

OAKS AND THEIR RELATIVES

KEYSTONE TREES IN NATIVE HABITATS

The oaks belong to a larger group, the Fagaceae or beech family, trees and shrubs prominent in the Northern Hemisphere

- The family is characterized by evergreen and deciduous shrubs and trees with alternate, simple (sometimes lobed) leaves
- Mostly wind-pollinated petal-less male flowers arranged in catkins,
- Small petal-less female flowers borne singly or in small clusters with usually obvious bracts and an inferior ovary with three styles and stigmas, and...
- A nut type fruit partly or completely enclosed in bracts

Prominent genera besides true oaks include...

- Beeches (*Fagus* spp.), deciduous trees from eastern hardwood and European forests,
- Chestnuts (*Castanea* spp.), deciduous trees from Europe, eastern Asia, and (formerly) the eastern U.S.,
- Chinquapins (*Chrysolepis* spp.), chestnutlike shrubs and trees from the western U.S., and
- Tanbark oak (*Notholithocarpus densiflorus*), an evergreen tree or shrub from the western U.S.
- In addition, a few more genera occur mostly in eastern Asia and are little known in North America

Beeches are moderate-sized trees with small, oblique, serrated leaves and nuts borne inside bracts covered with papillae. Most are edible. The European beech, (*F. sylvaticus*) is sometimes cultivated in the Bay Area



The chestnuts are small to large trees with conspicuous, ovate, coarsely serrated leaves, white candellike male catkins, and sweet nuts enclosed in viciously spiny burs. The American chestnut has succumbed to chestnut blight, but the Spanish chestnut is sometimes seen in California gardens



The two species of chinquapin have leathery, evergreen leaves backed with gold scales, candles of white male catkins, and small sweet nuts enclosed in viciously spiny burs like the chestnuts.

Here you see the coast chinquapin



The male blossoms of coast chinquapin are insect pollinated



The spiny burs of coast chinquapin. These have opened and shed their nuts.



The mountain chinquapin (*Chrysolepis sempervirens*) is a small shrub



The sole species of tanbark oak is restricted to the coastal conifer forests of California, Klamath Mountains, and northern Sierra



Old tan oaks feature massive trunks with bark rich in tannins, which were once used for tanning hides



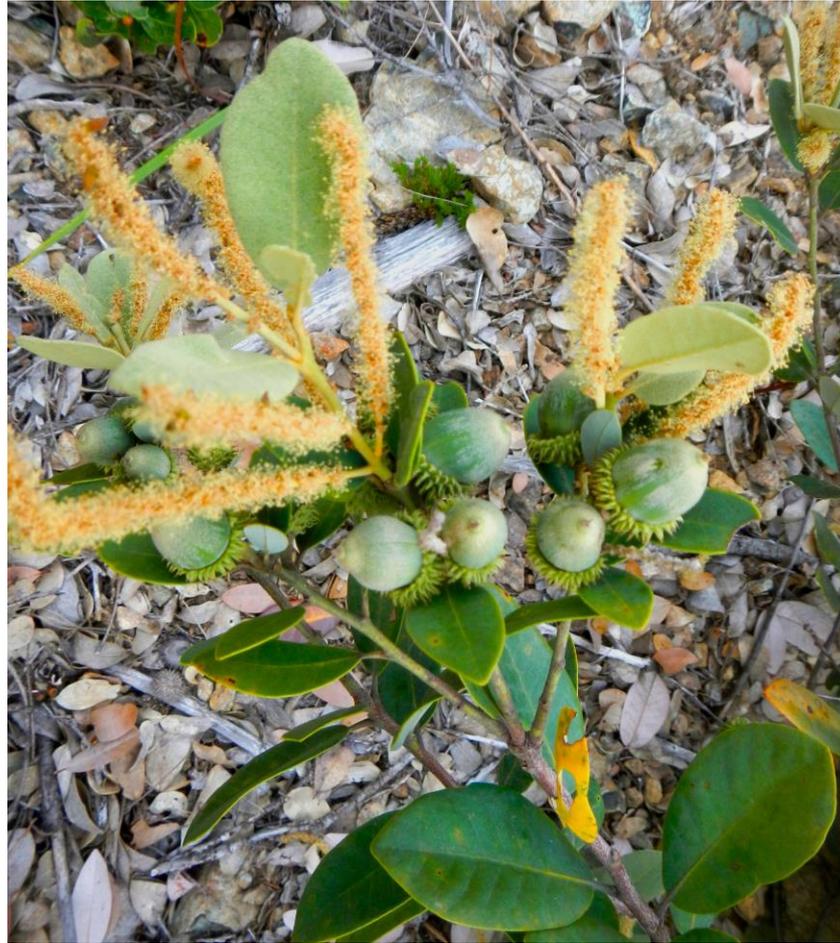
Tan oak leaves are tough, leathery, and longer than most true oaks, with a embossed pinnate vein pattern, coarse teeth, and dense woolly hairs underneath



