

**BORAGINACEAE, THE BORAGE OR FORGET-
ME-NOT FAMILY**

A DIVERSE FAMILY IN CALIFORNIA,
NEWLY EXPANDED TO INCLUDE THE
FORMER HYDROPHYLLACEAE

Found across the globe, the Boraginaceae is very diversified in California and generally across the Northern Hemisphere, with some surprising members in the tropics

- Poorly known in California is the subtropical genus *Cordia*, shrubs and trees with excellent quality hardwood
- The family provides a selection of ornamentals, especially from the Mediterranean where *Echium*, a popular biennial/perennial genus in our gardens, originates
- Several members of the family are also notable for medicinal uses including comfrey, borage, and hound's tongue
- Few provide food and then in the most superficial way, as the use of borage flowers in salads
- A few also provided pinole for California Indians, seeds ground into flour

Until recently, the waterleaf family Hydrophyllaceae was considered a separate but closely related family but currently it has been combined with the borages

- The waterleafs are especially prominent in western North America, including California, thus swelling the ranks of native Boraginaceae
- Waterleafs were formerly separated by having a two-chambered, (usually) many-seeded ovary that ripens into a capsule, while borages have a four-segmented ovary ripening into four, one-seeded nutlets
- The other major difference was that waterleafs having two separate stigmas while most borages do not
- Other features both families share

The newly expanded Boraginaceae contains annuals, perennials, shrubs, and trees, and lives in many habitats, although perhaps the majority in California live in summer-dry habitats, including deserts

- The following are typical traits of the family:
- Many have stiff hairs on stems and leaves
- The leaves are generally simple except certain former hydrophylls,
- The inflorescence consists of *scorpioid cymes*, clusters of flowers that are rolled up into a fiddlehead in bud, the coil slowly opening as flowers open
- Each flower consists of 5 partly joined sepals and petals, 5 stamens, and a superior ovary

Here you see a typical scorpioid cyme coiled up before the flowers open on *Phacelia californica*



For those used to separating hydrophylls and borages, we'll start out survey first with plants that have always been in Boraginaceae. In California the majority of these are annuals

- Genera that are mostly annual include...
- *Amsinckia*, fiddlenecks with yellow to orange flowers,
- *Cryptantha* and *Plagiobothrys*, popcorn flowers with white flowers that are difficult to separate and contain numerous species, and
- *Pectocarya*, comb-fruits, a small group with minute white flowers and distinctive, prickle-lined nutlets
- Perennials include *Mertensia* or mountain bluebells with hanging blue flowers,
- *Cynoglossum* or hound's tongue, early-spring bloomers with forget-me-not-like blue or purple flowers, and...
- *Lithospermum* or puccoon with yellow flowers

The fiddlenecks are easily recognized by growing in foothills, their orange-tinted flowers, and stiff hairy leaves and stems. Here you see the widespread *A. menziesii*. This species colors roadsides and fields in spring with thousands of plants.



In sandy desert habitats, the very hairy *A. tessellata* rules. The specific epithet relates to the cobble stonelike pattern of the nutlet covering. In fact, in most borages, details of the nutlets (often with the aid of a microscope) are important in making an accurate identification.



Although most amsinckias have rather small, unshowy flowers, *A. speciosa* from the southern Coast Ranges features larger, showier flowers.



As mentioned earlier, the popcorn flowers include two large genera, determination is based on nutlet attachment. Of this group, *P. nothofulvus* aka nievitas dominates wide swaths of grasslands in early spring, giving the impression of snowdrifts.



Most plagiobothryses live in temporary wetlands and have tiny flowers. On the left is a species from a montane meadow, on the right a species from a vernal pool



By contrast, most cryptanthas live in dry habitats, often in sandy or rocky soils, and many on desert flats. The genus name means hidden flower, alluding again to their tiny size



Here, and in the next frame, are examples of various cryptanthas



More desert cryptanthas



Finally, a few cryptanthas are perennials living in high dry mountains on the eastside of the Sierra or in desert mountains.
Here is the yellow-eyed *C. flavoculata*



