

RHAMNACEAE, THE BUCKTHORN FAMILY

A WOODY FAMILY WITH THE
WORLD'S CENTER FOR
CEANOTHUSES

The buckthorn family Rhamnaceae has a broad distribution across the world, but particularly diverse in California for the genus *Ceanothus*

- The family consists of deciduous and evergreen woody ground covers, shrubs, and small trees with alternate or opposite simple leaves, the leaves sometimes toothed and sometimes entire
- The leaves may have ephemeral stipules or, in some species of *Ceanothus*, prominent persistent stipules
- The tiny flowers are often arranged in dense paniclelike clusters and, in a few genera, are brightly colored, while in others they're greenish to pale yellow
- Each flower has (usually) 5 sepals and petals, the sepals green or colored, 5 stamens around a nectar-bearing disc, and a superior 3-chambered ovary that ripens into a drupe or capsule.

Although the masses of tiny flowers might also recall the woody Anacardiaceae or sumac family, there are usually easy-to-tell differences.

- Sumacs have aromatic leaves (only a few Rhamnaceae do),
- Tiny flowers with green sepals only (not colored as in *Ceanothus*),
- Often compound leaves (never found in Rhamnaceae),
- Fleshy drupes that do not have 3 chambers or are not 3-sided

Rhamnaceae is seldom used for anything but ornamentals, although some have medicinal properties in their bark, are good habitat plants, and occasionally useful wood

- California features 7 genera, 4 of which are relatively uncommon desert shrubs, while...
- *Ceanothus*, with its colored sepals and petals has over 50 species, and...
- *Frangula* (formerly *Rhamnus*) has a few prominent widespread species, and...
- *Rhamnus* has a few more prominent species
- We'll start our survey with the popular *Ceanothus* aka buckbrush, deerbrush, and wild lilac, a prominent genus of many habitats and with fragrant flowers highly attractive to bees.

A member of the buckthorn family, Rhamnaceae, *Ceanothus* has among the showiest flowers of the family, with a wide variety of species for gardens

- The genus is found from coastal bluffs to high-elevation montane chaparral and rock scree as well as in desert mountains
- The genus exhibits a wide variety of forms from prostrate woody ground covers to small trees
- Although usually evergreen, several species are winter deciduous
- The majority of species bloom from early to midspring, with a few finishing in late spring to early summer
- The common name alludes to an overall resemblance of the flowers to lilacs (*Syringa* spp. in the Oleaceae or olive family) but details of the flower structure and other features are quite different

Ceanothus are generally fast-growing shrubs with beneficial nitrogen-fixing bacteria in root nodules

- The tiny flowers are fragrant, and massed together in dense clusters to make a show attractive to bees
- The flowers may be snowy white, various shades of purple and blue, or even, occasionally pinkish
- The individual flowers consist of 5 hooded and colored sepals, 5 scooplike colored petals, 5 stamens attached to a nectar-bearing disc, and a superior, 3-lobed ovary
- Although the young seed pods start out fleshy, they soon dry out, and split into 3 segments, each with a few seeds
- When the seed pods fall, they leave behind a tiny, 3-angled receptacle

Ceanothus is thought to be a relatively old genus, which early on diverged into two distinctive subgenera

- The most commonly cultivated species belong to the subgenus *Ceanothus* (talk about confusing!), while
- The often slower-growing, less popular species are in the subgenus *Cerastes*
- The true ceanothus mostly have elliptical leaves with either 3 or 1 main vein running the length of the leaf,
- No apparent stipules at the base of the leaves,
- Alternate leaves, and...
- No hornlike appendages on top of the seed pods

The *Cerastes* subgenus differs from the true ceanothuses by...

- Elliptical to wedge-shaped tough leaves with a herringbone vein pattern on the underside with white stomatal blotches in between,
- Opposite leaves (two exceptions),
- Fat, corky stipules at the base of the leaves, and...
- Seed pods topped with hornlike projections
- Many species also have spinelike teeth along the leaf margins
- Quite a few species are also highly restricted to small areas and special soils

We'll start with a survey of the true ceanothus first. Traits to look for to help identify the species include...