Like chinquapins and chestnuts, tan oak produces white candles of male flowers, usually in early summer



But unlike chestnuts, tan oak produces acorns that sit in a cup



Tan oak acorn cups are distinguished by bearing fringed bracts.
The acorns are large and rich in nutrients, making them a
favorite food plant for coastal Indians



The true oaks, *Quercus* spp., are by far the largest genus in the family, sporting between 400 and 600 species according to whether you're a lumper or splitter

- True oaks range from shrubs to tall trees, although most have a rounded crown on trunks no more than 30 to 60 feet high
- Oak leaves may be entire, lined with prickly teeth, or pinnately lobed
- The male flowers are borne in dangling catkins that appear at winter's end
- The tiny female flowers are borne in axils of leaves on the new growth and are inconspicuous
- The acorns sit in a cup made of scalelike to knoblike bracts

Although California has over 20 species of oaks and several varieties, the greatest number of species occurs in the mountains of Mexico and in Southeast Asia

- Oaks are often confusing to identify because closely related species may hybridize where their habitats overlap
- In such a large genus, there are major subdivisions or subfamilies of oaks, each of which has its own distinctive characteristics. Only species within a subfamily can exchange genes.
- California has three major subfamilies: white oaks, golden or intermediate oaks, and black oaks (known as scarlet oaks in the eastern U.S.)

These oak subgenera often contain both deciduous and evergreen species as well as tree and shrub species, the latter known as scrub oaks

- The black oaks are characterized by dark bark, leaves usually lined with prickly teeth, acorns that take two years to ripen, scaly acorn cups, and acorn shells lined inside with hairs
- The white oaks are noted for their pale bark, leaves often lacking prickly teeth, acorns that ripen in one year, warty acorn cups, and acorn shells that are smooth on the inside
- The golden oaks usually have pale bark, evergreen leaves with prickly teeth (sometimes missing), acorns that take two years to ripen, warty acorn cups often with a gold powder, and acorn shells lined inside with hairs
- As you can see, the golden oaks combine traits from the other two groups

Let's start the survey with the black oaks, which ironically are known as scarlet oaks in the east. This subgenus is restricted to North America. California has the four following species

- Coast live oak, *Q. agrifolia* with two varieties,
- Interior live oak, *Q. wislizenii* with two varieties,
- California black oak, *Q. kelloggii*, and...
- Shreve oak, *Q. parvula* with two varieties
- Of these, the coast live oak deviates from the rules given earlier to identify black oaks because it ripens its acorns in one year, not two.

Coast live oak occurs from southern Mendocino County south through the Coast Ranges and mountains of Southern California into northern Baja California. Here you see the rounded canopy and dense foliage and dense foliage



Here are the muscular trunks of coast live oak. Note the dark bark.



Typical coast live oak leaves are shiny on top and usually with curled margins lined with small, prickly teeth. The underside has tiny clumps of hairs on the major vein junctions



Coast live oak leaves are tightly rolled under along the edges where they're exposed to hot sun.



