Cercis: The Redbuds

by KENNETH R. ROBERTSON

One of the few woody plants native to eastern North America that is widely planted as an ornamental is the eastern redbud, *Cercis canadensis*. This plant belongs to a genus of about eight species that is of interest to plant geographers because of its occurrence in four widely separated areas — the eastern United States southwestward to Mexico; western North America; southern and eastern Europe and western Asia; and eastern Asia. *Cercis* is a very distinctive genus in the *Caesalpinia* subfamily of the legume family (Leguminosae subfamily Caesalpinioideae). Because the apparently simple heart-shaped leaves are actually derived from the fusion of two leaflets of an evenly pinnately compound leaf, *Cercis* is thought to be related to *Bauhinia*, which includes the so-called orchid-trees commonly cultivated in tropical regions. The leaves of *Bauhinia* are usually two-lobed with an apical notch and are clearly made up of two partly fused leaflets.

The eastern redbud is more important in the garden than most other spring flowering trees because the flower buds, as well as the open flowers, are colorful, and the total ornamental season continues for two to three weeks. In winter a small bud is found just above each of the leaf scars that occur along the twigs of the previous year's growth; there are also clusters of winter buds on older branches and on the tree trunks (Figure 3). In early spring these winter buds enlarge (with the exception of those at the tips of the branches) and soon open to reveal clusters of flower buds. Each flower bud is composed of two parts: a bright magenta calyx tube and, protruding through the tube, five unopened, lavender-pink petals. A magenta stalk supports each flower bud. These flower buds do not open immediately, but their color and sheer number on otherwise bare stems make redbud plants very conspicuous at this time of the year.

Whoever coined the common name "redbud" must surely have been colorblind, but "redbud" is certainly more euphonious than "magentabud." In any case, the name "redbud" has been around for a long time. George Washington referred to the

Fig. 1. Young flowering tree of Cercis canadensis *var.* canadensis *(eastern redbud). Photo: Arnold Arboretum.*

planting of redbuds around Mt. Vernon, and later Thomas Jefferson described them at Monticello. Some people use the name "Judas-tree" for this plant, although that name rightly belongs to the European species *Cercis Siliquastrum.*

After a period of one to two weeks, the flower buds open into flowers that suggest those of a pea. The petals are a delicate, but still rather intense, shade of lavender-pink, which harmonizes well with the magenta calyx tubes. There are also forms in cultivation with pale pink to white flowers. With a little practice, one can tell from a considerable distance when a plant has open flowers by its overall pinkish rather than magenta color.

Close examination of the open flowers shows that there are five petals of three different sorts (Figure 2). The upper "banner" petal is innermost and is enclosed in bud by the two lateral "wing" petals and the two "keel" petals. The transfer of pollen from one flower to another is usually done by various long- and short-tongued bees, which are guided to the center of the flower by lines (nectar guides) on the "banner" petal. The two "keel" petals, which enclose the stamens, form a landing platform for the insect visitors. When an insect lands on a flower, the "keel" petals are pushed downward and the stamens spring upward, depositing pollen on the insect's abdomen. At this time the stigma is exposed so that it can receive the pollen already present on the abdomen. The insect meanwhile feeds on nectar produced by special tissue at the base of the stamens. This "papilionaceous" (pea-like) flower, which is unusual in this subfamily, is a good example of convergent evolution, for this flower functions like the flowers of another subfamily (the Faboideae) of the legume family. In flowers of that subfamily, the banner petal is outermost, the keel petals are innermost, and the wings and keel together function as a landing platform.

Not all flowers within a cluster (inflorescence) open at the same time, but the "life span" of the flowers that open first is long enough so that they have not withered by the time the younger flower buds open. Since all flower clusters on a tree mature nearly simultaneously, there is a period when most of the flowers on an individual tree are open at the same time and the branches appear to be covered with flowers (Figures 1, 3). At this stage, redbud trees are spectacular! However, the plants do not remain this way for very long, as the older flowers soon begin to fade and wither.