- Whether side branches are thorny,
- The color of the bark,
- Whether the leaf has one or three major veins from the base,
- The shape of the plant (mound like versus upright)
- Whether leaves are toothed and/or glandular
- The leaf shape,
- Whether the twigs are round or angled, and...
- Flower color

A few species feature rigid, spine-tipped side branches or thorns. Among them, *C. spinosus*, the red-heart or greenbark ceanothus, is common in the coastal mountains of Southern California. This large shrub produces masses of palest purple flowers early.



C. spinosus is called greenbark ceanothus because the bark is photosynthetic. The red heart name comes from the dense red wood.



C. leucodermis, the white-thorn ceanothus, is one of two species with whitish bark and thorny side branches. It lives inland in hot chaparral, the closest locale on the Mines Road.



White-thorn produces masses of pale purple to white flowers in early April.



White-thorn leaves are broad and oval. The coastal white-thorn, *C. incanus* is similar but with smaller leaves. It grows in openings of coastal scrub and forests.



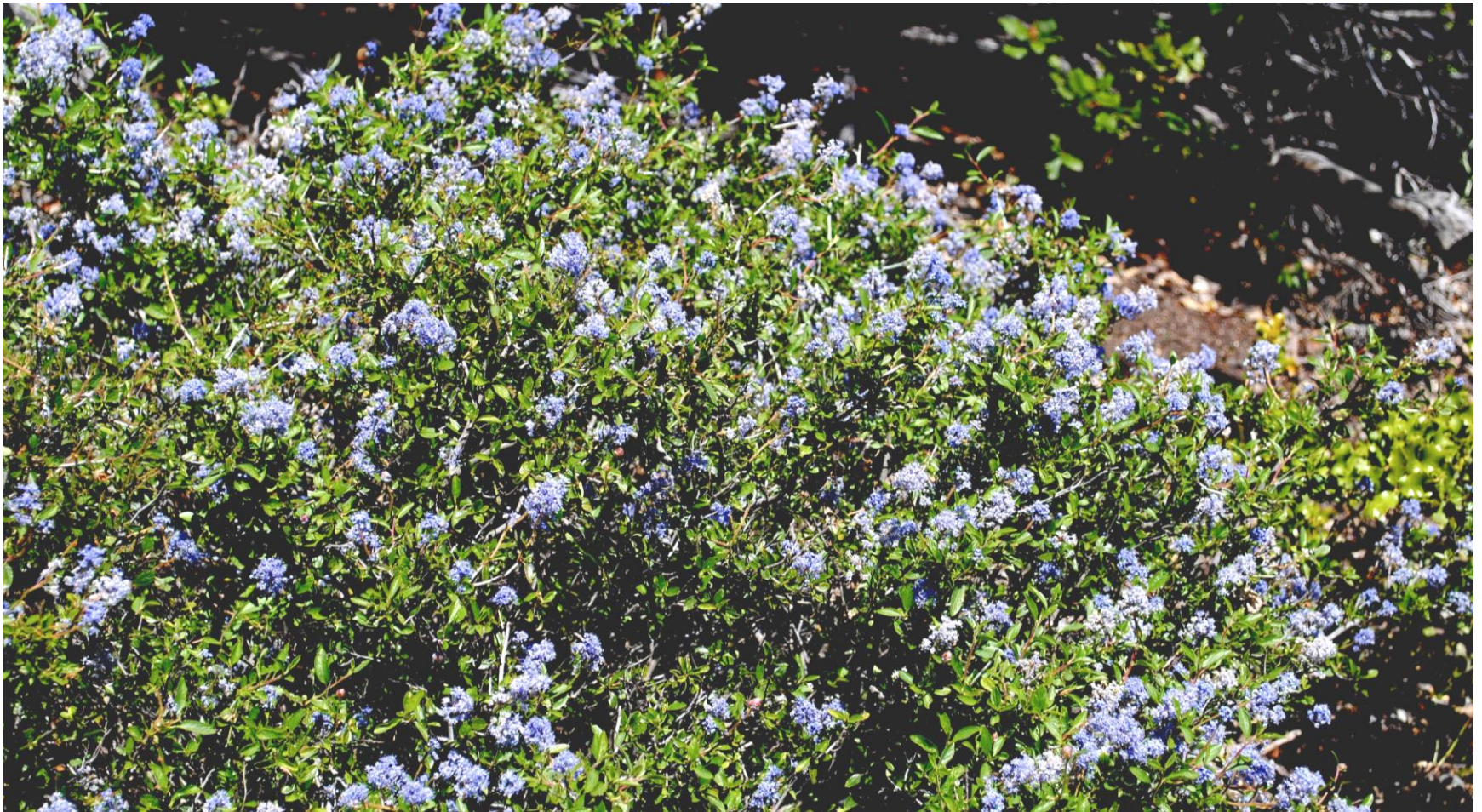
The last thorny species, *C. cordulatus* or snowbrush, lives in high mountains on rocky slopes with other shrubs. Here you see its winter condition, when the branches are leafless.