The new leaves are often bronze or reddish when they first emerge from their winter buds



Like other black oaks, coast live oak acorn cups are covered with flattened scales



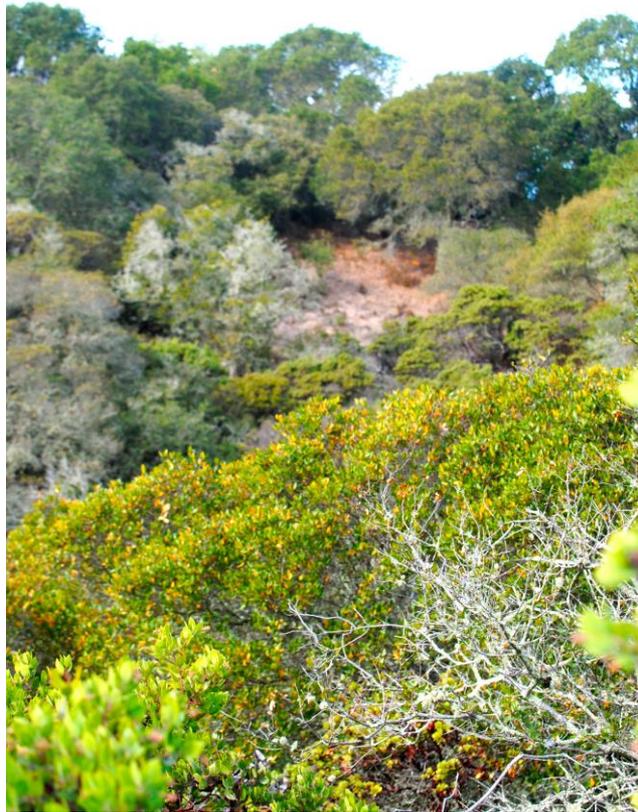
The acorns are long and tapered, often showing dark brown vertical stripes as seen here.



The typical form of coast live oak has only minimal hairs on the leaf underside, but var. *oxyadenia* from the mountains of Southern California has a covering of dense white hairs.



Closely related to coast live oak is the interior live oak, *Q. wislizenii*, which lives in the interior hot dry foothills of the Coast Ranges and Sierra Nevada. Here you see the broad canopies similar to coast live oak.



Interior live oak trunks are often less massive than coast live oak but otherwise similar in color and pattern



Interior live oak leaves are bright green on both surfaces, without obvious hairs underneath, and flat not curled. Note that the leaves may have smooth margins or prickly teeth even on the same plant.



Here you see the hanging male catkins of interior live oak.



And here is a tiny female flower in the crotch of the upper leaf, obvious only to those who look closely.



Interior live oak acorns site in a scaly cup but are shorter and less tapered than those of the coast live oak.



Besides the usual tree form, there is a scrub variety of interior live oak, var. *frutescens*, seen here. This shrub is common on the exposed slopes of Mt. Tamalpais in Marin County.



Here you see the nearly ripe acorns of the scrub interior live oak. These were photographed in fall 2013, about 3 weeks before they normally would ripen due to a long stressful, dry summer.



The Shreve oak, *Q. parvula*, is poorly known to most naturalists because it closely resembles interior live oak. The tree form, *Q. parvula shrevei*, grows in moist coastal forests especially in the Santa Cruz and Santa Lucia Mountains. Note the long tapered, glossy leaves edged with prickly teeth.



Even less well known is the variety known as *Q. parvula parvula*, a rare shrub from the Channel Islands with similar foliage, and growing on the edge of forests



Here you see the young acorns of the Channel Islands shrub form. Note the scaly acorn cups.



The Tamalpais scrub oak, a rare variety of *Q. parvula* called var. *tamalpaiensis* is seldom noticed. It grows along the edge of forests, often with toyon as seen here.