At about this time the winter buds at the tips of the branches enlarge and open, sending out the new growth of the year. Suddenly the plant becomes quite unsightly, with the remains of the flowers scattered along the branches and only immature

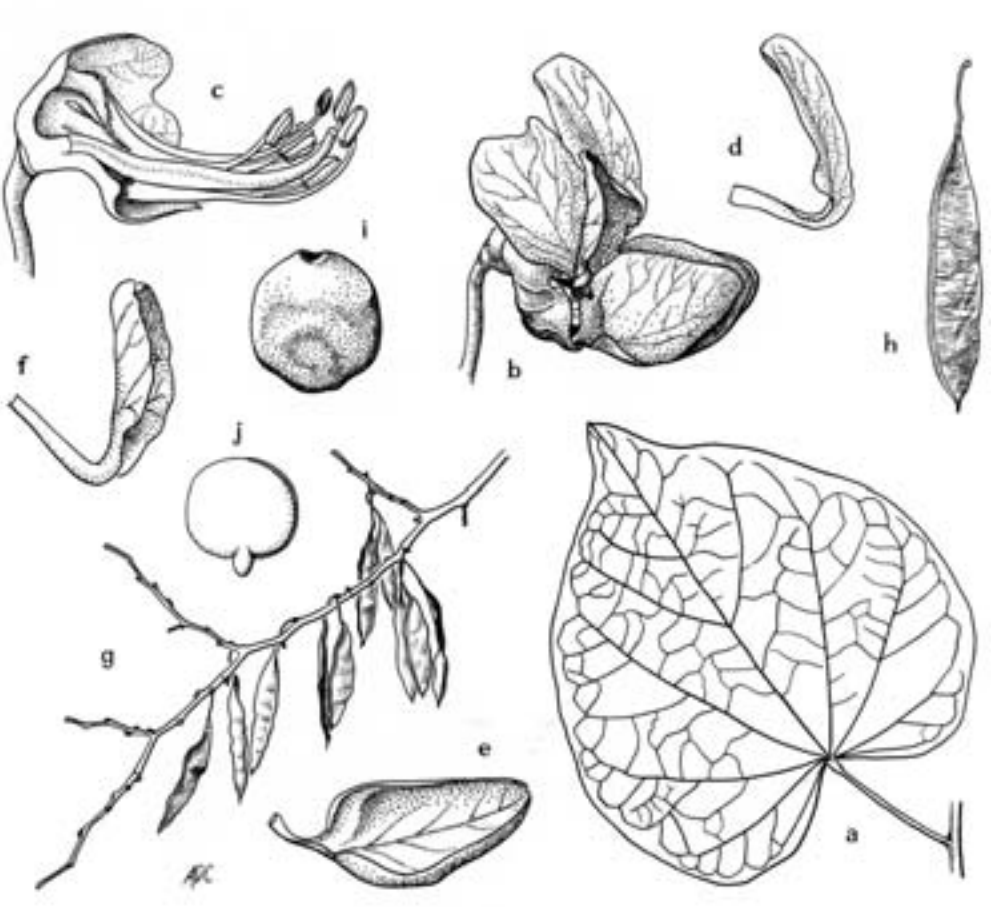

Fig. 2. Cercis. *a–j*, C. canadensis *var.* canadensis: *a, leaf — note swollen pulvinus at tip of petiole,* × *1/2; b, flower, the uppermost (banner) petal innermost,* × *3; c. flower in partial longitudinal section, the petals removed,* × *4; d, wing petal,* × *3; e, keel petal,* × *3; f, banner petal,* × *3; g, branch with fruits after fall of leaves,* × *1/4; h, mature fruit,* × *1/2; i, seed,* × *4; j, embryo from soaked seed,* × *3. Drawn by Arnold D. Clapman for a Generic Flora of the Southeastern United States and reproduced here with the permission of Prof. Carroll E. Wood, Jr.*

leaves at the tips. The young leaves, glossy and often reddish, grow rapidly, and in a few weeks the plants develop an attractive summer foliage. The mature leaves are arranged alternately in two rows along the branches of the current year. They are rather thin, dull green on both surfaces, usually three to six inches long and wide (with the largest leaves at the tips of the branches), and heart-shaped with abruptly tapering tips. Five to nine conspicuous veins radiate outward from the notch at the base of the leaf blade. Each leaf is borne on a petiole that is about as long as the blade itself. At each end of the petiole is a swollen area called the "pulvinus" (Figure 2). Changes in the volume of cells in the upper pulvinus bring about the sleep movements of the leaves — the leaf blades are usually held more or less horizontally, but at certain times, such as during the middle of a hot day, they droop. These sleep movements, while distinctly noticeable, are not as pronounced and regular in the redbud as in plants such as the hardy silk tree, *Albizzia Julibrissin*, and the sensitive plant, *Mimosa pudica.*