Snowbrush has horizontally trending, flexible twigs to carry the weight of winter snow, and snowy white flowers soon after snows melt.



Our next batch of species form mounds or mats rather than having upright branches. These make excellent garden ground covers. *C. lemmonii* forms mounds around 2 feet high with clear blue flowers.



C. lemmonii often lives on rocky outcrops in the zone with iron-rich red soils in the central and northern Sierra and Klamath Mountains.



Another mound former to 3 or 4 feet high is *C. foliosus* or little-leaf ceanothus in the chaparral of the Coast Ranges. Its clear blue flowers are in small clusters.



The small flower clusters of little-leaf ceanothus.



True to its common name, little-leaf ceanothus has tiny leaves that are wavy, lined with minute glandular teeth, and are highly fragrant on warm days.



The rare Hearst ceanothus, *C. hearstiorum*, is restricted to a coastal area near the Hearst Castle on the Big Sur coast. It is absolutely prostrate.



The bright blue flowers of Heist ceanothus appear in early to midspring.



Hearst ceanothus has narrow shiny leaves covered with sticky warts.



A few upright species of *Ceanothus*, like the low-growing species we just looked at, have a single main vein running the length of the leaf. Of these, the wart-leaf ceanothus, *C. papillosus*, has leaves similar to Hearst ceanothus.



Wart-leaf ceanothus grows into a tall shrub with arching branches, often up to 10 feet high, and is common in the Santa Cruz and Santa Lucia Mountains.



Closely related to wart-leaf ceanothus is *C. impressus* from sandy soils near Lompoc in coastal Santa Barbara County. The name refers to the deeply embossed veins. Here you see a named cultivar of it, *C.* 'Dark Star'



C. 'Dark Star' is a beautiful selection with deep blue flowers early in the year, and makes a dense shrub to 4 or 5 feet high for the garden.



Our remaining species have 3 major veins from the base to the tip of the leaf. The first, *C. integerrimus* or deerbrush, is deciduous and has no teeth on the leaf margins.



Deerbrush is widespread at middle elevations on the edge of montane conifer forests. The form from the Sierra is mostly white flowered.



Deerbrush also comes in pale pink, blue-purple, and purple, with great color variation especially near Mt St. Helena.



Arguably the largest of all species, *C. arboreus* or tree ceanothus from the Channel Islands, grows into a tree twenty or more feet high within a short time. Besides having large leaves, the leaves are densely felted with hairs underneath



Everything about tree ceanothus is large, the long pale purple flower clusters in early spring, the leaves, and even the seed pods.



A close view of tree ceanothus flowers. This species is the basis for a popular garden cultivar known as 'Ray Hartmann'



The coastal blue-blossom, *C. thyrsiflorus*, bears some similarity to tree ceanothus but everything is smaller, and the shiny leaves are not as densely hairy underneath. This species features sky blue flowers in midspring.



A coastal species, coastal blue-blossom can grow to small tree status as you see from this specimen on Montara Mountain.



Ironically, coastal blue-blossom also has a genetically dwarf form growing on headlands as near the Pt Reyes lighthouse in Marin County.



White variants of coastal blue blossom are available in the trade such as this 'Snow Flurry'



For years, *C. griseus* was held to be distinct from *C. thyrsiflorus*, differing mainly by the hairiness of its twigs. It is now a variety. The most popular form is 'Carmel Creeper' a mounded shrub originally from the cliffs near Carmel.



