



Lewisias in Captivity *by Sean Hogan*

Emerald Canary



Cliff maids (*Lewisia cotyledon*), in Siskiyou County

The genus *Lewisia* is a western treasure. Coming across its cheery forms and bright flowers makes a rigorous trek, often accompanied by a steep climb, more than worth it.

As with so many plants, seeing *Lewisias* in their natural habitat can answer a lot of questions about what might be required when “reduced to cultivation” in the garden or on a windowsill. As luck and editing space would have it, the three general groups of the genus fit rather neatly into habitat types and care needs. As always, for every exception there’s a rule,

so extra details will be included. These groups include the evergreen rosette-formers, headlined by the flashy cliff maids (*L. cotyledon*); the snow-melt species, with the most notable being *L. pygmaea*; and the small but mighty bitterroot (*L. rediviva*) clan.

The Cotyledon Group

In the last twenty years or a bit more, *L. cotyledon* and its hybrids have progressed from the realm of the specialist rock gardener to mainstream. All have similar requirements. Yes, people still often kill them quite quickly, but maybe some of these notes will help. With one exception (*L. congonii*, described below) the cotyledon group remains evergreen. Its members inhabit cliffs and screes almost entirely in the winter-rainfall West from the southcentral Sierra north to Mount Arrowsmith on southwest Vancouver Island in British Columbia, Canada. Winter or early spring growth and summer dormancy are key here. All members of the cotyledon group live in lean soil, and often little of it. Some sites such as those on canyon walls might appear rich with duff falling from above, but often there is little organic matter present in the shallow pans of soil on rock ledges or in rock crevices. In most of these locations, survival depends on a balance of soil

Bob Case



Lewisia pygmaea in Colorado

Continued on page 3

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moisture, temperature, and ever-present soil fungi (cooties being the technical horticultural term). In general, saturating rain ceases as temperatures warm, or, in high-elevation habitats subject to summer thunderstorms, soil never warms enough to activate root-killing fungi. Even in nature, plants can succumb from rain followed by heat. Inland, where summer heat is a given, summer dormancy is important. When soil temperatures reach near 70 degrees Fahrenheit, plants should be allowed to dry, preferably in a shady place. Once dormant, thorough soaking can easily allow the cooties to rule, outpacing the plant and possibly leading to collapse. I've always marveled at the ability of many of our western natives to be grown with ease in such places as the United Kingdom; our natives, *Lewisia* included, thrive there in what I see as perpetual March. The consistent cool implies a land of milk and honey where summer (or maybe old age) never happens. Within the fog belt of our coast, similar conditions, save for summer rain, exist. The entire cotyledon group can often be watered year-round and kept quite lush, like cabbages some would say. All appreciate good nutrition while growing and can be induced to flower from late winter or spring through autumn in cool areas.

Lewisia cotyledon has as many as five recognized forms depending on the latest dissertation. All inhabit an area in and around the Klamath and Siskiyou mountains from Trinity County, California through Douglas County, Oregon. *Lewisia cotyledon* var. *howellii*, a river cliff dweller with large pink and white flowers, has been among the easiest to grow. *Lewisia cotyledon* var. *purdyi* from serpentine in Josephine County, Oregon is no longer recognized as distinct enough for variety status, but these plants and others have been used extensively in hybridization programs. Thanks to the extreme talents of horticulturists such as those at the United Kingdom's Ashwood Nursery, gorgeous hybrid strains now feature brighter and clearer colors (including bright yellow) than plants seen in the wild.

Lewisia leeana with its quill-like leaves also inhabits Siskiyou country with a disjunct population in the High Sierra of Fresno County. It loves a good scree and a bit more sun than others and has crossed with *L. cotyledon* var. *cotyledon* where their distributions overlap. *Lewisia cantelovii* and *L. serrata* are two species