The ovaries of one to several flowers in most flower clusters enlarge and develop into fruits that reach their full size by midsummer. The fruits are elongate, lustrous, deep pink or reddish legumes about 2½ to 4 inches long and mostly ⅝ inch wide (Figures 2, 3). They are strongly flattened laterally with tapering tips and bases and parallel margins, or the upper margin curves downward at the tips. A small wing is usually present along the upper margin. Each fruit contains four to ten compressed, reddish-brown, beanlike seeds. The generic name *Cercis* is derived from the Greek *kerkis*, weaver's shuttle, alluding to the shape of the fruit.

In early autumn, the inner leaves of the eastern redbud turn a clear yellow while the outer leaves remain green, thus creating a contrast of colors that is particularly vivid against a brilliant blue autumn sky. The outer leaves soon turn so that the whole tree is yellow for a brief period. Rapidly, however, the yellow changes to brown and the leaves drop. Thus, while attractive for a short time in autumn, the redbud is not as effective as some other native plants (such as the witch hazels or dogwoods) in contributing to fall color. The fruits remain on the trees after the leaves have fallen. By autumn, they have lost the reddish pigment and are dry, very light, and tan or brown in color. Dispersal of the seeds takes place primarily during the fall and winter as the wind periodically blows most of the fruits from the branches. Late in the season, after the