Perhaps the most distinctive of all the diverse forms of coastal blue-blossom is this ground cover with variegated leaves known in the trade as *C. griseus* 'Diamond Heights'.



Inland, in summer-hot chaparral, the jimbrush, *C. oliganthus sorediatus*, replaces coastal blue-blossom. It generally has narrower leaves and instead of angled twigs, the twigs are rounded.



Jimbrush flowers are very pale and open generally after their common companion, buckbrush, *C. cuneatus*.



Our last species in the true ceanothus group is the distinctive tobacco brush, *C. velutinus*. Its large leaves are wavy, highly sticky, and have a fragrance reminiscent of sweet pipe tobacco.



Tobacco brush produces clouds of snowy white flowers in late spring to early summer. It is widespread in montane chaparral throughout California's mountains, growing locally near Mt. St. Helena.



We'll turn now to the *Cerastes* subgenus, whose species are not as widely grown in gardens, and many of which, in the wild, are uncommon to rare.

- We'll start first with the truly common and widespread buckbrush, *C. cuneatus*, the specific epithet referring to the leathery, wedge-shaped leaves.
- The common form lives in some of the hottest driest chaparral throughout the foothills with rigid branches and white flowers.
- Other forms may be prostrate, or have arching branches with various shades of purple flowers.

Buckbrush growing on Mt. Diablo. It blooms in late winter in great profusion.



The somewhat wedge-shaped leaves of buckbrush



Here you see a prostrate form of buckbrush from the Klamath Mountains. Other similar forms can also be found in the Sierra foothills on steep roadbanks.



The once separate species, *C. ramulosus* from coastal central California, with widely arching branches, is now considered a form of buckbrush.



C. "ramulosus" forms masses of purple in the coastal chaparral of Marin County.



Two other ceanothus have leaves and flowers similar to buckbrush, but the leaves are often alternate rather than opposite. Here you see the bigpod ceanothus, *C. megacarpus*, from coastal chaparral in Southern California



A close view of bigpod ceanothus flowers.



A second rare species, *C. verrucosus* or wart-stem ceanothus, is restricted to coastal San Diego County.



Here you see the alternate leaves and large deep brown “warts”, actually the stipules, of wart-stem ceanothus.



The seaside or maritime ceanothus, *C. maritimus*, is confined to coastal areas in San Luis Obispo County, where it forms low mats. Although the leaves look a bit like buckbrush, they're covered with dense white hairs underneath.



The remaining species have toothed leaves. The first of these have sharp, hollylike teeth on plants 3 feet or more tall. Here you see Jepson's ceanothus, *C. jepsonii* growing on serpentine



Jepson's ceanothus is confined to a few north bay counties, including Carson Ridge and Mt Tam in Marin County. Here is a close view of the lovely blue-purple flowers



Jepson's ceanothus is characterized by thick-margined leaves lined with 7 or more prickly teeth



Although not recognized as a valid variety, the former *C. jepsonii albiflorus* differs by having a more upright stance and snowy white flowers. It's typical of the inner north Coast Ranges.



The closely related Sonoma ceanothus, *C. sonomensis*, is localized in the inner mountains of Sonoma and Napa counties on serpentine and volcanic soils. It is distinguished by flatter leaves with 5 or fewer teeth.



Other upright species with toothed leaves have less spiny teeth. Thick-leaf ceanothus, *C. crassifolius*, is a tall chaparral shrub from the mountains of Southern California. The leathery leaves have rather obscure, weak teeth.



Thick-leaf ceanothus flowers vary from near white to pale purple.



In this same general category, two rare and distinctive species come from Southern California. The first, *C. ophiophilus* or Vail Lake ceanothus (the locale), has tiny leaves with just a few token teeth



Vail Lake ceanothus, an early bloomer, has tiny, highly perfumed whitish flowers



The second rare species, *C. otoyensis* or Otoy Mountain ceanothus, is confined to serpentine on this mountain near the Mexican border. Also early blooming and fragrant, the leaves have more prominent, evenly distributed teeth



We'll finish our survey with several prostrate species with hollylike teeth, rooting as the stems spread. Of these, the glorymat, *C. gloriosus*, has broad rounded leaves less than twice the length compared to the width.



