

## The Bladdernuts

by RICHARD E. WEAVER, JR.

The month of May is the peak of bloom for woody plants in New England. The majority of azaleas, lilacs, magnolias, crabapples, and other favorite and familiar trees and shrubs bloom during the month, and they provide such a spectacular display that many other fine but less showy ornamental plants are often overlooked. A good example of these neglected ornamentals are the bladdernuts, the genus *Staphylea*. The seven to ten species are shrubs or small trees with white to pink, often fragrant flowers borne in drooping to pendent panicles in mid-May. The flowers of all the species are distinctly charming, but unlike those of crabapples or magnolias, must be viewed close at hand to be appreciated. The flowers are followed by curious papery, bladderlike fruits with very hard, nutlike seeds, which are ornamental through the summer and the fall, somewhat compensating for the lack of good autumn foliage color. All the species are woodland plants so they grow and flower well in full deciduous shade. They will succeed in any good, well-drained soil; they have no major insect pests; and the truly hardy species require minimal maintenance, looking their best with very occasional removal of the oldest stems. Admittedly, some of the species will re-

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*The hybrid Staphylea × coulombieri usually bears both two-celled capsules as in S. pinnata and three-celled capsules as in S. colchica. Photograph by R. E. Weaver, Jr.*



*A young plant of Staphylea pinnata in the Arnold Arboretum. The conspicuous fruits, even while immature as in this photograph, are nearly as ornamental as the flowers. Photograph by R. E. Weaver, Jr.*

main curiosities, cultivated in arboreta or botanic gardens for their botanical interest. But several are first-rate ornamentals and deserve to be cultivated more widely. Unfortunately, none of the species are readily available commercially at present. It is hoped this article will stimulate some interest among nurserymen, encouraging them at least to test the potential of these plants as ornamentals.

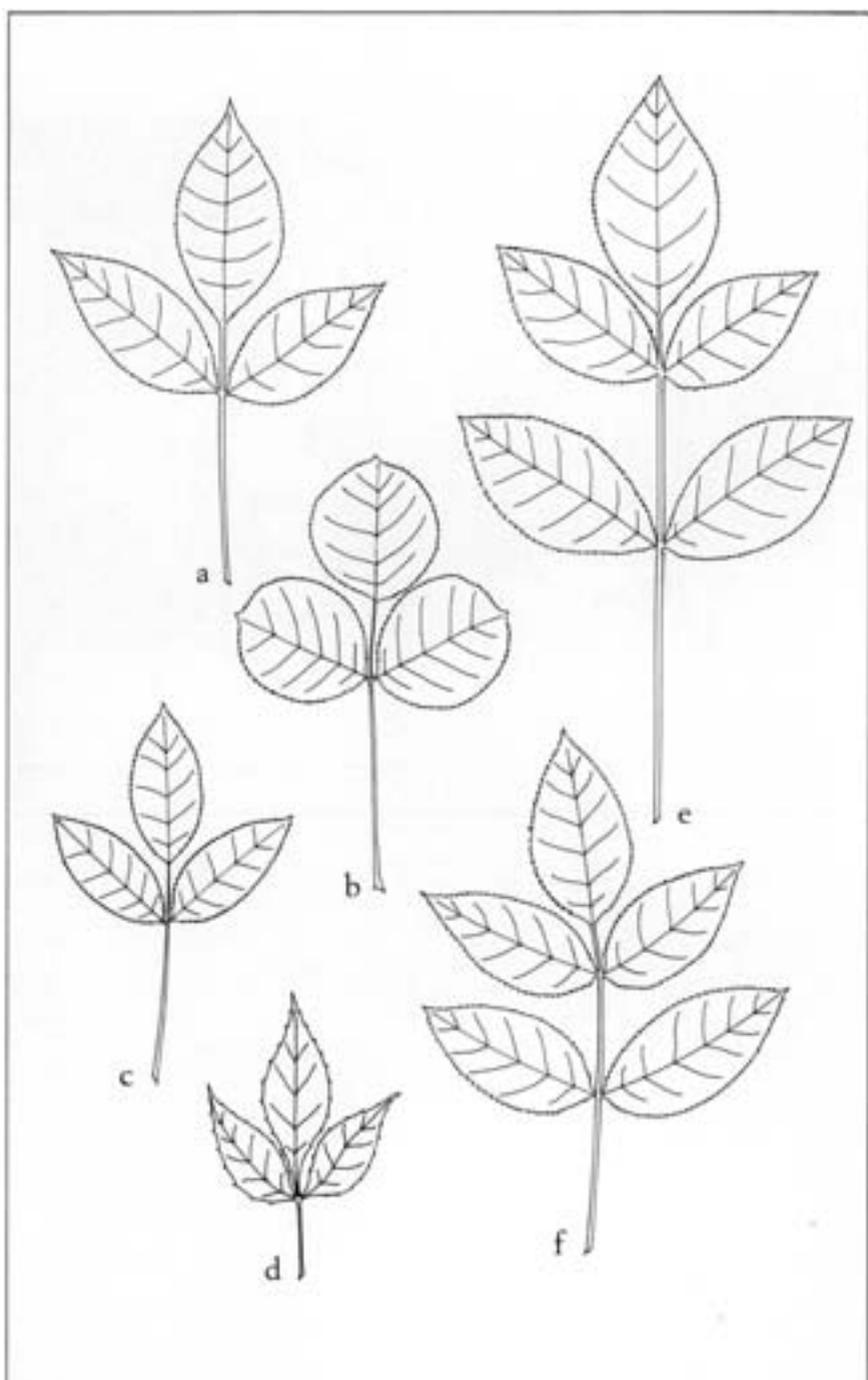
*Staphylea* is the type genus of the small family Staphyleaceae. The largest genus, *Turpinia*, is widely distributed through both the Old and New World tropics. Another genus, *Euscaphis*, with its single species *E. japonica* distributed in Japan, Korea, and China, is occasionally cultivated, but is not quite hardy at the Arnold Arboretum. *Staphylea* itself has a classic Arcto-Tertiary distribution. Plants with such a distribution pattern were once more or less continuously distributed across the entire North Temperate Zone. With time their ranges became restricted to several discrete and widely separated areas within that vast expanse: southeastern United States,