Sean Hogan

Lewisiopsis tweedyi on Chumstick Mountain, central Washington



Sean Hogan

White flowering *Lewisia rediviva* near Chumstick Mountain, WA

Steve Matson



Lewisia longipetala closeup

Steve Matson



Lewisia longipetala in Desolation Wilderness near summit of Keith's Dome

Sean Hogan



Lewisia longipetala in bud

near to my heart. Both are cliff and sometimes scree dwellers, inhabiting steep canyon walls from the southern Siskiyou to the central Sierra. They have toothed leaves and tidy rosettes that produce airy inflorescences of two feet or more with small white-to-pink flowers on the same stalks throughout summer. A bit further south above the canyon of the Merced River lies (or clings) *L. congdonii*. Summer deciduous

at lowest elevations, and nearly so or reduced to a cluster of reddish leaves higher, it has caused consternation over the years, having been declared extirpated and resurrected from various sites from time to time. The plants produce thickened, almost caudex-like stems and have extensive root systems. Larger containers and more moisture than instinct might dictate will keep the plant nearly evergreen and producing relatively large flowers on indeterminate stalks. In comparison, *L. columbiana* is really easy-peasy with its subspecies *rupicola*; the species is widely distributed on cliffs and screes from the coastal mountains of extreme southwestern British Columbia to both the Coast and Cascade ranges of Douglas County, Oregon. Those spreading east into the Wallowa Mountains and surrounds of northeastern Oregon are the most tolerant of summer water. Think monsoon. Once placed in the cotyledon group and now placed in its own genus, *Lewisiopsis tweedyi* enjoys like conditions and can thrive in sun or shade. It grows in a multitude of soil types in Washington State's Winachee Mountains where ample soil volume helps stabilize soil temperatures. It can be nonfatally watered in summer but not during a heat wave.

The Snow-Melt Group

A large group, generally referred to as the *L. pygmaea* complex, are generally snow-melt species. As alpine they are generally distributed from the Rocky Mountains west and from Baja California's Sierra San Pedro Mártir north to southern Alaska. They are surprisingly easy to grow, even in milder areas, if kept a bit dry or

well drained in winter, then damp in spring. Too much drying in summer can cause dehydration of the tuber-like underground stems. Addition of some clay to their soil mix is helpful. A couple of standouts include *L. longipetala* from the northern Sierra and *L. brachycalyx* from the mountains of the Southwest from Baja to Arizona and Southern California. These can be kept growing throughout the summer if not too hot and will often repeat flower. Another weirdo (one more technical term) is *L. oppositifolia*. Endemic to the Josephine serpentine of the same county in Oregon and into Del Norte County, California, it emerges in late autumn and winter, flowering mid-spring as the leaves begin turning red in preparation for summer dormancy. The somewhat flattened white-to-pale-pink flowers are attractive, and the plant is not difficult to grow if kept dry in summer, but some believe it has a face for radio and thus is best left for observation in the wild. The plant has suffered from unscrupulous collecting in the past, but from my observations, its populations are stable at the moment.

The Rediviva Group

A final group might be the most famous, and the most obscure. The type plant was collected, pressed, and stored by the Lewis and Clark expedition; many months later, as it was being processed in the herbarium, someone noted that the specimen had resprouted and grew to flower again! Hence its epithet: *rediviva* or resurrected. *Lewisia rediviva* occurs from interior western Canada throughout the drier Rocky Mountain region, west to the interior scree and gravel plains of California and Oregon. Rosettes of rice-like leaves appear with the first moisture (much later to the east) with quarter- to half-dollar-sized flowers early to mid-spring in lavender, pink, or white. Capturing seeds can be both a matter of timing and willingness to engage in healthy excursions, as the seed spends very little time ripe before tumbling away in wind-dispersal-adapted tumble pods, a challenge especially in the often very windy Great Basin. *Lewisia maguirei*, endemic to a single mountain range, differs by having two or even three flowers per inflorescence rather than merely one in the remainder of the group. Both require mineral soil—the addition of some clay fines is helpful. For reducing dehydration during their summer dormancy, planting in groups in larger containers or troughs is helpful. It is useful

to find a quiet, shady place of rest where accidental watering will not occur when the flowers fade and the leaves dry in late spring to mid-fall. Watering upon the first cool weather is a must, so don't forget where they are! Finally, an exquisite little plant from the Sierra in and about Yosemite National Park is Yosemite Lewisia (*L. disepala*).

Bob Case



Lewisia triphylla at Calaveras Big Trees



Orange-flowered *Lewisia cotyledon* hybrid

Sean Hogan



Lewisia cotyledon hybrids in pots ready for the Regional Parks Botanic Garden plant sale

Multiple rosettes produce one-centimeter-sized flowers for about a month in spring. Inhabiting deposits of gritty soil on high granite domes, *L. disepala* are often free of snow prior to plants at lower elevation. Though the area appears dry, and can be at times, frequent thunder storms visit them in summer. In cultivation, giving them a smaller container but never allowing absolute dryness has been helpful. Until it can be produced more easily in the nursery trade, it might be best to save seeing it for a long hike.