Glorymat occurs on the edge of coastal forests and bluffs in the north Bay. Two of the varieties are prostrate, a third is actually more of an upright shrub. The attractive blue flowers make this an excellent ground cover for coastal gardens.



Closely related to glorymat is the rare Mason's ceanothus, *C. masonii*, confined to coastal forest openings on Bolinas Ridge. It differs in very small unimportant ways from glorymat.



The last two species, also prostrate, feature somewhat narrower leaves than glorymat. The most widespread is mahala mats, *C. prostratus*, whose specific epithet is fitting.



Mahala mats is widely distributed on steep, rocky, semishaded banks throughout the middle elevations of the mountains with the variety *occidentalis* occurring around 2 to 3,000 feet in Sonoma & Napa counties.



By contrast, the rare dwarf ceanothus, *C. pumilus*, is confined to serpentine soils in the northwestern corner of the state. It differs from mahala mats in having narrower leaves with few teeth.



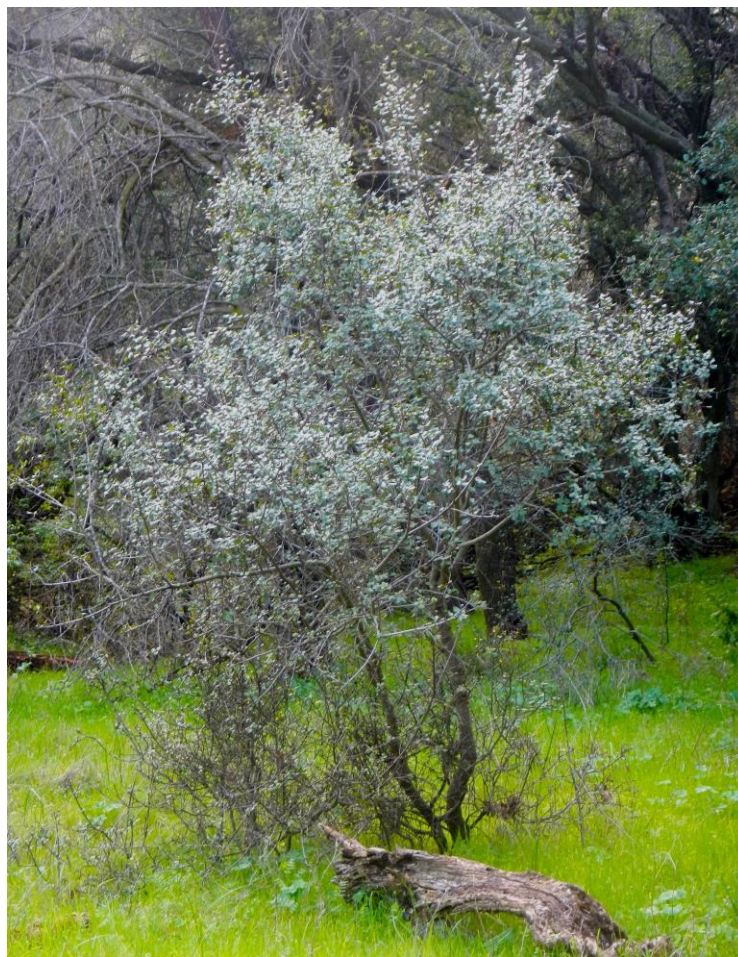
A closer view of dwarf ceanothus, which finds its best habitat on steep barren banks where there's little competition with other shrubs.



Moving on now to the buckthorns, which have been recently divided into two genera as follows

- *Rhamnus* generally is dioecious with the female plants producing (usually) red berrylike drupes, while
- *Frangula* is usually bisexual with the fruits drupes a dark purple and with (usually) larger leaves
- The best known frangulas include the coffee berry, *F. californica* and the cascara sagrada, *F. purshiana* while the best known rhamnuses include the red-berry buckthorn, *R. crocea* and the holly-leaf redberry, *R. ilicifolia*

Starting with species still in *Rhamnus*, here you see the large evergreen shrub or small tree, *R. ilicifolia*, the holly-leaf redberry, common in chaparral and woodlands. Note the bluishgreen cast to the leaves from a distance.



Although relatively small, the holly-leaf redberry has leaves that look something like holly (*Ilex aquifolium*) with a shiny surface and prickly teeth. At first glance, some might mistake these leaves for a scrub oak but the vein pattern is different.