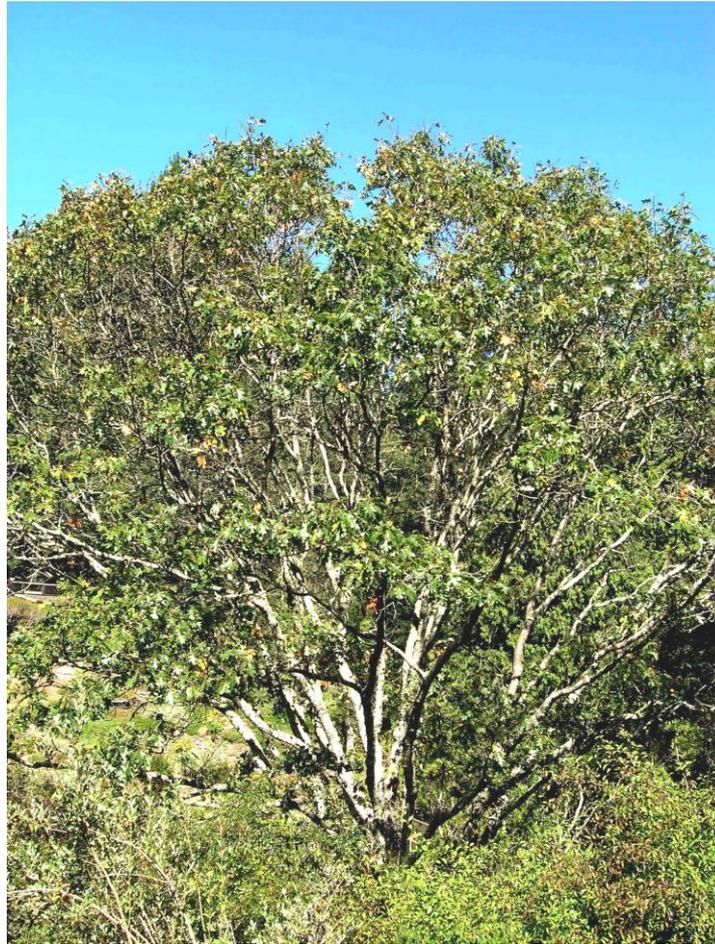
The Tamalpais scrub oak is similar to the tree form of Shreve oak but seldom grows more than 8 to 10 feet high. Here you see the handsome leaves.



A single leaf of the Tamalpais oak shows the dark green color and spiny teeth. The leaves may reach 14 centimeters long. Beside the leaf is the acorn in its scaly cup. Tamalpais oak can be confused with the scrub interior live oak.



The last of the black oaks, and often simply referred to as black oak, is *Q. kelloggii*, a tree typical of open middle elevation conifer forests but widely scattered elsewhere.



Q. kelloggii has many traits unlike the evergreen black oaks, including signature leaves that are deeply lobed but with each lobe ending in a bristle tip



California black oak leaves are also noted for being covered with a bright pink “fur” when they first emerge from their winter buds and...



...for their brilliant fall colors brought on by autumn chill



California black oak trunks have fissured dark gray, almost black bark



The scaly acorn cups of California black oak hold fat, rounded acorns rich in fats, making them among the favorites of the California Indians



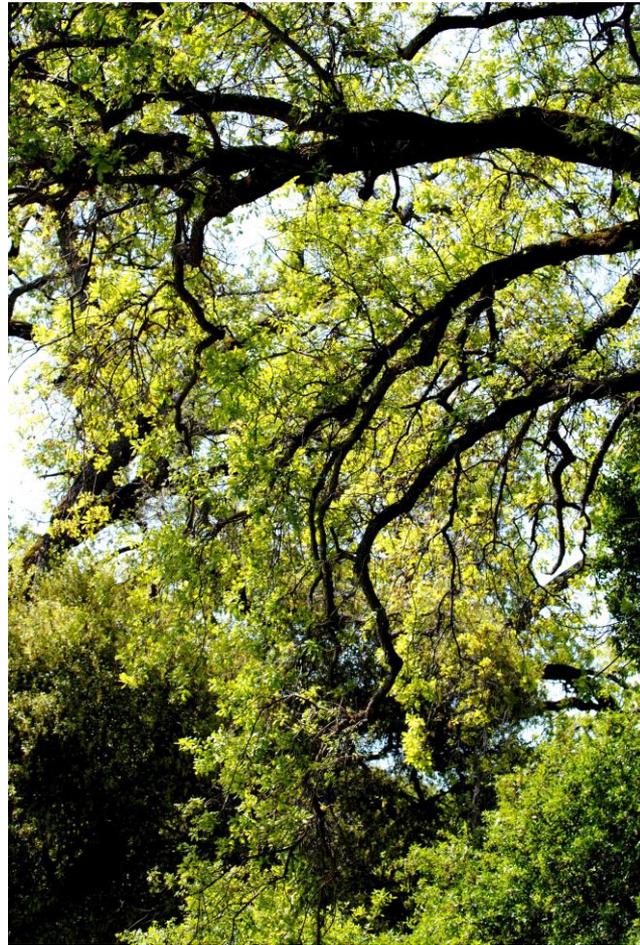
Because species within an oak group occasionally hybridize, we have the curious case of *Q. x morehus*, which produces shallowly lobed leaves but most astonishing of all is half deciduous in winter, retaining some leaves but losing others