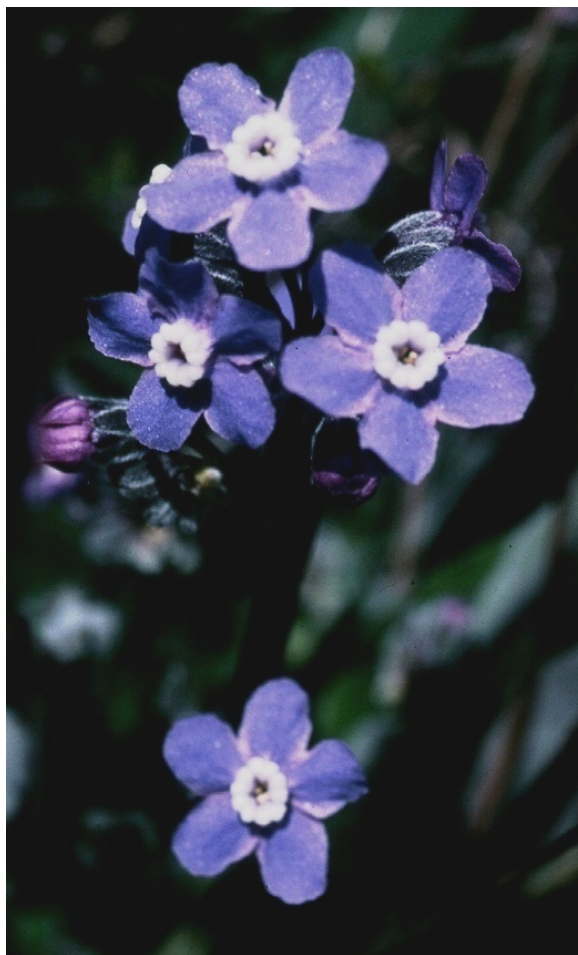
Another perennial *Cryptantha*, this one from the Warner Mountains. These species have larger flowers and attractive foliage but are virtually unknown in gardens.



The common hound's tongue, *Cynoglossum grande*, is a beautiful early spring-flowering perennial of woods throughout the foothills. It is named for the purportedly tongue-shaped leaves



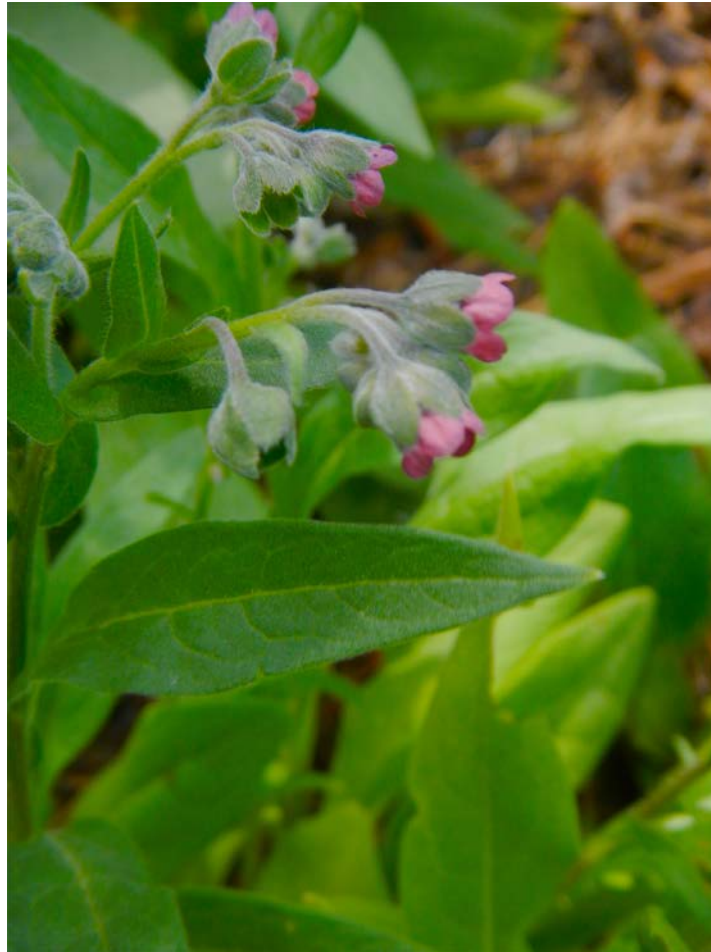
A close view of hound's tongue flowers shows a white *corona* around the narrow opening into the tube where the nectar lies. Many borages share this feature, such as the garden forget-me-not



While most borages have tiny nutlets that are hidden inside sepals, hound's tongue readily displays its nutlets, which are covered with prickly warts, a good identifying feature.



Our other hound's tongue, *C. occidentale*, lives in mountain forests. It displays narrower leaves and red-purple flowers.