*A flowering branch of Staphylea pinnata, showing the pendent inflorescence and the roundish, pearl-like flowers typical of this species. Photograph by R. E. Weaver, Jr.*

western United States, eastern temperate Asia, the Himalaya Mountains, the Caucasus Mountains, and central Europe. At present one or two species of *Staphylea* are native in each of these areas.

The species of *Staphylea* are weakly to strongly stoloniferous shrubs with numerous arching, sparsely branched stems. In the wild they tend to be loose and unkempt, but in cultivation form attractive, vase-shaped shrubs. A few species occasionally grow to be small trees. The leaves are deciduous and opposite, as in the hardy members of the closely related maple family, and compound with finely serrate leaflets. The leaves of most species are trifoliolate, with three leaflets, but two species have pinnately compound leaves with five to seven leaflets at least on the non-flowering shoots. The flowers appear mostly with the leaves in more or less erect but usually drooping to pendent racemes or panicles. The flowers are perfect with five sepals, barely fused at their bases and often nearly as long as the five free, white to pink petals; five stamens; and a two- to three-parted pistil



**Leaves of the various *Staphylea* species. (a) *S. trifolia*; (b) *S. bolanderi*; (c) *S. holocarpa*; (d) *S. bumalda*; (e) *S. colchica*; (f) *S. pinnata*. Drawings by J. Hicks.**

with as many separate styles. The base of the superior ovary is surrounded by a fleshy, nectar-secreting disklike gland. The common name of the genus is derived from the unique fruits, which are actually papery, inflated, bladder-like, two- to three-celled capsules, with a few large, nutlike seeds with lustrous and extremely hard seed coats in each cell at maturity. The fruits develop rapidly after the flowers fade, and they persist into the fall or early winter, providing ornament for a long period of time.