The white oak group is considerably larger, not only in California, but across much of the Northern Hemisphere, with great variation. We'll start with the deciduous species first. The king of white oaks is the majestic valley oak, *Q. lobata*



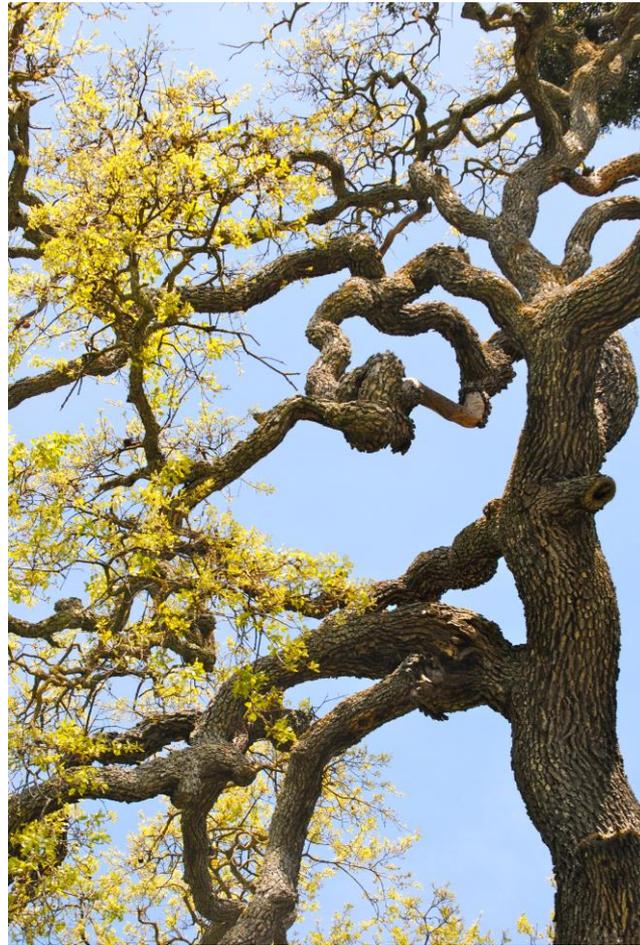
The valley oak is not only the most massive oak but features gracefully drooping side branches as seen here



Although the deciduous valley oak has lobed leaves somewhat like the California black oak, its lobes lack bristle tips, easily distinguishing it.



Valley oak also has paler bark and frequently bizarrely twisted limbs



Old trunks of valley oak show a checkerboard pattern



Here you see the deep acorn cup with warty bracts and the long tapered acorns typical of valley oak



As with most other oaks, valley oak is noted for spectacular galls. Here you see the so-called apple gall, which is actually intensely bitter due to its tannin content.



The Oregon white or Garry oak shares many similarities with valley oaks, including the leaf patterns but the trees bear mostly upright branches and the trees, instead of living on valley bottoms, occur on hills in the mountains



Garry oak bark is also similar to valley oak although perhaps with a somewhat less pronounced checkerboard pattern



Garry oak acorns readily separate it from valley oak. Note here the shallow, broad acorn cup.