In fruit, the nutlets of *C. occidentale* are unmistakable.



The mountain forget-me-nots or stickseeds belong to the genus *Hackelia* and live on the edge of meadows and forests. At first sight, this *H. jessicae* has flowers that look like hound's tongue but the fruits are different.



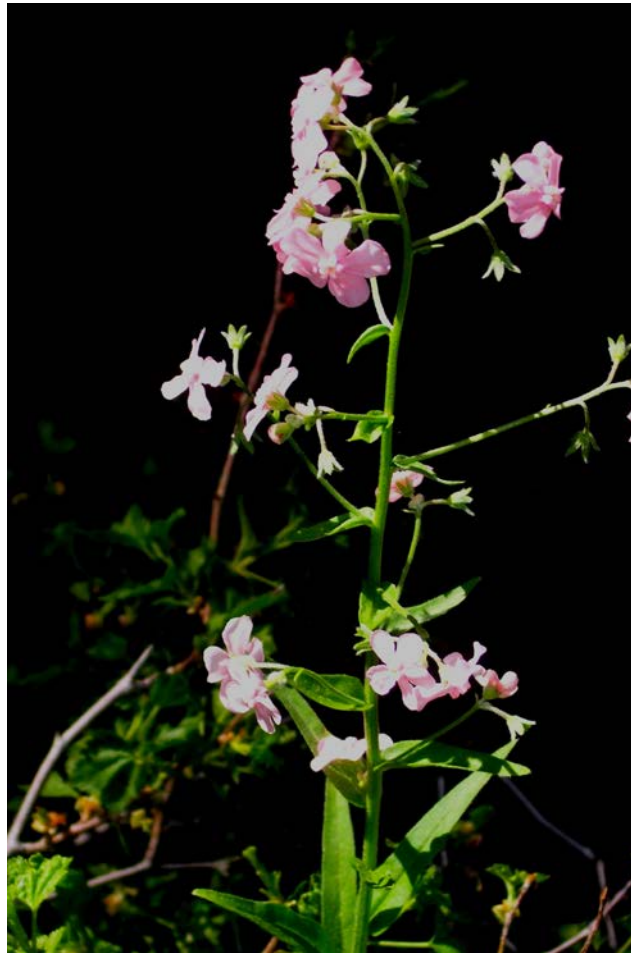
This mountain stickseed has nutlets that are obvious but don't spread and, instead of warts, displays hooked spines that cling to passerby.



Not all hackelias have blue flowers; *H. californica* generally has white ones



H. bella, with pink flowers, is common in the Castle Lake area of the Klamath Mountains



H. mundula from the Sierra displays especially large blue flowers, worthy of a place in a mountain garden.



The genus *Mertensia* or mountain bluebells is well named, for the nodding flowers are bell shaped and the plants live in mountain meadows. The most common is *M. ciliata* seen here.



This close view of *Mertensia* flowers shows the narrow bell shape. It should be noted that an entirely different genus, *Campanula* in its own family, is also referred to as bluebells.



The heliotrope, *Heliotropium curasavicum*, belongs to a genus sometimes cultivated but this species is seldom grown in gardens. It inhabits temporary wetlands and coastal and desert sand dunes, sprawling close to the ground.



Besides succulent, blue-green leaves, heliotrope is distinctive in the color change of its “eye,” starting yellow and fading to dark purple.



The genus *Lithospermum*, literally stone seed, is also known sometimes as puccoon. Our few species have small yellow flowers and are mostly perennial. This one is *L. californicum*, widely scattered on rocky banks in the northern part of the state.



Besides the flower color, *Lithospermum*—as the name indicates—has stone-hard seeds, in this case actually one-seeded nutlets.



Let's turn now to the former Hydrophyllaceae or waterleaf family, which also contains many native species. Some of the genera include...

- *Nemophila* or baby-blue-eyes, annuals in grasslands and woodlands,
- *Pholistoma* or fiesta flower, scrambling annuals from deserts and woodlands,
- *Eucrypta* (ncn), annuals with tiny white flowers from drylands,
- *Emmenanthe penduliflora* or whispering bells, an annual that follows fires and also occurs in deserts,
- *Eriodictyon* or yerba santa, evergreen shrubs in chaparral,
- *Nama*, annuals and colonizing ground cover perennials from deserts and rocky banks, and—most important of all—
- *Phacelia* with around 80 species of annuals and perennials from a variety of habitats

Nemophila (literally woodland lover) consists solely of low-growing annuals with scalloped leaves and few flowers per cluster. The best known is baby-blue-eyes, *N. menziesii*, which is a popular garden annual blooming in early spring



Typical baby-blue-eyes has clear blue petals with a paler center, but several colors forms including a midnight purple are now available.