**Key to the Identification of the Cultivated Species of *Staphylea***

- A. Leaves with 3 leaflets.
  - B. Terminal leaflets and panicles usually sessile (stalkless); fruits 2-parted, flattened. . . . . 5. *S. bumalda*.
  - B. Terminal leaflets and panicles on long slender stalks; fruits 3-parted, inflated.
    - C. Panicles appearing before the leaves from lateral buds on year-old wood; fruits unlobed at apex. . . . . 4. *S. holocarpa*.
    - C. Panicles appearing with the leaves on short, lateral, leafy branchlets; fruits 3-lobed at apex.
      - D. Leaflets typically nearly round in outline; stamens conspicuously projecting beyond the petals. . . . . 2. *S. bolanderi*.
      - D. Leaflets typically oval in outline; stamens more or less enclosed by the petals.
        - E. Plants usually shrubby; flowers less than ½ inch long; fruits less than 1½ inches long at maturity. . . . . 1. *S. trifolia*.
        - E. Plants usually treelike; flowers about ½ inch long; fruits usually more than 2 inches long at maturity. . . . . 3. *S. emodii*.
- A. Leaves with 5-7 leaflets or with only 3 leaflets on the flowering shoots.
  - F. Panicles horizontal to slightly drooping; flowers with the fragrance of orange blossoms; sepals widely spreading, exposing the petals, which form a "tube" around the stamens; fruits more or less pear-shaped, longer than broad, becoming brittle and shedding their seeds while still attached to the plants.
    - G. Flowers pure white; leaves on flowering branchlets with 3 leaflets; fruits usually 3-parted. . . . . 6. *S. colchica*.
    - G. Flowers white, but the sepals tinged purple at their tips; leaves on flowering branchlets with 3-5 leaflets; fruits usually 2-parted. . . . . 7. *S. × coulombieri*.
  - F. Panicles pendent, hanging vertically; flowers with a faint spicy fragrance; sepals spreading only at their tips, more or less enclosing the petals; fruits more or less globular, about as long as broad, remaining soft and pliable and falling from the plants with the seeds still enclosed. . . . . 8. *S. pinnata*.

**1. *Staphylea trifolia* Linnaeus**

Our native bladdernut, *Staphylea trifolia*, is widely distributed in eastern North America from southern Canada to the northern Gulf states and eastward from the Mississippi Valley, but it has always been one of our lesser known native shrubs. There does not appear

to be any folklore associated with it, nor have references been located documenting its use by the American Indians. Finding it in the wild has always been exciting for me, perhaps because it often is an indicator of rich forests with an interesting and varied flora. It usually grows as an understory shrub, often forming dense colonies as a result of root suckering, but it occasionally grows to be treelike. The largest known individual, growing near Utica, Michigan, is thirty-six feet tall with a trunk circumference of nineteen inches. In cultivation it forms a graceful, vase-shaped shrub with numerous arching stems up to twelve to fifteen feet tall.

Like the majority of *Staphylea* species, *S. trifolia* has trifoliolate leaves. The three typically oval leaflets taper abruptly to a slender point, and their margins are finely and regularly serrate. They may be as much as four inches long when mature, and they are thinly covered on their undersides with fine hairs. The terminal leaflet is borne on a long, slender stalk, but the lateral leaflets are often nearly sessile (stalkless). The odorless flowers are borne in drooping panicles one to three inches long at the tips of short lateral branches and appear in mid-May at the Arnold Arboretum. The individual flowers are less than a half inch long. The white petals barely project beyond the sepals, and the effect is basically greenish. Also, since the flowers appear with the developing leaves and are partially obscured by them, *S. trifolia* is one of the least showy of the species in bloom. However, the three-parted, inflated fruits are borne profusely, and they persist on the plants well into the winter, longer than do those of most of the other species.

In 1918 a second eastern American species, *Staphylea brighamii*, was described from plants first noticed in a garden in Toledo, Ohio, but grown from locally collected stock. These plants differed from typical *S. trifolia* in a few technical characters, but also in having pink to maroon tinted fruits borne in profusion. Most taxonomists now agree that these differences are not of enough significance to consider *S. brighamii* a distinct species. However, selection of similar plants or of plants with particularly large flowers could produce better garden plants than those presently in cultivation.