General Cultivation Guidelines

In the garden, soil temperature is more easily regulated by the insulating qualities of the planet, but moisture must be controlled by placement in a gritty soil mix or in rock gardens or green wall situations. Placement under a rock lip or in a crevice can keep unwanted water away from the plant's crown, and placement on the north side of a wall or stone can greatly reduce soil temperature, even if the plant's face is in the sun.

Pots or troughs deeper than wide are best for *Lewisias* because they pull moisture down and away from the crown, but allow roots access when they need it. (This is less of an issue for very

shallow-rooted species such as *L. rediviva*.) Troughs or other thick-walled containers insulate the soil and dull spikes in soil temperature. In all types of containers, limiting organic matter reduces the likelihood of fungal attack, especially during the warmer months. If for whatever reason the plants have dried and begun dormancy, keeping water to a minimum until cooler weather prevails in autumn is very important, especially away from the coast.

Cultivating our natives, including *Lewisias*, will call attention to the fragile and beautiful natural world around us. These plants' availability in refined horticultural forms will decrease and hopefully eliminate undue pluckage from the wild. 🌱

Sean Hogan studied botany and horticulture at American River College and Sacramento State. Early work included mapping rare and endangered plants, mostly Cactaceae, Portulacaceae, and Montiaceae for the State of California. From the mid-80s to the mid-90s, Hogan served as the curator of the South African, New Zealand, Australian, New World Desert, and California Native Cultivar gardens of the University of California Botanical Garden. In 1995, he returned to his native Portland to start a design and consulting firm, work that evolved into Cistus Nursery, widely held to be among the best of the West Coast retail micronurseries.

Delicate Colors and Bitter Roots of *Lewisia* by Margareta (Greti) Séquin, PhD

Hues of pink to white come to mind when we reflect on the colors of bitterroot (*Lewisia rediviva*) flowers. It is interesting to learn that the pigments that compose these colors are uncommon in the plant world.

Pink, purple, and red (and sometimes blue) plant colors, whether appearing in flowers, leaves, or roots, are usually composed of *anthocyanin* pigments. Anthocyanins create, for example, the colors of red and pink rose petals and red fall leaves. In contrast, several plant families in the order Caryophyllales have *betalain* pigments that provide pink and red colors to plant parts. Betalain pigments have distinctly different properties and just happen to produce colors similar to anthocyanins. Well-known plant families among the Caryophyllales that feature betalains are the goosefoot family (Chenopodiaceae), the cactus family (Cactaceae), the four o'clock family (Nyctaginaceae), the purslane family (Portulacaceae), and the miner's lettuce family (Montiaceae). The genus *Lewisia* is in the Montiaceae family.

The bright pink color of some cactus flowers (Cactaceae) and the deep red color of beets (Chenopodiaceae) are due to betalains. The name betalain is derived from *Beta*, the genus of beets. Betalains make the famous soup borscht a deep red. Betalains can be yellow as well; vegetable markets often feature yellow beets beside the common red ones. The yellow colors of cactus flowers and even some *Lewisia* are due to slightly different structures of their betalains. Higher concentrations of the pigments lead to more intense colors.

A few tidbits about the chemistry of betalains: While both anthocyanins and betalains are rather complex organic (carbon-based) molecules with several aromatic rings, betalains also have nitrogen atoms in their structures, making betalains alkaloids. The structural differences result in some noticeably different properties. Betalain pigments are more stable than anthocyanins and can better withstand conditions like elevated temperatures. The stability of betalains comes in handy in food production: strawberry and raspberry flavorings, for example, commonly have small amounts of beet juice added for a deeper shade of pink. (Check the list of ingredients in organic yogurt and ice cream.) With regard to our digestive systems, anyone who has eaten red beets can attest to the stability of betalain pigments!