Near the coast, the variety *atomaria* grows in grasslands with pale flowers decorated with lines of purple dots.



Five-spot, *N. maculata*, is aptly named. It looks much like baby-blue-eyes except for the flower color pattern, and is widespread in the Sierra foothills



The other nemophilas have tiny flowers and so are seldom encountered in the trade. A common one, *N. heterophylla* or baby-white-eyes, is widespread in oak woodlands in the foothills.



Pholistoma with two species consists of scrambling annuals with the stems lined with recurved prickles that cling to surrounding vegetation. *P. auritum* or fiesta flower is best known and deserves a place in a shade garden.



The individual flowers of fiesta flower are similar to baby-blue-eyes in shape and size



The second species, *P. membranaceum*, has small white flowers and grows in rock crevices in the southern foothills and edges of deserts.



Eucrypta, especially *E. chrysanthemoides*, is a fire follower and desert-edge annual with fernlike leaves sprinkled with white dots.



The tiny white flowers (eucrypta means well hidden) are similar to *Pholistoma membranaceum*



The single species of whispering bells, *Emmenanthe penduliflora*, is an annual with fragrant scalloped leaves and small yellow, bell-shaped flowers that nod



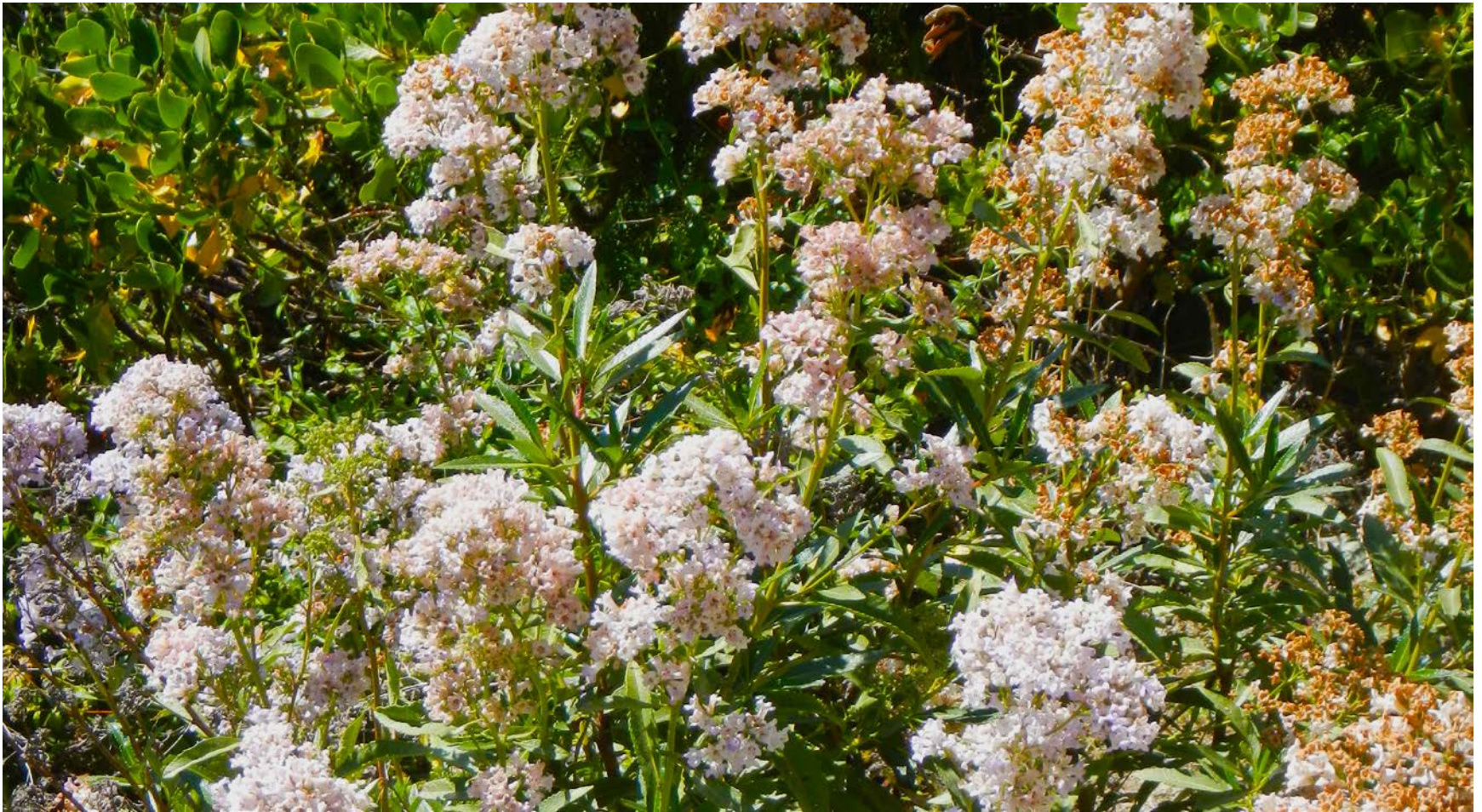
In fruit, whispering bells retains its petals, which rustle in the breezes. This annual is common in deserts and is a fire follower elsewhere.



