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Redbuds similar around the world

Like music, one of the hallmarks of biodiversity is theme and variation. Redbuds—species of the genus *Cercis*—from around the world illustrate this analogy well. Because all redbud species conform to a certain morphological theme, anyone familiar with one particular species of redbud should be able to recognize without hesitation any other redbud species as a member of the genus *Cercis*. In brief, the redbud theme consists of broad, basally-lobed, leaves with pulvinate petiole thickenings, and pea-like red-purple (rarely white) flowers that may arise on small twigs or main trunks. In fact, these plants are so distinctive, it would scarcely matter whether an unknown specimen were encountered in flower, before the leaves emerge, or later in the season, with just leaves and no flowers. The generic morphological theme is that strong. But with that theme come subtle variations from species to species.

Underlying plant form and ecology also contributes significant aspects of variation within the genus *Cercis*. Redbuds around the world occur in two distinctly different environments. Our familiar, local, eastern redbud, *Cercis canadensis*, the 2013 VNPS Wildflower of the Year, inhabits moist deciduous forests of eastern North America and five species of *Cercis* from China inhabit similar environments. On the other hand, the remaining species of *Cercis* have adapted to harsher, seasonally dry habitats that, in some cases, verge on desert conditions.

In the southwestern portion of its range, our eastern redbud offers a good example of the interplay between morphology and ecology found in the genus at large. In comparison to redbuds of Virginia's forests, Texas redbud (*Cercis canadensis* var. *texensis*) and Mexican redbud (*Cercis canadensis* var. *mexicana*) are smaller shrub-like plants tending to produce multiple stems rather than a single trunk; their leaves are smaller, glossier, hairier, have wavy/undulate margins and, further, they are found in shrub- (not tree-) dominated habitats. Of the two, var. *mexicana* represents the more

extreme divergence from the "typical" morphology (technically known as var. *canadensis*). The divergent leaf characters of Texas and Mexican redbud are routinely interpreted as adaptations to withstand drought stress. And while our local redbuds are intolerant of wet, soggy soils, the Texas and Mexican redbuds are even fussier in this regard. These two redbuds are sometimes recognized as distinct species, *Cercis reniformis* for the Texas redbud and *Cercis mexicana* for the Mexican redbud.

Further to the west, we find the western redbud, *Cercis occidentalis*, a characteristic species of the chaparral scrub vegetation of the coast range and western slopes of the Sierra Nevada of central to northern California. Chaparral vegetation develops in areas of Mediterranean-like climate, i.e., cool wet winters and hot dry summers. Western redbud is also found as widely scattered populations in truly desert regions of southern California, Arizona, Nevada and Utah, but only in restricted areas that are, compared with the surrounding desert, relatively moist. Morphologically, western redbud is very similar to eastern redbud; the leaves, however, are somewhat shorter with a more rounded apex, thus approaching a reniform (kidney-shaped) pattern more than the cordate (heart-shaped) form of eastern redbud.

In similar environments a half world away, to the north and east of the Mediterranean Sea, one finds *Cercis siliquastrum*, the Judas tree. Like North America's western redbud, Judas tree is adapted to cool wet winters and hot dry summers, and like the western redbud it, too, has more or less reniform leaves. The common name, Judas tree, is either a corruption of "Judea's tree," the plant being native



The leaves of the eastern redbud are heart shaped. (Photo courtesy John Hayden)

in Judea, or a reference to the legend that Judas Iscariot hanged himself from the branches of this tree. Judas tree is native from eastern Bulgaria and Turkey to Israel, Jordan, Lebanon, Syria, Iraq and Iran. It has been planted widely in other regions with Mediterranean climate, yet it has only rarely naturalized outside its native haunts.

Further to the east we find a rare and little known redbud. Afghan or Griffith's redbud (*Cercis griffithii*) is yet another multi-stemmed shrub from dry forests and rocky soils; it is found from the southern borders of Tajikistan and Uzbekistan, into Afghanistan and perhaps also Pakistan and India. Some botanists prefer to interpret the Afghan redbud as merely the easternmost extreme form of Judas tree.

We turn to China to conclude this brief survey of global redbud diversity and, just as a great symphony reprises the opening theme before the finale, we find among the Chinese redbud plants that inhabit moist deciduous forests and bear striking similarity to our eastern redbud. Of the several redbuds from China, *Cercis chinensis* is one of the most widespread; it is also most frequently cultivated in other temperate countries where it can be found in botanical gardens and arboreta. Chinese redbud is shrub-like, forming multiple-stemmed clumps, whereas eastern

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redbud is tree-like, usually producing just a single trunk.

Other Chinese species of redbud include *Cercis chingii*, notable for its thick, leathery, leaves and thick-walled dehiscent seed pods—other redbuds have indehiscent fruits. Also distinctive is a group of species (*C. chuniana*, *C. racemosa*, and *C. glabra*) that are characterized by flowers borne on elongate racemes, as opposed to the sessile umbel-like

clusters characteristic of all other redbuds. Of the raceme-bearing redbuds, *Cercis chuniana* is further distinguished by virtue of its ovate-rhombic leaves with somewhat asymmetric tapered bases; it is the redbud species with leaves most different from the heart- or kidney-shaped leaves of most species. Finally, there are hints of an enigmatic redbud from China called *Cercis gigantea*. Despite the fact that this name pops up from time to time in horticultural and systematics literature, *Cercis gigantea* is a completely informal name, never having been pub-

lished, and lacking both a designated type specimen and formal description. It seems reasonable to suppose that there is a remarkably large redbud lurking somewhere in China, awaiting careful study—and on this mysterious note we conclude our survey of redbuds around the world.

Clearly, redbuds illustrate recurring patterns of form and ecological adaptation, species-level variations that play out across the globe, overlain on a pervasive generic theme: this is the music of redbud biodiversity.

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