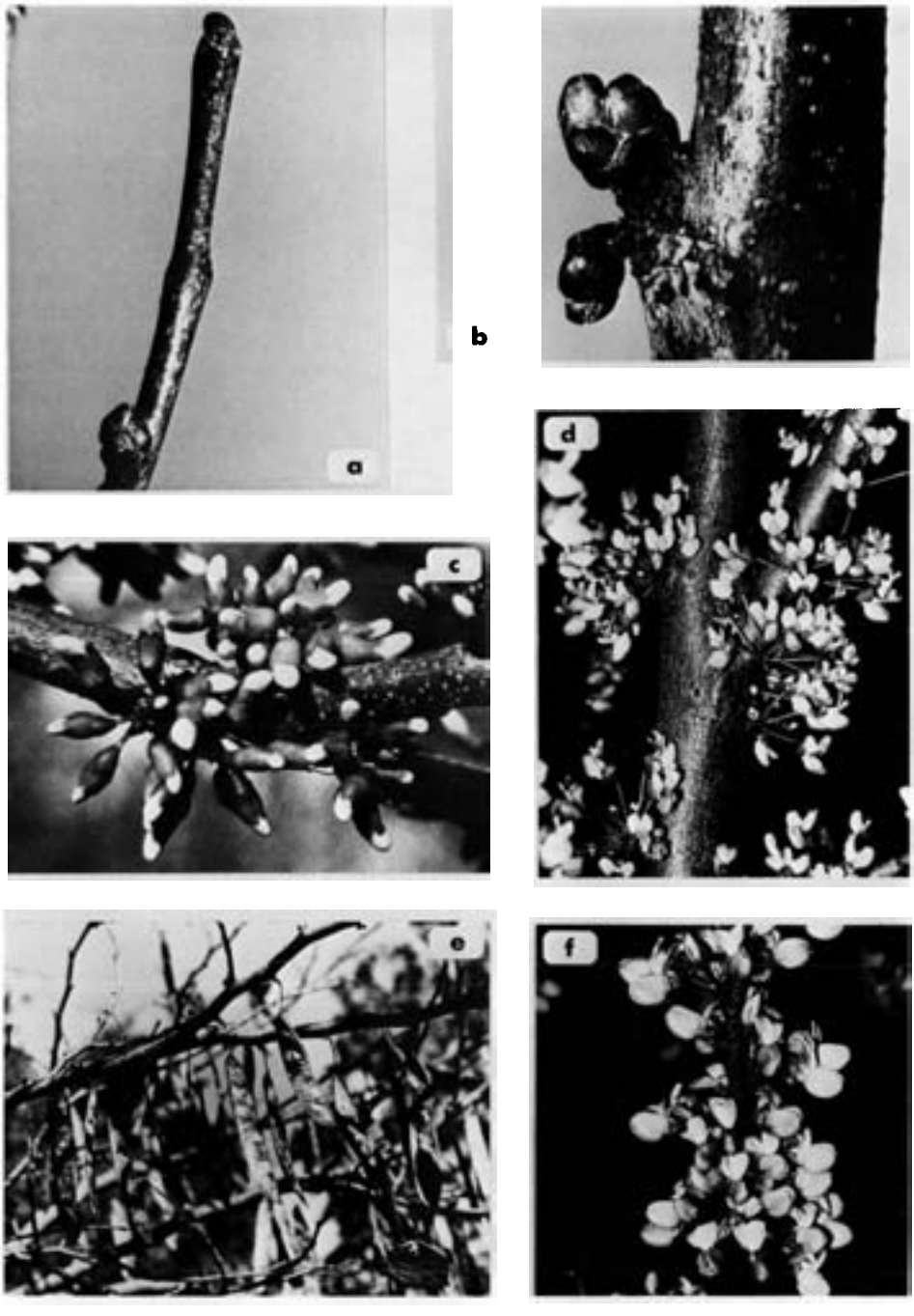

Fig. 3. Cercis. *a–e,* C. canadensis *var.* canadensis: *a, tip of winter twig with vegetative bud above and floral buds below; b, close-up of winter twig with buds of 2 inflorescences (flower clusters); c, inflorescences with flower buds; d, stem with numerous inflorescences and open flowers; e, branch with mature fruits. f, flowering twig of* C. chinensis. *Photos: K. R. Robertson (from colored slides).*

fruits have fallen or while they are still on the plants, the sutures on some of the fruits open, releasing the seeds; in the case of those fruits that do not open, seed release is effected by the decay of the fruit walls.

The eastern redbud is most often seen these days as a small tree or tall shrub. Mature specimens, however, can be moderate-sized trees with broad, rather flat-topped crowns, the largest being more than fifty feet tall, with a crown spread of over forty feet and a trunk diameter at breast height exceeding thirty inches. The natural range of the eastern redbud is from southern Connecticut and New York, south to central Florida, and west to Michigan, southern Wisconsin, Iowa, eastern Nebraska and Kansas, much of Oklahoma (except for the panhandle), and eastern Texas. In Canada, only one plant has been reported outside of cultivation — a tree that grew formerly on Pelee Island in Lake Erie, Essex County, Ontario. The eastern redbud is most abundant to the west of the Appalachian and Alleghany mountain ranges. It has a rather wide tolerance of environmental conditions, preferring strong sunlight and soils that have good drainage and are derived from limestone or acidic sandstone. In the northern and eastern part of its range, it is mostly found in open woodlands, limestone glades and openings, and thickets and along the borders of woods, rocky streams, and bluffs. Toward the south and west, it occurs in deep woods, ravines, bottomlands, and rich soil along streams.

Eastern redbud and flowering dogwood (*Cornus florida*) have similar geographical distributions and often occur together. Although the flowering season of the redbud is usually almost over when the dogwood begins to bloom, there are exceptional years when the trees flower simultaneously and produce a memorable show of spring color. I was raised in southwestern Missouri at the edge of the Ozark Mountains and vividly remember excusions into the countryside to admire the spectacle of the redbuds and dogwoods. Both of these species thrive in a border habitat, and, as a result of the many roads constructed in this century, they are probably more abundant now than ever before. In some places, redbud also flowers at about the same time as some of the shadbushes and wild plums (*Amelanchier* and *Prunus* species).