A number of plant species native to the eastern United States including sweetgum (*Liquidambar styraciflua*), witch hazel (*Hamamelis virginiana*), partridgeberry (*Mitchella repens*), etc., have disjunct populations in the mountains of Mexico, separated from the main body of the species by 500 miles or more. These Mexican populations often differ from the eastern United States populations in a variety of characteristics and in many instances have been classified by some taxonomists as distinct varieties or even distinct species. *Staphylea pringlei* from the Sierra Madre of northern Mexico closely resembles *S. trifolia* except that its fruits are nearly round in outline rather than oval, its seeds larger, and its panicles of flowers usually longer and broader. These differences appear to be significant, but



*A flowering branch of Staphylea trifolia. Although this species is normally quite floriferous, it is not showy because its flowers are mostly greenish and obscured by the leaves. Photograph by R. E. Weaver, Jr.*

probably only enough to consider the Mexican plants a variety of *S. trifolia*. We have never attempted to grow the Mexican plants at the Arnold Arboretum, but considering the hardiness of *Pinus ayacahuite* (the Mexican white pine) from the same area (see *Arnoldia* 39(4):278–285), they might succeed here.

## 2. *Staphylea bolanderi* A. Gray

The Sierra bladdernut, *Staphylea bolanderi*, is an uncommon shrub or small tree to twenty feet tall that occurs sporadically along the western slope of California's Sierra Nevada at elevations between 2000 and 4000 feet. It is closely related to *S. trifolia* and is quite similar to that species in most respects. However, the leaflets of *S. bolanderi* are generally almost round rather than oval, and the stamens project conspicuously beyond the petals rather than being essentially enclosed by them. Like *S. trifolia*, *S. bolanderi* is rare in cultivation. We have tried the western species a number of times at

the Arnold Arboretum, but it has never survived for more than a few years even though Rehder lists it as being marginally hardy in Zone 5. In general, most other plants that grow within its native range are not hardy in New England.

### 3. *Staphylea emodii* Wallich

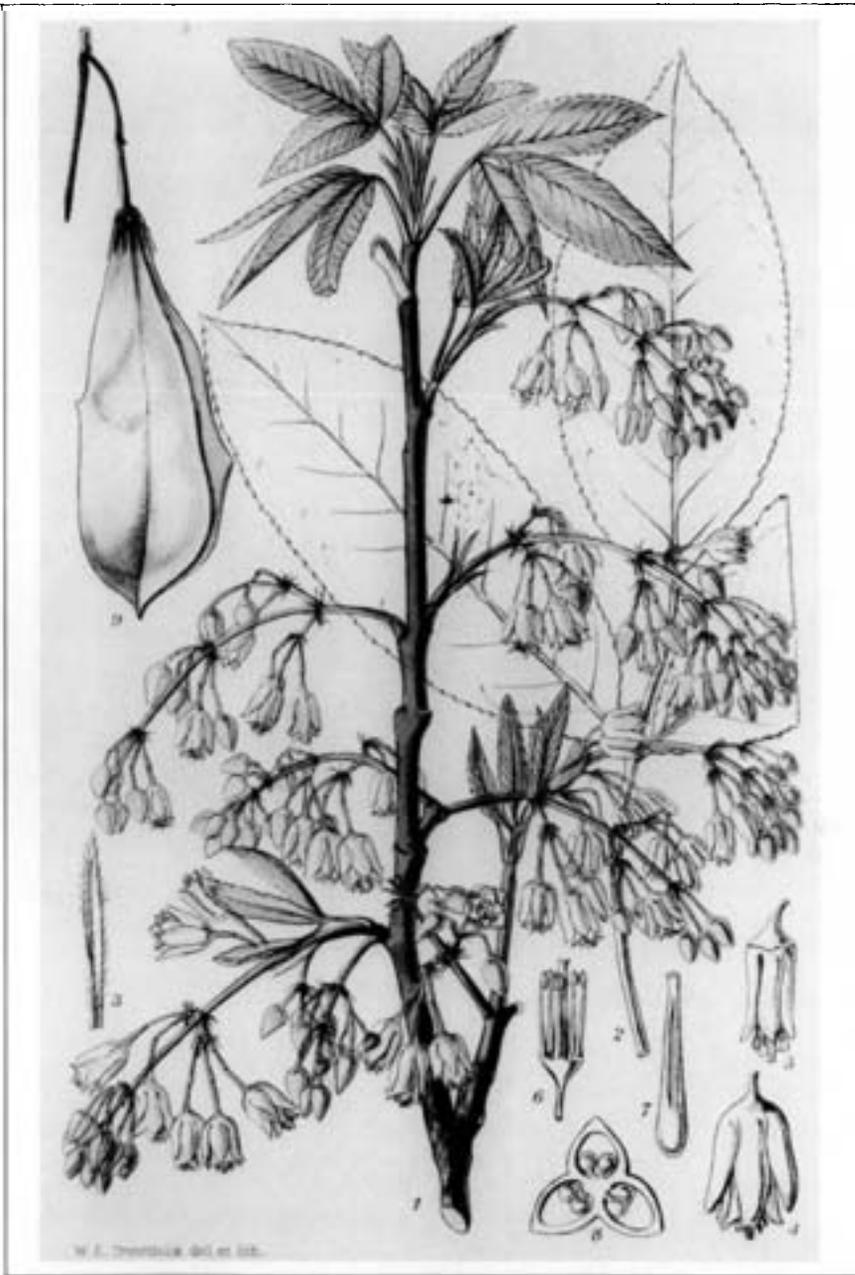
*Staphylea emodii* is distributed in the Himalayas of Pakistan, Nepal, and India at elevations between 7,000 and 10,000 feet. Although it was introduced into cultivation about 1890, it has never been commonly planted. It is very similar to *S. trifolia*, but it is larger in all respects: leaflets, flowers, fruits, and growth habit. Its common name in India means "snake stick." Several features may have given rise to the name: the bark is reported to be mottled, resembling a snake's skin; the straight branches are used for walking sticks and possibly for physically repelling snakes encountered in the field; and the odor of the cut branches reputedly is offensive to snakes, a single branch being sufficient, it is claimed, to keep a home free from them.