Yerba santa (holy herb in Spanish) belongs to the genus *Eriodictyon* (woolly net), a group of small evergreen shrubs with widely wandering roots which establish colonies over time



The fragrant leaves have been used medicinally, and the narrow, bell-shaped flowers are white, pinkish, or purple and produced in late spring to midsummer. Here you see a butterfly on the widespread *E. californicum*



E. californicum, a fire follower and opportunist, is common from the northern border of the state south through the Sierra and Coast Ranges. Here you see the bifacial leaves, sticky and green above, and with a woolly network of veins beneath



E. californicum features white to pale purple flowers. It is seldom available and somewhat difficult to establish in gardens.



Southern California is home to a number of other yerba santa.

This one, *E. capitatum* for the heads of purple flowers, is restricted to nutrient-poor soils in northern Santa Barbara County near Lompoc.



The small purple flowers of *E. capitatum*



By contrast, the thick-leaved yerba santa, *E. crassifolium*, is a common sight along roadways in the Transverse Ranges of Southern California



Although seldom grown, *E. crassifolium* is a good subject for dry gardens, providing a profusion of pale purple flowers in late spring.



From the central Coast Ranges, especially the Santa Lucia Mountains, comes the woolly yerba santa, *E. tomentosum*, whose gorgeous gray-silver leaves carry the day despite the tiny flowers.



Here you see the typical habitat for *E. traskiae*, another Southern California species especially common in the Santa Barbara area.