The mature acorns of Garry oak are also fatter and rounder than valley oak as seen here.



Although Garry oak is normally a tree, the variety *breweri* aka Brewer's oak is a shrub that favors higher elevations in the mountains, often on rocky slopes, where it may form dense shrubberies



In all other respects, Brewer's oak is like Garry oak as you can see in these leaves



Blue oak, *Q. douglasii*, is another tree white oak. This deciduous species rings the Central Valley in hot, dry foothills, often growing with gray pine (*Pinus sabiniana*).



Blue oak is easily identified by its shallowly lobed, blue-tinted leaves, adapted to reflect the hottest wavelengths of light from the leaf surface. Here you see the leaves with the male catkins



Blue oak bark is similar to valley oak except the checkerboard pattern is not as obvious.



Blue oak's acorns are egg shaped and sit in a warty cup.



Mature blue oak acorns



Engelmann oak, *Q. engelmannii*, is a Southern Californian equivalent of blue oak but lives at moderate elevations in the mountains.



Besides the several tree species of white oaks, there are many species of scrubby, shrub white oaks, many of which are difficult to distinguish. Here you see the common scrub oak or *chaparro* from California's chaparral



The common scrub oak, *Q. berberidifolia*, is best identified by its bright green leaves edged with hollylike teeth.



Closely related to the common scrub oak is a rare species in coastal scrub of Southern California, *Q. dumosa*, which differs in small details of the leaf hairs.



Another close relative is the island scrub oak, *Q. pacifica*, whose leaves have small or no teeth and have a subtly different shape. This species is restricted to scrub and forests on the Channel Islands



Island scrub oak can assume several forms from low woody mats to small trees with highly twisted trunks as seen here.



Muller's scrub oak, *Q. cornelius-mulleri*, is a handsome shrub from the high desert mountains bordering the Sonoran Desert and is common in Anza Borrego State Park. Note the bicolored leaves, pale underneath with dense hairs.



Typical of serpentine soils in the northern Sierra and Coast Ranges is the dusty-looking leather oak, *Q. durata*.



Leather oak leaves usually look dusty because the upper surface has many, whitish starburst hairs. Note also the rolled down leaf margins.



Leather oak produces a fat, rounded acorn in a warty acorn cup.



Of all the scrub oaks, the deer or Sadler oak, *Q. sadleriana*, has the most unique leaves, leaves that resemble chestnuts. This forest edge oak is most closely related to white oaks from Eastern Asia.



Sadler oak produces thickets to 8 feet high along the margins of conifer forests exclusively in the Siskiyou Mountains of northwestern California and southwestern Oregon.



As mentioned previously, the golden oaks have combinations of traits from both the black and white oak groups. The most widespread is the canyon live or goldcup oak, *Q. chrysolepis*.



Although goldcup oak lives in canyons, it also is found at middle elevations in most of the mountains, often on north-facing slopes.



Like the live oaks in the black oak group, goldcup oak is evergreen but easily distinguished by its bicolored leaves, glossy green on top and pale bluish-white on the bottom.



Although goldcup oak has warty acorn cups like the white oaks, the fresh cups also have a golden powder



The other full-fledged tree in the golden oak group is the rare island oak, a relict species now confined to moist canyons on the Channel Islands.



Island oak leaves are bicolored, dark green on top and with white matted hairs underneath.



Here you see the herring-bone pattern on *Q. tomentella*, similar to the pattern on tan oak leaves



The widely scattered Palmer's oak, *Q. palmeri*, is a small tree localized on hot, dry slopes in the inner Coast Ranges and Transverse Ranges. Note the pale, twisted leaves lined with large spiny teeth



The huckleberry oak, *Q. vaccinifolia*, is the dwarf of the group, attaining only shrub status and confined to rocky slopes in the high mountains.



Huckleberry oak leaves do resemble the leaves of the evergreen huckleberry, *Vaccinium ovatum*, but note that the undersides are pale.