Rehder lists *Staphylea emodii* as being hardy to Zone 7. It has never survived out-of-doors at the Arnold Arboretum and to my knowledge is not cultivated in this country.

### 4. *Staphylea holocarpa* Hemsley

China is the home of several *Staphylea* species, the best known being *S. holocarpa*. This species was discovered by Augustine Henry in 1886, but it was not introduced into cultivation until E. H. Wilson sent seed to the Arnold Arboretum from western Hupeh in 1908. Wilson noted that it was very common on the margins of woods and thickets in western Hupeh and eastern Szechwan and that it was normally a large shrub, but occasionally grew to be a tree thirty feet tall with smooth gray bark. In unpublished notes he wrote that the plants are extremely floriferous and the flowers sweetly fragrant. The abundant nectar is much appreciated by sunbirds, the brilliantly colored Old World counterparts of hummingbirds. In the same notes Wilson commented that this species is one of the finest small trees he introduced from China. Yet the plant is extremely rare in cultivation in the United States.

Wilson recorded that the original plants at the Arnold Arboretum took several years to adjust to the New England climate and were slow to flower. The first flowering occurred in 1926 when the plants were seventeen years old. Few plants persisted for any length of time. The last remaining plant (actually a propagant from one of the original plants) was killed to the ground during the winter of 1933-1934. It recovered and was eventually moved when the *Staphylea* collection was consolidated in its present location across Conifer Path from the old dwarf conifers. The plant since has died, but our records do not say when or how. Therefore, except for some recently-germinated seedlings from various sources, we no longer have *S.*



*Staphylea holocarpa* from Curtis's Botanical Magazine (151(1925):t.9074). Floral details are shown in the inset drawings in the lower right. Inset 9 (upper left) shows the distinctive capsule of the species with its unlobed apex. Permission to reproduce this illustration granted by Curtis's Botanical Magazine and the Bentham-Moxon Trust.

*holocarpa* in our living collections. Fortunately, the seeds collected by Wilson in 1908 were widely distributed, and several plants grown from those seeds are still alive in the British Isles. Wilson noted that in 1929 the finest specimen was the one at Caerhays Castle in Cornwall, England, and that it was twenty-one feet tall at that time. According to our latest reports, the tree is still alive and magnificent and when last measured in 1966, was twenty-nine feet tall. We hope to procure propagating material from this plant as well as from other of the many original Wilson plants still growing at Caerhays Castle.