The type of redbud that has been discussed thus far corresponds technically to *Cercis canadensis* var. *canadensis*. It is native to the eastern United States and is distinguished from other North American redbuds by its tapering-acute leaves that at maturity are thin and dull green on both surfaces. Southwestward from the Arbuckle Mountains of Oklahoma, some or all of the wild redbuds are shrubs, instead of trees, with rather

thick, rich deep-green and waxy-shiny leaves that have blunt tips. Plants of this kind that lack hairs on the young branchlets and the petioles are known as the Texas redbud, *C. canadensis* var. *texensis* (or *C. reniformis*), which ranges from the Edwards Plateau to north-central Texas and the Arbuckle Mountains. Those plants with densely hairy branchlets and petioles are called the Mexican redbud, *C. canadensis* var. *mexicana*, and they occur from Crockett and Val Verde counties, Texas, to the Trans-Pecos and northeastern Mexico. Finally, the California or western redbud, *C. occidentalis*, distinguished from the eastern redbud by its larger flowers and fruits, occurs naturally from the Siskiyou Mountains of northern California southward through the Coast Ranges and the Sierra Nevada to San Diego County, California, eastward to southern Nevada, southwestern Utah, and northwestern Arizona (particularly along the canyons of the Colorado River). The Texas, Mexican, and California redbuds are commonly cultivated in the areas to which they are native. They are seldom grown in the eastern U.S., however, except as curiosities in botanical gardens.

Isely, in a very recent paper that appeared since the preceding discussion was written, while officially adopting the classification scheme established by Hopkins and modified by Turner, recognized six types of redbuds in the United States: (1) the eastern redbud, (2) the Texas redbud of east-central Texas and adjacent Oklahoma, (3) the Mexican redbud of Trans-Pecos Texas and south into Mexico, (4) the Intermountain redbud, *Cercis occidentalis* pro parte, of nothern Arizona, adjacent Utah, and contiguous southeastern Nevada, (5) the San Diego redbud, *C. occidentalis* pro parte, of the Laguna Mountains of California, and (6) the Sierra redbud, *C. occidentalis* pro parte, that occurs on the inner Coastal Ranges and eastern slopes of the Sierra Nevada from Kern to Siskiyou counties, California. Two hypotheses were advanced by Isely to accommodate these phases in a taxonomic scheme. Following the first hypothesis, two species would be recognized, with *C. canadensis* including only the eastern redbud (*C. canadensis* var. *canadensis* of this paper) and *C. occidentalis* including all the forms with thick rounded leaves that occur from Texas to California. Isely's second hypothesis would treat all the redbuds of the United States (and probably Mexico) as a single species constituted of a number of regional varieties (approximately as outlined above).

In addition to the redbuds found in North America, several other species of *Cercis* are found in the Old World. The Judas-tree, *C. Siliquastrum*, is commonly seen throughout the Mediterranean region and southern Europe. According to legend, Judas Iscariot hanged himself from a branch of this plant, and

Fig. 4. Young flowering plant of Cercis chinensis. *Photo: Arnold Arboretum.*

its white flowers then turned red with either shame or blood (Figure 5). The Judas-tree is so widely cultivated and naturalized that it is difficult to ascertain its original geographical distribution; a good guess is that it is native only from Turkey eastward to Afghanistan. This species is quite variable both in nature and in cultivation, and many of the variants have been recognized as botanically different varieties or species. Just as the eastern redbud, *C. canadensis*, does not do well in cultivation in Europe, so the Judas-tree is not adaptable to gardens in eastern North America; each species is at its loveliest in the areas in which it grows spontaneously.

Five additional species of *Cercis* have been described from central and eastern China. One of these, *C. chinensis*, commonly called the Chinese redbud, is hardy in the Boston area (Figure 4). The flowers of this plant are larger and of a deeper color than those of the eastern redbud. In cultivation, the Chinese redbud is a moderate-sized shrub, but in the wild it can be a tree up to fifty feet tall with a trunk three to four feet in diameter. Another Chinese species, *C. racemosa*, is unique in the genus in that the flowers are borne in elongated racemes rather than in umbels. This species was collected in the wild and distributed to botanical gardens in 1907 by E. H. Wilson of the Arnold Arboretum, who said that of all the flowering trees he introduced into cultivation this was one of the very best and most beautiful. Unfortunately, *C. racemosa* is not hardy in Boston, but it would be worth trying on Cape Cod, Martha's Vineyard, and Nantucket Island. Apparently no commercial nursery in eastern North America currently offers *C. racemosa*. The other Chinese species of *Cercis* are poorly known to science and are evidently not in cultivation.

