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**Berkeley's Refuge for Rare Plants**

**The Best Water Lilies, Camellias, Hostas, and Dahlias**

**The Dwarf Conifers of Watnong Terrace**

# A Noah's Ark for Endangered Plants

By Marcia Bonta

The University of California Botanical Garden has it all—a sweeping view of San Francisco Bay, an equable climate for growing a wide variety of plants from around the world, and an unsurpassed collection of California native plant life. Situated in lower Strawberry Canyon, less than a mile from the Berkeley campus, the thirty-three acre site is replete with intriguing paths that snake mostly up and down its hilly, picturesque terrain.

Red-tailed hawks float high above rock-strewn Strawberry Creek as it tumbles past the Asian area, through the Japanese Pool, and between the palm and cycad garden and the Californian area. Several species of hummingbirds zoom like miniature buzz bombs

around the South American area, attracted by such exotics as the dangling red and gold flowers of the *Abutilon megapotamicum* and the deep purple flowers of the large, spreading shrub *Tibouchina laxa* from Peru. In the shrubby underbrush throughout the garden California quail, robins, and rufous-sided towhees forage. The dry New World Desert Garden and the inhospitable serpentine habitat in the Californian area skitter with lizards. The botanical garden is a perfect mix of the exotic and native, where one's naturalist interests war constantly with horticultural ones.

This is particularly true in the Mather Redwood Grove, a five-acre plot across the road from the main garden. Begun in the 1930s as a memorial to Stephen Tyng Mather, the first director of the National Park Service and an alumnus of the University of California, the grove has been

transformed over the last several years into a model coast community of redwoods (*Sequoia sempervirens*).

Although the redwoods are less than sixty years old, they are already large enough to provide a cool, dark retreat where visitors can walk on peaceful paths and admire such blooming wildflowers as red-



**Above:** A hawk's-eye view of Strawberry Canyon with the botanical garden to the left and the Berkeley campus and San Francisco Bay in the background.

wood sorrel (*Oxalis oregana*), yerba buena (*Satureja douglasii*), and alumroot (*Heuchera micrantha*). The forest floor is carpeted with sugar scoops (*Tiarella unifoliata*), members of the saxifrage family, California huckleberry (*Vaccinium ovatum*), yerba-de-selva (*Whipplea modesta*), and several fern species including the handsome sword ferns (*Polystichum mun-*

*itum*). In the grove are plants that look similar to those in Eastern woodlands—lady ferns, false lily-of-the-valley, wake-robin. But while the common names are the same, the scientific names are different (*Athyrium filix-femina*, *Maianthemum kamtschaticum*, and *Trillium ovatum*) and al-

though the lady ferns are also found in the interior mountains of California and as far east as Idaho, Colorado, and New Mexico, false lily-of-the-valley and wake-robin grow only along the moist, mild areas of North America's West Coast. Another intriguing flower found here is the inside-out flower (*Vancouveria planipetala*), so called because its unusual white or lavender-tinged blossoms have reflexed petals and sepals.

The coast redwood forest is only the largest and most complete example of the botanical garden's commitment to grow representatives of as many indigenous California plant communities as possible, a directive that dates back to the founding of the garden in December 1890 by E.L. Greene and Willis Linn Jepson. Both men were

indefatigable collectors and classifiers of California natives, as even a cursory look at the scientific names of many California plants will reveal. They called the garden a Garden of Native Plants and not only collected the seeds and plants for it but laboriously planted them as well. Within five years the garden encompassed seven acres on the Berkeley campus and contained nearly 1,500 species of plants.

The almost total concentration on native California plants continued until the garden was moved to its present location in the 1920s. The larger acreage allowed the garden to expand its holdings and several collecting expeditions, most notably into South America, were launched in the

**Right:** The giant pitcher plant (*Darlingtonia californica*) is one of California's most interesting and striking wildflowers.



1930s, '40s, and '50s. Today the garden contains more than 12,000 species and varieties of plants from all over the world.

But a third of the garden area remains devoted to California natives, with representatives from more than one-quarter of the state's 5,000 species, including 130 types of plants listed as rare or endangered by the California Native Plant Society. Those plants, along with most of the rest of the garden's specimens, have been grown from seeds and cuttings obtained from wild populations, and collectors for the garden, such as Roger Raiche and Kurt Zadnik, continue to go afield in search of more specimens.

In 1987, Raiche attained botanical immortality when a fairy lantern, Cedars' fairy lantern (*Calochortus raichei*) was named for him. Originally considered a local form of the Mount Diablo endemic, *Calochortus pulchellus*, it was first collected back in 1947 from its only known locale—the headwaters and upper drainage of Big Austin and East Austin Creeks in Sonoma County. When Raiche re-collected the plant from The Cedars at the headwaters of Big Austin Creek on June 7, 1986, he noticed that it looked strikingly different from the other four *Calochortus* species: taller, with fewer flowers and narrower leaves. It also has a marked preference for serpentine soils and blooms much later in the year than others in the genus.