Common names often suggest specific properties of a plant, and a common name like bitterroot alerts us to



Bart O'Brien

Lewisia cotyledon in the Botanic Garden, 2013

its special taste. Native people have long known that the roots of *Lewisia* are not only edible and nutritious as a source of starch but also have a bitter-tasting sheath or covering. This bitter taste can be destroyed by cooking the roots, but what is its chemical nature? Plants have evolved a great diversity of substances that taste bitter to us and often to browsing animals. These bitter compounds are a form of plant defense: roots, as well as leaves or bark, can contain intensely bitter chemicals that deter animals from eating them. Think of quinine in the bark of tropical *Cinchona* trees or tannins in alumroot (*Heuchera*). In bitterbrush (*Purshia tridentata*) the bitter taste of the leaves is due to cucurbitacins, organic compounds that also occur in bitter cucumbers. The bitter taste of *Lewisia* roots is due to another type of organic compounds, the saponins. Saponins are soapy substances that form suds in water, as seen when we mix bits of soap plant (*Chlorogalum pomeridianum*) with water. Saponins have a somewhat bitter taste. They are not harmful to humans but undesirable in plant parts that are used as food. People have learned to remove these chemicals by cooking the roots before eating them.

While native people have long known special uses of *Lewisia*, we can enjoy the exquisite beauty of bitterroots and reflect on the nature of their pigments and the protective secrets of their roots. 🌱

Margareta (Greti) Séquin is an organic chemist, plant enthusiast, and docent at the Regional Parks Botanic Garden. She is the author of The Chemistry of Plants: Perfumes, Pigments, and Poisons, RSC, Cambridge, in 2012, and The Chemistry of Plants and Insects: Plants, Bugs, and Molecules, RSC, Cambridge, 2017.

Lewisia: A Spectacular Plant *by Bob Case*

Bob Case



Bitterroot (*Lewisia rediviva*)

Bitterroot, *Lewisia rediviva*, beautiful and conspicuous in bloom, occurs in ten western states and the two western Canadian provinces. However, it has a short spring growth and flowering period, after which the aboveground portion of the plant dries up—the remaining underground root lies dormant and awaits the next spring when it leafs out and blooms. The Lewis and Clark Corps of Discovery had their first encounter with the plant when in its resting root stage.

Drouillard's Plunder and the Taste that Nauseated Lewis

On August 22, 1805, the Corps of Discovery made camp near the headwaters of the Beaverhead River in western Montana, upstream of the Jefferson River. Members of the corps were preparing a cache. They had finally found Sakagawea's tribe, the Shoshone, on whom they were counting to supply horses for the trek over the mountainous Continental Divide. While scouting in the area, George Drouillard, corps hunter, translator, and sign-talker, met several Shoshone who had been digging roots. During the conversation one young man separated himself from the group and attempted to steal Drouillard's gun.

After a chase and scuffle the Indians retreated, leaving behind the gun, some baggage, and their harvest. As described by Captain Lewis, the harvest consisted of:

...a couple bags woven of silkgrass containing about a bushel of dried serviceberries, some chokecherry cakes, and about a bushel of roots of three different kinds dried and prepared for use which were folded in as many parchment hides of buffalo....one species of the root was fusiform about 6 inches long...another species appeared to be fibrous. The parts were brittle, hard, and of the size of a small quill, cylindric, and white as snow throughout, except some small parts of the hard black rind which they had not separated in the preparation....Indians with me informed were always boiled for use. I made the experiment, found that they became perfectly soft by boiling, but had a very bitter taste, which was nauseous to my palate, and I transferred them to the Indians who had eat them heartily.

Lewis asked to see the plant in the field, but the Indians told him the plant did not occur in the Lost Trail Pass area although it was common in the valley to the east (which came to be known as the Bitterroot Valley). Remember that in August the plant would have been in its dormant state as an underground root. Lewis would have to wait for his return trip to collect this nutritious, beautiful, and interesting plant.

Some Historical Notes

French and Spanish explorers, early trappers, and mountain men also referred to the bitterness of lewisias, but they carried the roots as food because they were light, nutritious, and did not spoil. Early naturalists and pioneers ate bitterroot but seldom gathered the food themselves—they preferred trading with Indians to obtain a supply. Some Indian tribes taught that plants that were harvested soon after bloom were sweeter than those taken later in the fall.