I have never seen a living specimen of *Staphylea holocarpa*, but illustrations and herbarium specimens show it to be indeed beautiful. Vegetatively, it is similar to *S. trifolia*, but its leaflets tend to be narrower. However, unlike all other members of the genus, the drooping panicles appear before the leaves from lateral buds on year-old growth. Since they are not obscured by the leaves, the flowers are shown to better advantage than are those of the other species. The panicles are from two to four inches long, and they are produced profusely. The individual flowers are about a half inch long and vary in color from white to pink. Wilson and Alfred Rehder described the pink-flowered plants as the variety *rosea*, but as Wilson later admitted in unpublished notes that the color variation is continuous from pure white through shades of pink, the recognition of a distinct pink-flowered variety is unwarranted.

The fruits of *Staphylea holocarpa* are unusual in that the tips of the three segments are united rather than free and spreading as in the other species. This character is not completely constant, but there are too few herbarium specimens available to assess the significance of this variation from a taxonomic standpoint.

Several other species, superficially similar to *Staphylea holocarpa*, have been described from China. However, as far as I know, they have never been in cultivation so they will not be treated here.

##### 5. *Staphylea bumalda* de Candolle

*Staphylea bumalda* is the most distinctive of the trifoliolate species and in fact has been classified as the sole member of a separate genus *Bumalda*. It differs from all the other species of *Staphylea* in having a fruit which is flattened rather than inflated. In addition, the base of the terminal leaflet is drawn out into a long tapering point which ends where the lateral leaflets are attached. In all the other species the terminal leaflet is borne on a distinct stalk. The inflorescence of *S. bumalda* is also sessile (stalkless) with the lower-most branches originating in the axils of the subtending pair of leaves.

Native throughout Japan and into Korea and eastern China, *Staphylea bumalda* is a rather weedy plant in the wild. It is most common in thickets, cut-over forests, and other disturbed areas. As a cultivated plant, it is similar to the other species in habit, but is not completely hardy here at the Arnold Arboretum. Our plants experi-



Top: A flowering branch of *Staphylea bumalda*. This species is unusual in that even the flower stalks are white, as is evident in this photograph. Bottom: The capsules of *S. bumalda*, shown here from two different angles, are flattened rather than inflated as in the other members of the genus. Photographs by R. E. Weaver, Jr.



*An inflorescence of Staphylea colchica. The relatively large flowers, with a fragrance reminiscent of orange blossoms, help make this species one of the most attractive of the bladdernuts when in bloom. Photograph by R. E. Weaver, Jr.*



*The large, pear-shaped capsules of Staphylea colchica, with their long, slender tips are distinctive and conspicuous. Photograph by R. E. Weaver, Jr.*

ence considerable dieback during most winters; as a result, they are a bit unkempt in the spring and require a good bit of annual pruning. The leaflets are seldom more than three inches long, and the foliage as a result is delicately textured. The individual flowers are slightly fragrant, pure white (including the sepals), and rather small, but they are borne in broad, more or less horizontal panicles while the leaves are not very well developed. Therefore a plant in good bloom is reasonably showy. However, the fruits are small and probably the least attractive in the genus.

#### 6. *Staphylea colchica* Steven

*Staphylea colchica* has a limited distribution in forests at elevations to 4000 feet in the Caucasus Mountains of the southeastern U.S.S.R. and adjacent Iran. It is certainly among the most ornamental of the species although it occasionally suffers some winter dieback at the Arnold Arboretum. The  $\frac{3}{4}$  inch long flowers are the largest

in the genus, and they have a fragrance strongly reminiscent of orange blossoms. At a glance, they also resemble the flowers of citrus in appearance: the white, widely spreading sepals (= petals in citrus) expose the erect white petals (= stamens in citrus). In *S. colchica* the column of petals surrounds the stamens. The flowers are borne in broadly pyramidal, horizontal to slightly drooping panicles, two to four inches long and about as broad.

The leaves on the flowering branchlets generally have only three leaflets, while those on the other branches have five. The mature leaflets are up to six inches long so the foliage is somewhat coarse in texture. The large, two to three inch long capsules are conspicuous during the summer and fall.

Most of the species of *Staphylea* have essentially no economic importance except as garden ornamentals. But the flower buds of *S. colchica* are fermented and eaten where the plant is native, and the oil extracted from the seeds, reportedly with the taste of pistachio nuts, is used as a purgative.