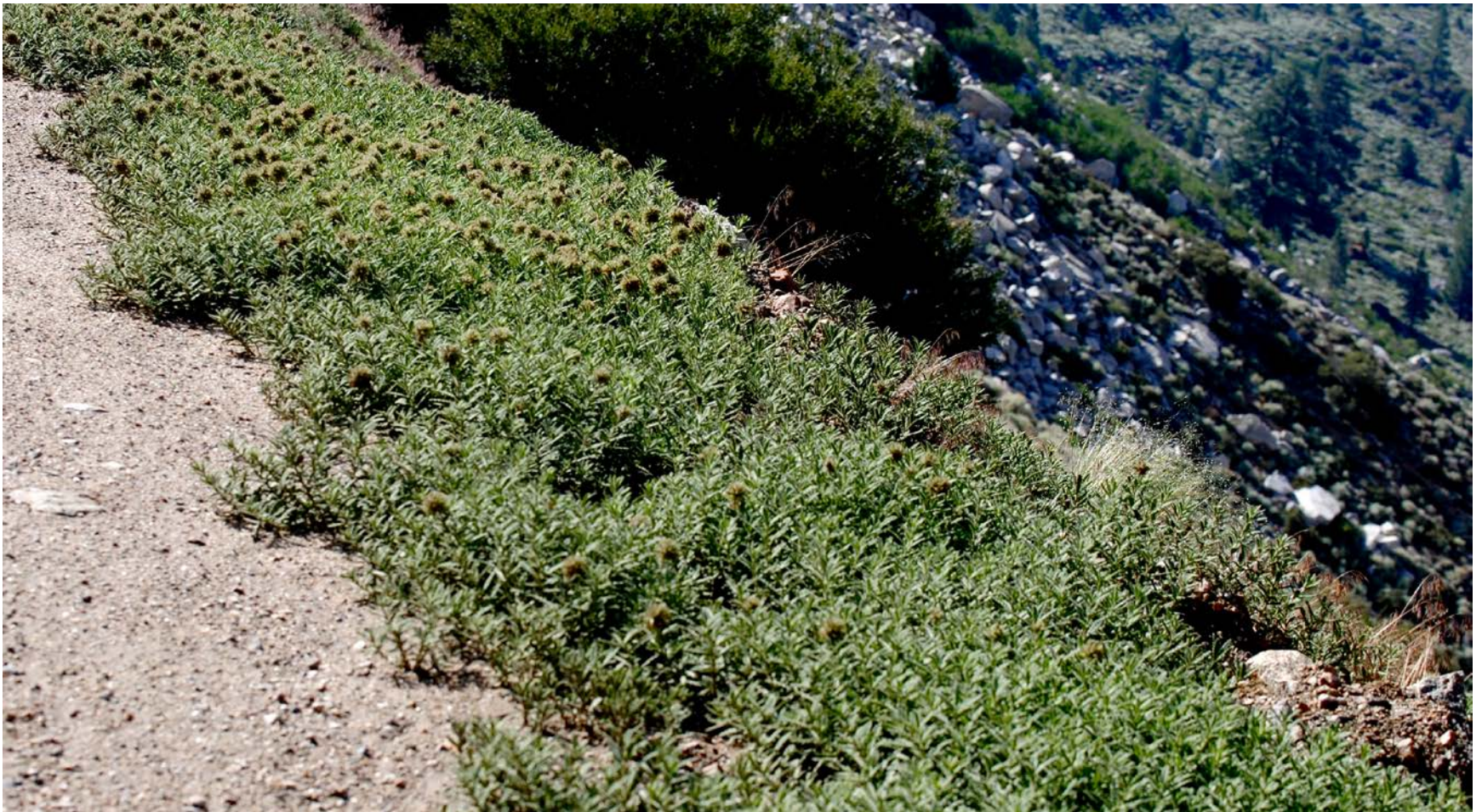
E. traskiae combines the woolly leaves of *E. tomentosum* with larger, pale purple flowers. Unfortunately, very few of the species are ever encountered in the trade.



The small genus *Nama* includes annuals and colonizing perennials with small clusters of bell-shaped pink or blue-purple flowers. Purple mats, *N. demissa*, is a typical “belly flower” of sandy desert soils.



Other namas, like this *N. rothrockii*, form extensive woody mats on loose, scree slopes in the mountains. Here you see a colony on the road up Mt Shasta



Here you see *N. rothrockii* in bloom with beautiful bell-shaped blue-purple flowers. The problem with this decorative species? Difficulty of propagation and lack of availability.



The old type genus, *Hydrophyllum* (waterleaf), forms rhizomatous clumps with coarsely pinnately slashed leaves that often have pale “water” spots on the upper surface. Here you see the leaves of western waterleaf, *H. occidentale*



Western waterleaf produces pale purple flowers in dense headlike clusters, blooming in mid to late spring. It is widespread at middle elevations in conifer forests.



By contrast, redwood waterleaf, *H. tenuipes*, has widely spreading rhizomes and grows on the forest floor in northern California. Note the beautiful, compound leaves.



A close view of *H. tenuipes* flowers, which are a rather drab white.



Our last genus, *Phacelia* (various common names), is a huge highly varied one, which often is identified by eliminating the other contenders. The genus typically has...

- Both annuals and perennials,
- Leaves that vary from simple and unlobed to highly compound and fern like,
- Clearly coiled clusters of flowers in pink, purple, blue, or white,
- Sometimes irritating hairs (some people develop allergies)
- The species grow from coastal dunes to alpine heights with many annuals common in deserts

Because of its huge size, *Phacelia* is broken down into 3 major groups in the *Jepson Manual* as follows:

- Perennial species, many of which grow in rocky places with deeply pinnately lobed to pinnately compound leaves, a few otherwise in other habitats,
- Annuals with compound leaves, sometimes highly divided into fernlike segments, and...
- Annuals with simple to lobed leaves, with one major group having particularly large, showy flowers

We'll start with a sampling of the perennials, many of which are relatively poorly known in the trade with a couple of exceptions. *P. bolanderi* has exceptionally large flowers and is one of the few to live at the edge of moist, shaded coastal forests.