Blooming Lewisia Discovered and Transported

President Jefferson's instructions to Meriwether Lewis directed him to collect plants and animals not found in the United States

and to gather information about Indian food plants. The expedition collected large quantities of plants on the plains and Rocky Mountain foothills during the westward journey, but unfortunately these specimens were lost when a canoe upset and lost its cargo. Another cache at Great Falls molded due to spring flooding. On the return trip in 1806, Lewis collected one hundred and fifty specimens, and among these was a specimen of bitterroot. While Lewis wrote a 500-word description of *Clarkia* the day he collected specimen #43, remarkably he made no specific mention of his bitterroot find: "Wednesday July 2ed 1806 ... Nothing worthy of notice transpired in the course of the day.... I found two species of native clover here.... I found several other uncommon plants specimens of which I preserved." The collection was made at the mouth of Lolo Creek, the place they called Traveler's Rest, about 20 miles southwest of present day Missoula. Today, the site is the location of a Montana state park. Eventually this specimen found its way from Montana, traveling over Lewis and Clark Pass by horseback, up the Marias River, then down the Missouri by canoe, and on to Thomas Jefferson by boat and coach, three thousand miles total, and finally into the hands of the unofficial expedition botanist, Benjamin Barton, at the Academy of Natural Sciences in Philadelphia.

***Lewisia rediviva* Gets a Name**

Eventually, the collection was passed from the aged and ailing Barton, to whom Jefferson and Lewis had offered the opportunity to study and publish a volume on the plants collected,

to the German botanist Frederick Pursh. As Pursh studied the material, he was sure it was a new genus in the family Portulacaceae. (Although formerly in the Portulacaceae family, lewisias are now in the Montiaceae family.) He named it *Lewisia* in honor of Meriwether Lewis, the true plant collector of the Voyage of

Bob Case



Bitterroot (*Lewisia rediviva*)

Discovery. The species epithet *rediviva* (resurrection) was assigned to describe the following event: In 1809 or 1810 Thomas McMahon, a gardener working for Barton in Philadelphia, was able to resprout the plant from the dried herbarium sheet specimen almost two years after it was collected by Lewis. In 1863 a gardener at Kew Gardens in London performed a similar experiment: He placed a pressed specimen in boiling water, then in potting soil, watered the pot, and enjoyed several blooms thereafter!

Montana State Flower

Montana chose a deserving state flower in the lovely bitterroot. It has lent its common name to a mountain range, a valley, and a river. Few plants rival the radiant beauty of the bitterroot, whose flowers paint spring foothills and prairies with colorful hues of pink and white.

Lewisia Today

I saw many *Lewisia rediviva* in Montana in the Tobacco Valley near the Canadian



Bitterroot (*Lewisia rediviva*)

Bob Case

Bitterroot (*Lewisia rediviva*)

border while visiting my college roommate Art Weydemeyer. The plants were abundant along a rocky-gravelly ridge, probably an esker or moraine, well drained to be sure. Some speculate that this area may be a shoreline of the ancient Lake Missoula. Art told me that he and his family used to picnic in the area in the spring and planted some bitterroot specimens they had dug from this site around their homestead for the glorious blooms in springtime. Historical accounts written by Olga Wedemeyer Johnson attest to the roots being dug and used as a food by the local Kootenay (or Kuteni or Kutenai) Indians well into the 1950s. There are many areas where one may witness the beauty of *L. rediviva*, including the Tobacco Valley and the National Bison Range near Ronan, Montana. I have seen them in many Bay Area locations including the Fire Interpretive Trail that circles Mt. Diablo, where it grows in pure chert scree and fractured strata, seemingly devoid of organic matter. A great place to see them is the BLM Red Hills Area of Critical Ecological Concern (ACEC) in Tuolumne County

*Lewisia cotyledon* var. *heckneri* f. *alba* in the Regional Parks Botanic Garden.

Origin Story

The Flathead Indians, who valued bitterroot more than other tribes, have given us a story explaining how man came to possess this edible and beautiful plant:

Long ago, in what today we call the Bitterroot Valley, people were experiencing a famine. One old woman had no meat or fish to feed her sons. All they had to eat were woody shoots of balsamroot. Believing that her sons were slowly starving to death, she went down to the river early one morning to weep alone and sing a death song. The sun, rising above the eastern mountains, heard the woman singing. Taking pity on her, the sun sent a guardian spirit in the form of a red bird to comfort her with food and beauty. The bird flew to the gray-haired woman and spoke softly. "A new plant will be formed," said the bird, "from your sorrowful tears which have fallen into the soil. Its flower will have the rose of my wing feathers and the white of your hair. It will have leaves close to the ground. Your people will eat the roots of this plant. Though it be bitter from your sorrow, it will be nourishing. When they see these flowers they will say, 'Here is the silver of our mother's hair upon the ground and the rose from the wings of the spirit bird. Our mother's tears of bitterness have given us food.'"

near Chinese Camp. On April 3 of this year they were blooming in greater numbers than I have seen there in twenty years. Of course, timing is critical as many a *Lewisia*-chaser can tell you. Napa, Sonoma, and Lake counties have good populations, and I used to be warmed at the sight each spring of a small patch that I monitored on serpentinite just south of Cañada College near the Edgewood Preserve in San Mateo County.