#### 7. *Staphylea* × *coulombieri* André

From within a year after it was first described, the supposed hybrid between *Staphylea colchica* and *S. pinnata* has been the subject of much confusion. The hybrid was originally named *S. × coulombieri* by André in 1897 from a cultivated plant of unknown origin grown by a Mr. Coulombier in Vitry, France. A year later, a hybrid of supposedly the same parentage was described as "*Staphylea elegans*" by Zabel from a plant in a nursery in Flottbeck, Germany. Zabel was aware of the existence of the previously described hybrid, but he had not seen a specimen when he named "*S. elegans*". To add to the confusion, he later treated André's *S. × coulombieri* as a variety of *S. colchica* (retaining his "*S. elegans*" for the hybrid) and described "*S. elegans* var. *Hessei*", which is almost surely not a hybrid at all. So both the nomenclature and the identity of these plants are in a state of confusion. The whole situation needs further study, and the suggestions below are tentative.

The name *Staphylea* × *coulombieri* André is the correct name for all hybrids between *S. colchica* and *S. pinnata*. Study of plants in our living collections and herbarium specimens, including those from Zabel's herbarium, have led me to the following conclusions: the plants which have generally been known as "*S. elegans* Zabel" and "*S. colchica* var. *coulombieri* (André) Zabel" are referable to *S. × coulombieri* André; "*S. elegans* var. *Hessei* Zabel" is referable to *S. colchica*; and the status of "*S. colchica* var. *Kochiana* Medvedev" is uncertain.

*Staphylea* × *coulombieri* is distinctly intermediate between its parents; the characters that distinguish the plants are outlined in the key (page 81). It has the orange-blossom fragrance, capsules, and flower form of *S. colchica* and the purple-tipped sepals of *S. pinnata*.



*Staphylea* × *coulombieri*, the hybrid between *S. colchica* and *S. pinnata*, most resembles the former species in floral characteristics. The purple-tinged sepals, most obvious in the buds, distinguish the hybrid from *S. colchica*. Photograph by R. E. Weaver, Jr.

The inflorescences are intermediate between the loose, broadly pyramidal, more or less horizontal ones of *S. colchica* and the dense, slender, pendent ones of *S. pinnata*. Flower size is also intermediate. The leaves on the flowering branchlets have either three or five leaflets. To me, *S. × coulombieri* is not as attractive as *S. colchica*.

#### 8. *Staphylea pinnata* Linnaeus

*Staphylea pinnata* is a plant of low elevation woodlands throughout much of central and southern Europe into Asia Minor, and it has long been naturalized in the British Isles. It has been in cultivation since the end of the sixteenth century, but it is now rarely seen in gardens. Yet it is an attractive plant in flower and fruit. The flowers have a faint, but distinct, spicy fragrance, and their purple-tipped sepals add a touch of color. The panicles are dense and tight and hang as if suspended by threads from the branches. The capsules are nearly always two-parted, and they are tinged with pink at maturity.



*The roundish fruits of Staphylea pinnata fall without shedding their seeds. The holes near the tips, visible in this photograph, are far too small to allow the seeds to be released. Photograph by R. E. Weaver, Jr.*

Unlike those of the other species, the capsules of *S. pinnata* do not become brittle and papery when ripe, but remain soft and pliable. They fall with the leaves without shedding their seeds; the seeds are not released until the capsules eventually decay. About the size of an average pea, the seeds are the largest in the genus. They have been used as rosary beads by Roman Catholics in countries where the plant is native.

As implied by the specific epithet *pinnata*, the leaves of this species are pinnately compound. It is the only *Staphylea* species in which the leaves on all the branches are consistently composed of five to seven leaflets. The plant is at the limit of its hardiness range at the Arnold Arboretum and suffers mild dieback in severe winters. Yet we have in our collections a fine old specimen twelve feet tall with a spread of eight feet.

### Propagation

The bladdernuts are all easily propagated by division, preferably in the spring. The propagation files of the Arnold Arboretum show that the seeds germinate readily if subjected to warm stratification for five months, followed by cold stratification at 40°F for three months. Cuttings rooted most successfully when taken in late July, treated with 0.8% IBA, and placed under mist.

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