P. bolanderi leaves are broad and coarsely toothed, offering a distinctive pattern that helps identify the species.



A second perennial is *P. sericea* or silky-leaf phacelia with narrow spikelike clusters of flowers. Common in the Rocky Mountains it barely enters California on rock outcrops in the northeastern Warner Mountains.



The unassuming *P. hydrophiloides*, named for the white spots on the leaves that resemble *Hydrophyllum* leaves, grows in mountain conifer forests.



The headlike clusters of *P. hydrophiloides* flowers feature turned back petals that end in a point, a good way of identifying it.



Many of the remaining perennial phacelias live in rock outcrops and scree, most featuring basal leaves that are deeply pinnately divided or compound, and with deeply impressed featherlike veins. *P. californica* grows on coastal bluffs.



Unlike many of the other “rock” phacelia, *P. californica* typically has pale purple flowers



The common rock phacelia, *P. imbricata*, is widespread on rocky slopes in the inner, summer-hot foothills. This particular form has purple-tinted leaves.



Large colonies of *P. imbricata* make dramatic clumps in bloom in spring, featuring snowy white flowers.



The bristly phacelia, *P. nemoralis*, has bright green leaves and whitish flowers, and lives in dry open woods.



True to its common name, *P. nemoralis* features prominent stiff, white bristles.



At higher elevations, *P. hastata* is common. Note that the leaves are not compound like the others just covered.



Finally, in this group with engraved veined leaves, we have *P. heterophylla virgata* or tower phacelia, common in dry slopes of the mountains, featuring distinctive, narrow, tower-shaped inflorescences.



Next, we'll move to a few annual phacelias with clearly compound leaves. One of the most widespread, common throughout the foothills in woodlands is the fern-leafed *P. distans*, here with white flowers.



Showier is the blue-purple form of *P. distans*, a common sight in desert scrub, blooming by the hundreds in good years.



A close view of *P. distans* flowers; note the stamens are no longer than the petals.



Similar in overall appearance, the tansy-leaf phacelia, *P. tanacetifolia*, has long stamens. It grows in dry foothills and the edge of deserts.



Yellow-throat or *P. fremontii*, is another of the desert annuals, with deeply lobed leaves and clear blue flowers with a yellow throat. It grows only a few inches high.



Another colorful desert-edge species is *P. bicolor*, similar to *P. fremontii* but with dense clusters of flowers.



One more desert annual, this one with richest blue flowers, is *P. crenulata* or royal phacelia. It grows taller than the last two.



As the specific epithet suggest, *P. crenulata* has deeply lobed, scalloped leaves. Unfortunately, the leaves have a strong, unpleasant scent



Not all dry-growing annual phacelias have these compound or deeply lobed leaves. Several examples follow. Of these, a couple are very short plants like the *P. divaricata* here whose flower shape and color somewhat suggests baby-blue-eyes.



The humble phacelia, *P. humilis*, is even shorter—only inches high—but makes up for it by growing by the hundreds in sandy soils in the northern mountains.



A close view of the lovely blue flowers of humble phacelia



In our annual species with simple leaves, we have a closely related group with uncommonly large, showy flowers, which either grow in deserts or follow fires. Here you see the beautiful *P. campanularia* or bell phacelia on sandy desert soils



The clear blue bell-shaped flowers of *P. campanularia* make intensely blue swaths of color in gardens.



Similar to *P. campanularia* is a sister species with a shorter blue bell, and which generally doesn't grow to the 3-foot height of the first.



Sticky phacelia, *P. viscida*, of similar stature to *P. campanularia* has shallow saucer-shaped flowers of an intense blue color. This species follows fires in the South Coast Ranges.



P. viscida provides among the best true blues of any wildflower, and can be obtained from native nurseries.



With equally large flowers, the closely related *P. grandiflora*, again a fire follower from Southern California has beautiful pale purple, saucer-shaped flowers



The broad, coarsely toothed leaves of *P. grandiflora* are similar to the others with large flowers



This is but a sampling of the many phacelias, some well known, others not known but still good choices for gardens

- Our overview of the borages has shown what a large group this is, with all sorts of possibilities for gardens
- Most of the annual species are only available as starts (in the case of the showier phacelias) or simply seed, but many have yet to make it to a commercial source
- The yerba santas can be propagated by long root runs or hardwood cuttings, but are somewhat difficult to establish, and...
- Many of the perennials are also grown from seed
- Many of these and other species in the family await a thorough garden trial