Growing *Lewisia*

I have had little success growing *L. rediviva* at my home—it tends to rot easily—but *L. cotyledon*, purchased over the internet, has lived and bloomed for several years growing in gravel-filled pots. The texture of the roots actually seems to be near that of rubber. It is very difficult to break with the hands. However, the plant is easily killed by overwatering. While lewisias can be purchased online, most people start with the seeds and good drainage. Many other *Lewisia* species are found on the web and Annie's Annuals and Perennials sells *L. cotyledon* in many beautiful colors each spring. 🌱

Bay Area native **Bob Case** taught biology in the Peralta Community College District for 25 years, is a retired Deputy Agricultural Commissioner for Contra Costa County, and sits on the Board of the Friends of the Regional Parks Botanic Garden. He has traveled most of the Lewis and Clark Voyage of Discovery Trail and is a member of the Lewis and Clark Trail Heritage Foundation.



Lewisia rediviva leaves at UC Botanical Garden

Bob Case

In the spring of 1996 Glenn Keator and members of the garden's second docent training class came up with the idea of forming a *Friends* group to provide ongoing support for the garden's educational and horticultural programs and for its long-term financial security. Months of meetings followed throughout that fall, as a small group of enthusiastic docents set to work organizing a board and an advisory council, drafting bylaws, and putting together a membership brochure. Memberships to the *Friends* were offered for the first time at the plant sale in the spring of 1997, and the first issue of *Manzanita* was mailed that summer, twenty years ago this month.

Comparing Volume 1, Number 1 to this current issue, some things have changed, but much remains constant. Among the first authors were names still familiar to many *Friends* members today: Founding President Katharine Greenberg continues to teach classes on gardening with native plants; former gardener Bert Johnson still pops in to share his expertise at our plant sales and writes for our e-newsletter and the *Manzanita*; and Glenn Keator remains a stalwart of our education program, teaching docent training classes and leading workshops and field trips. In 1997 you could find Glenn teaching "Learning to Identify California's Complex Composites"; this summer he'll walk you through "Demystifying the Composites." Apparently the challenge of mastering certain subjects persists.

Among a series of articles on the genus *Arctostaphylos* in the inaugural issue was Garden Director Steve Edwards' short piece

appealing for new volunteers, "a noble few who might rally to the call to take up this good work." Twenty years later, the *Friends* is still an organization driven entirely by its members. New volunteers are always welcome.

On hearing that we were planning to acknowledge the 20-year milestone in our summer issue, Katharine Greenberg wrote to me: "It's gratifying to know that the

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The Genus *Arctostaphylos*

KATHERINE GREENBERG

I think if I were forced to choose only one shrubby genus, giving up all others, I would say unhesitatingly 'Manzanitas, please,' for they can be all things at once to the lover of shrubs, giving you complete satisfaction at any time of year.
Lester Roundtree, Flowering Shrubs of California



Mature specimen manzanita (*Arctostaphylos* whatever) photographed in the Regional Parks Botanic Garden by Carrie Sprague.

This inaugural issue of *Manzanita* features the genus *Arctostaphylos* and is named for one of the notable collections in the Regional Parks Botanic Garden. The articles that appear in this newsletter explore various aspects of the fascinating manzanitas most species of manzanita, in the process saving some that were threatened by extinction. *Arctostaphylos franciscana*, extinct in the wild, was rescued from Laurel Hill Cemetery in San Francisco by James Roof before the bulldozers destroyed the last surviving plants. For years Alice Eastwood thought it was gone until James Roof brought her to the garden where she wept when she saw it. In the March, 1976 issue of *The Four Seasons* James Roof wrote, "California contains the world's greatest aggregation of members of the manzanita family, the genus *Arctostaphylos*. The garden contains sixty-six named 'species and varieties' and many specimens apparently not referable to any of the accepted categories but kept for observation. The nearly complete collection offers opportunities to observe living manzanita material at any time—an undeniable advantage when critical information on certain species is required on short notice or in inconvenient seasons. Before being declared to be of a new species or variety, if they are so declared, subject plants are usually grown and observed in this garden for a minimum of five years, and

cont'd page 10

1

Note the photo caption:

"Mature specimen manzanita (*Arctostaphylos* whatever). . ."

