is also for the patient gardener. First of all, it is rather difficult to find in nurseries, and, when available, it is usually
Fig. 5. Distribution map by county of Cladrastis lutea.
in limited quantities. It also is slow growing, taking ten to twenty years to flower for the first time, and it only flowers heavily every second or third year.

Although yellow-wood is not commonly cultivated, there are a number of fine specimens in Cambridge, Massachusetts, particularly in the vicinity of the Botanic Garden Apartments on Garden Street (former site of the Harvard Botanic Garden), in Mount Auburn Cemetery, and in the Tercentenary Theater of Harvard Yard between Memorial Church and Widener Library. The Arnold Arboretum’s grove of yellow-woods is on the Tree Legume slope (Figures 1 and 4).

Yellow-wood may be propagated by root cuttings or by seed, which should be covered with hot water (190°F), allowed to set overnight, then stratified for three months at 40°F.

On the grounds of the Perkins School for the Blind in Watertown, Massachusetts is a pink-flowered yellow-wood. It is not at all clear where this tree originated, and there is no report of a pink-flowered form from the wild. This tree has been propagated by scions and distributed to the Arnold Arboretum and to the Brimfield Nurseries in Connecticut. A number of years ago, the Morton Arboretum, Lisle, Illinois, and the Arboretum of the Barnes Foundation, Merion, Pennsylvania obtained plants from the Brimfield Nurseries. The plant at the Morton Arboretum first flowered in 1970, while that at the Barnes Foundation first flowered in 1976. The plants at the Arnold Arboretum have not yet flowered. For more information on the pink-flowered yellow-wood, see Fogg (1976) and Wyman (1963).

While Cladrastis lutea is the only species of the genus native to the New World, there are four other species in eastern Asia. These are: C. sinensis Hemsl. of central and western China (Figure 6), C. Wilsonii Takeda of central China, and C. platycarpa (Maxim.) Makino and C. shikohiana Makino of Japan. All of these, except for the last species, are cultivated in Europe, but only C. platycarpa and C. sinensis are occasionally grown as botanical curiosities in this country. They are not as ornamental or as reliably hardy as our native C. lutea. Cladrastis is closely related to Maackia, and the two genera are sometimes united under the former name. Maackia amurensis, a native of Manchuria, is occasionally cultivated in the eastern United States for its July bloom.

**KEY TO THE CULTIVATED YELLOW-WOODS**

1. Legumes flattened but not winged, stipels absent.

2. Leaflets broadly elliptic or ovate with acuminate tips and tapering or slightly rounded bases; ovary glabrous, panicles mostly drooping.
   - **C. lutea.**

2. Leaflets oblong to oblanceolate with obtuse or acutish apices and rounded bases, ovary finely pubescent, panicles upright.
   - **C. sinensis.**

1. Legumes flattened, winged all the way around; stipels present.
   - **C. platycarpa.**
Fig. 6. A 60- x 10-foot specimen of Cladrastis sinensis at base of Fei-Yueh-ling in Ching Chi Hsien (5,000-foot altitude). Photo. E. H. Wilson, 1908.
Selected References

———. The discovery of the southern yellow wood Ibid. 15. 40-42. pl. 4. 1927.
Duncan, W. H. Preliminary reports on the flora of Georgia. 1. The distribution in Georgia of spermatophytes new to or rare in the state. Castanea 13: 70–83. 1948 [Cladrastis, 77–79, includes distribution map of the genus in the southeastern U.S.]
———. Cladrastis. Silva N. Am. 3. 55–57. pls. 119, 120. 1890.

Steyermark, J A. A tomentose form of *Cladrastis lutea*. Rhodora 40. 487. 1938. [From along the Black Warrior River near Tuscaloosa, Alabama.]