Our native eastern redbud and the Chinese redbud have much to recommend them for gardens in eastern North America. They are reliably hardy; they are highly ornamental in spring and summer; they flower consistently each year; they stay a nice compact size in a yard; and they are reasonably free of serious diseases, although canker can be a problem, particularly in areas where the summers are hot and humid. Commercially available cultivars of the eastern redbud include 'Alba' with white flowers; 'Flame', with double flowers and a more erect habit; 'Forest Pansy', with bright red new growth deepening to maroon as the season progresses; and several forms with light pink flowers, such as 'Pink Bud', 'Ruby Atkinson', and 'Withers Pink Charm'. The cultivar *Cercis* 'Oklahoma' is a variant of the Texas redbud with rich wine-red flowers and glossy foliage. Artificial hybrids have been obtained between *C. canadensis* and *C. chinensis* at the U.S. National Arboretum in Washing-

ton, D.C., where research involving breeding and selection of *Cercis* is being conducted.

Redbud plants should be transplanted at an early age since large specimens usually die when moved. Propagation is mostly from seed. Ripe seeds must be treated to break the hard waterproof seed coat. This may be done by filing or nicking the seed coat, by soaking the seeds in sulphuric acid for about an hour, or by covering the seeds with hot (180° F.) water and letting them sit overnight. The seeds should then be subjected to a moist cold treatment (40° F. for 3 months).

The following key is presented as an aid to the identification of cultivated redbuds. The use of this key requires knowledge of the flowers, fruits, and mature leaves. The species of *Cercis* are so similar that it is often necessary to observe a plant throughout a season before it can be identified. The overall shape of leaves and of leaf apices mentioned in couplet "2" of the key reflects the usual condition on a plant, rather than that of individual leaves. Flower length is measured from the base of the calyx tube to the tip of the "keel" petal.

Key to the Cultivated Redbuds

1. Flowers in umbels or shortly elongated fascicles. 2.
   2. Leaves cordate or more or less triangular in overall outline, some or all with acuminate, acute, or narrowly rounded apices (at least tapering toward the tips); fruits mostly less than 16 mm. wide. 3.
      3. Leaves without a definite translucent border; flowers 6–12 mm. long; petals light lavender-pink (white to dark pink in cultivars). 4.
         4. Leaves dull green above and below, thin, not coriaceous, the apices usually abruptly acuminate. *C. canadensis* var. *canadensis*.
         4. Leaves rich green, glossy, coriaceous, the apices narrowly rounded or acutish. 5.
            5. Leaves glabrous beneath. *C. canadensis* var. *texensis*.
            5. Leaves densely pubescent beneath. *C. canadensis* var. *mexicana*.
      3. Leaves with a narrow translucent border; flowers 15–18 mm. long; petals purplish-pink. *C. chinensis*.
   2. Leaves orbicular or reniform in overall outline, some or all with broadly rounded, often emarginate apices, not distinctly tapering toward the tips; fruits mostly 15 mm. or more wide. 6.
      6. Leaves subcoriaceous to coriaceous; flowers 10–15 mm. long. *C. occidentalis*.
      6. Leaves thin, not coriaceous; flowers 15–20 mm. long. *C. Siliquastrum*.
1. Flowers in elongate racemes. *C. racemosa*.

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This article is dedicated to my late mother, Mrs. Faye Robertson, who loved redbuds.

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Fig. 5. Cercis Siliquastrum, *showing derivation of common name "Judas-tree." From Castor Durante,* Herbario Nuovo. *Venice. 1636.* [*Arnold Arboretum copy on deposit at the Houghton Library, Harvard University.*]