Apparently, we were a little more relaxed about scientific names back then.

Friends are celebrating 20 years in support of the garden. It doesn't seem that long ago that we were planning the first issue and gave the newsletter a name, *Manzanita*. We had a great group of board members and wonderful support from Steve, Glenn, and (previous garden director) Wayne Roderick. Our idea was to give each issue a theme related to native plants, with the hope that the articles would be informative and timeless. It's great that the concept has endured for 20 years and counting."

The volunteers who produce the *Manzanita* today strive to create a publication that is engaging, informative, and beautiful. Over the years, the *Friends* e-newsletter has picked up more of the garden news, leaving the *Manzanita* free to focus even more on California native plants. Aesthetic changes have been made along the way which we hope have enhanced the publication, but we try to remain true to that original concept. In the summer of 2008 (Volume 12, Number 2) glossy paper and full color photographs replaced the original black-and-white ink on matte paper. We've tried several printers in search of the best color, and, more recently, added a heavyweight cover, so your issue can be mailed without a fold. And rather than agonize over leaving interesting material out of an issue, we post supplemental text and photos to our website.

We hope you look forward to receiving the *Manzanita* each quarter and

reading it cover-to-cover. Your feedback is always welcome! And if you are interested in writing for the *Manzanita*, please contact Managing Editor Rosie Andrews at rosie_a@pacbell.net.

A copy of *Manzanita* Volume 1, Number 1, can be found on our website:
www.nativeplants.org/publications/Manzanita-newsletter. 🌱

Rosie Andrews has been a docent at the garden since 2009 and a past President of the Friends. She is currently Managing Editor of the Manzanita.



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Lewisias in Captivity by Sean Hogan

Emerald Canary

so extra details will be included. These groups include the evergreen rosette-formers, headlined by the flashy cliff maids (*L. cotyledon*); the snow-melt species, with the most notable being *L. pygmaea*; and the small but mighty bitterroot (*L. rediviva*) clan.

The Cotyledon Group
In the last twenty years or a bit more, *L. cotyledon* and its hybrids have progressed from the realm of the specialist rock gardener to mainstream. All have similar requirements. Yes, people still often kill them quite quickly; but maybe some of these notes will help. With one exception (*L. congonii*, described below) the cotyledon group remains evergreen. Its members inhabit cliffs and scree almost entirely in the winter-rainfall West from the southcentral Sierra north to Mount Arrowsmith on southwest Vancouver Island in British Columbia, Canada. Winter or early spring growth and summer dormancy are key here. All members of the cotyledon group live in lean soil, and often little of it. Some sites such as those on canyon walls might appear rich with duff falling from above, but often there is little organic matter present in the shallow pans of soil on rock ledges or in rock crevices. In most of these locations, survival depends on a balance of soil

Cliff maids (*Lewisia cotyledon*), in Siskiyou County

The genus *Lewisia* is a western treasure. Coming across its cheery forms and bright flowers makes a rigorous trek, often accompanied by a steep climb, more than worth it. As with so many plants, seeing *Lewisias* in their natural habitat can answer a lot of questions about what might be required when "reduced to cultivation" in the garden or on a windowsill. As luck and editing space would have it, the three general groups of the genus fit rather neatly into habitat types and care needs. As always, for every exception there's a rule,

Bob Case

Lewisia pygmaea

Lewisia, Revered For Rock Gardens *by Glenn Keator, PhD*

John Rusk



Lewisia cotyledon

The Lewis and Clark expedition was not only memorialized by *Clarkia* but also by *Lewisia*, a fascinating genus in the miner's lettuce family (Montiaceae) represented by 18 species in the West, including 16 species in California. In keeping with other members of the family, *Lewisia* has succulent leaves; flowers mostly in the red, pink, and white range; and shiny brown or black seeds. Its seed pod differentiates it from the other native Montiaceae: Each capsule splits open by a circular band (*circumscissile*), and the top falls off as a cap. Many lewisias have more than two sepals (two is the standard for most Montiaceae) and several-to-many petals and stamens.