Here you see the masses of tiny yellow starlike flowers, borne in late spring.



Closely related is *R. crocea*, the redberry buckthorn, whose low, sprawling branches and smaller leaves distinguish it.



The tiny yellow flowers of redberry buckthorn are similar to the holly-leaf redberry. This species occurs mostly on rocky slopes of the Coast Ranges.



R. pirifolia, the island redberry, is the giant of the genus forming dense tall shrubs on the Channel Islands.



With flowers and fruits similar to the others, the island redberry has leaves often several times as big. The large stature is due to the mild island climate and isolation from competing plants.



Turning now to the genus *Frangula*, by far the most diverse species is *F. californica*, the coffee berry, named for the coffee-bean-shaped stones inside the fruit. In this photo note the different leaf colors of 2 adjacent shrubs.



Coffee berry can grow as a mounded woody ground cover, a shrub, or even a small tree to 12 or more feet tall.

- Many cultivars have been selected based on the natural variation of the species
- Most coffee berry varieties are evergreen with long, elliptical leaves, but the leaves vary from glossy dark green to woolly and gray white depending on the variety and habitat
- The species ranges all across the foothills of California's mountains, also appearing on the eastside of the Sierra in relatively hot dry places
- All the varieties produce bisexual flowers and dark purple drupes with 2 stones inside

Here is a close view of a dense cluster of coffee berry flowers appearing in late spring and summer



Here is a close view of coffee berry leaves. Note the herringbone-like vein pattern, each vein ending just short of the leaf margin, a defining trait throughout the genus.



Coffee berry drupes start green, turn pale yellow, then red, and finally when fully ripe dark purple. The fruits are a laxative.



The giant of the genus is *F. purshiana* aka cascara sagrada (Spanish for sacred bark) which is famous for its laxative properties. This species is deciduous and has larger leaves.



The long thin leaves of cascara sagrada. Note the similar vein pattern to coffee berry. This species is an indicator of moist forests, often growing close to streams.



The tiny summer blossoms of cascara.



Here you see the nearly ripe drupes of cascara, which eventually turn dark purple. These contain 3 stones each whereas coffee berry has only 2 stones.



Now we'll finish with the small genera, many of which are rare in California. For example, *Adolphia californica* is a dense, multibranched shrub with opposite green twigs and lives in the chaparral of far Southern California.



Here you see the dense clusters of white flowers when *Adolphia* is in bloom.



In this close view of *Adolphia* flowers, note that the sepals and petals are both colored, the sepals triangular, the petals spoon-shaped, traits reminiscent of *Ceanothus*. The fruit is an explosive capsule.



By contrast, *Colubrina californica* is a fewer-branched shrub with alternate branches, white bark, and is rare on the fringe of the southern deserts.



Colubrina has broad leaves and small clusters of pale green flowers but, like *Adolphia*, has explosive capsules.



Our other two small genera are recognized by having drupes with a single stone each. The rare *Condalia globosa pubescens*, found in the Sonoran Desert is typified by rigid crossed branches, tiny leaves, and petal-less flowers.



Condalia fruits are near-black olive-shaped drupes containing a single stone.



Our last genus, *Ziziphus* aka jujube contains two densely branched shrubs with rigid branches, some of which form thorns, clusters of elliptical leaves, and yellow flowers. Here you see the branch pattern of *Z. parryi* in winter.



Here leaves are just beginning to reappear on *Z. parryi*, which is widely scattered in chaparral and the desert margins of Anza Borrego. Without flowers, this species somewhat resembles the desert apricot, *P. fremontii*, with which it sometimes grows.



The somewhat similar *Z. obtusifolius* aka graythorn is widely scattered in the deserts but differs in details of the fruits. Its purple fruits are somewhat smaller than the brown ones of *Z. parryi*.



The starlike flowers of graythorn display a starlike pattern of reddish brown petals around a prominent green disc.



Finally, the Chinese jujube, *Z. jujube* known for its small edible fruits, is a occasionally naturalized tree in the Sierra foothills. Notably its leaves are shiny on top.



Here are the edible ripe fruits of the Chinese jujube.