Only a handful of *Lewisia* species are regularly cultivated, often in containers or rock gardens. Other *Lewisia* species occur in highly restricted ranges and are thus considered rare. Habitats vary from the expected rocky slopes and crevices to wet-to-dry montane meadows, sometimes in full sun, sometimes in partial shade. Many species are found in the Sierra and several in northwestern California,

but only bitterroot (*L. rediviva*) is widespread through the Coast Ranges into Southern California. Although widespread, it is not as common as one might expect—it is fussy about its habitat and restricted to areas with no competing plants.

Bitterroot, named for its fleshy taproot protected by a bitter sheath, occurs not only in California but across the West, including the Bitterroot Mountains in Montana. One of our most distinctive and beautiful species, bitterroot forms a nearly flat rosette of narrow, semitubular fleshy leaves and a series of flower buds opening from the center. The whole plant blooms for two to three weeks, then dries and goes dormant shortly after the seed ripens. Look for the gorgeous waterlily-like pink to white flowers from early to midspring, illuminating the rocky, often barren surroundings for their short duration. As the silky petals fade, the papery sepals remain, surrounding a capsule full of seeds that are carried on winds to potential new homes.

In the Bay Area, bitterroot's white flowers are most easily seen on the Mary Bowerman Trail just below the summit of Mount Diablo, growing near sickle-leaf onion (*Allium falcifolium*) and sulfur buckwheat (*Eriogonum umbellatum*). Bitterroot also occasionally crops up in limited quantities in Annadel State Park near Santa Rosa and, more extensively, along Oathill Mine Road near Mount Saint Helena. Other stands occur on Table Mountain near Oroville in the northern Sierra foothills, in serpentine outcrops in the Red Hills Management Area near Chinese Camp, and near the top of Mount Pinos above the Grapevine in Southern California. Although tolerant of serpentine, bitterroot also occurs on various other substrates including lava outcrops.

The lewisia most often seen in garden centers is cliff maids (*L. cotyledon*) and its varieties, locally abundant on steep rock slopes (again often serpentine) in the Klamath Mountains. Cook and Green Pass north of the Klamath River hosts thousands of plants along the Pacific Crest Trail. This species, again anchored by a fleshy taproot, sports a flat rosette of

broadly elliptical to spatulate bright green leaves and open cyme-like flowering stalks with several to many showy waterlily-like flowers. Blooming mostly in early summer, plants in the garden often extend their bloom cycle. *Lewisia cotyledon* displays great variation in color forms, sometimes apricot, sometimes shell pink, other times rose pink or even white, the petals often beautifully striped with lighter and deeper shades. When the flowers fade, the leaves remain green the rest of the year. (Other species lose their leaves during drought.)

Another lewisia offered at several nurseries is long-petaled lewisia (*L. longipetala*), a rare species from the high central and northern Sierra, where it grows on bouldery slopes and rock outcrops. It has a basal rosette of linear leaves and open inflorescences of attractive white to pale pink flowers with multiple petals. Although the flower size is usually less than in *L. cotyledon*, the flowers make a fine colorful display.

A less common but garden-worthy species is Leean's lewisia (*L. leeana*), with a distribution similar to *L. cotyledon* and sometimes growing with it, where it forms occasional hybrids. Leean's lewisia has dense rosettes of nearly tubular basal leaves and open cymes of small but colorful red-purple flowers which, at peak bloom, make a stunning display.

Glenn Keator



Lewisia rediviva seeds in sail-like sepals for wind dispersal



Leean's lewisia (*Lewisia leeana*)

Emerald Canary

Several other species are occasionally cultivated, but the four I've described are the most available. Rock garden enthusiasts often covet the less-well-known species, but all lewisias are special and deserve a careful planting in native gardens. 🌱

Glenn Keator is chairman of the Friends Advisory Council. He is a popular instructor of botany and field trip leader in the Bay Area, and he teaches the docent training course at the Regional Parks Botanic Garden. He is the author of a number of books on native plants.

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The fall plant sale will take place at the Garden on **October 7**, from 10 a.m. to 3 p.m. (*Friends* members only from 9 to 10 a.m.) The fall sale offers the full range of California native plants, featuring manzanitas, California wild lilacs, buckwheats, and sages, plus a wide array of subshrubs, shrubs, and trees that, for optimal success, are best planted in the fall.