Cedars' fairy lantern now grows in the garden's California native bulb bed, which was established in the 1960s and comprises one of the garden's most extensive and unusual collections. More than 300 pots of native lily and amaryllis bulbs and corms in two raised beds contain representatives collected from the meadows, chaparral, mountains, and roadsides of California. With two families (Liliaceae and Amaryllidaceae), thirteen genera, and 139 species, varieties, and naturally occurring hybrids, the garden's bulb collection is the largest of its kind in the state. About all it lacks are species from high, infertile areas, which cannot adapt to the moist, cool win-



**Above:** A student takes notes on the flowering times of native plants in the garden. **Top right:** A field of *Lasthenia burkei* and *Downingia* near the Santa Rosa Airport. **Right:** Cedars' fairy lantern (*Calochortus raichei*) is the namesake of U.C. Botanical Garden collector Roger Raiche.

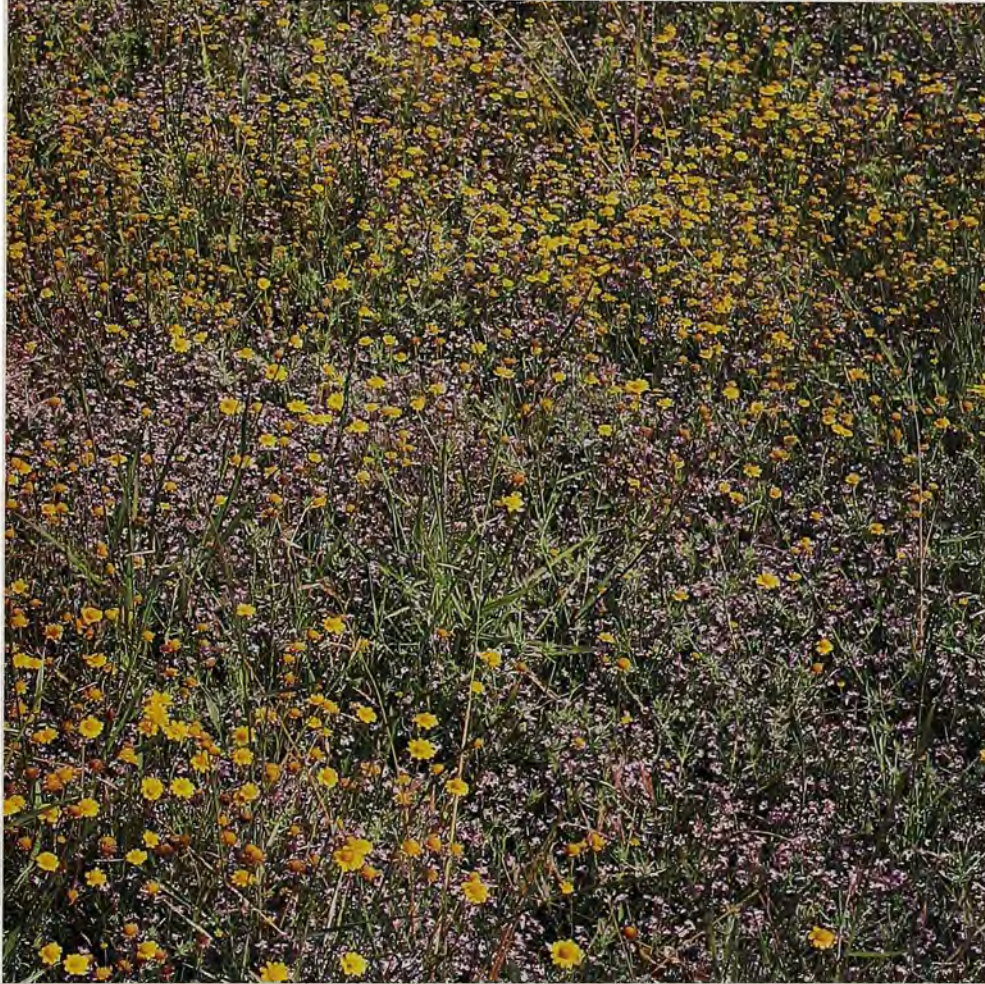


ters and warm, dry, foggy summers that characterize the Berkeley climate.

Other outstanding collections in the garden's Californian area—which is arranged primarily by plant communities—are of two of the six California genera with the highest number of endemic species—*Arctostaphylos* (manzanitas) and *Ceanothus* (wild lilacs). One manzanita—presidio manzanita (*Arctostaphylos hookeri* subsp. *ravenii*)—has been reduced to a single plant growing in the serpentine soil in the San Francisco Presidio. Such specimens have given the garden a reputation for being a

Noah's Ark of endangered native plant species.

While perhaps not as difficult as gathering animals two-by-two, this is no small undertaking. California has the richest heritage of plant life in the continental United States, due to its almost complete isolation on its northern, eastern, and southern borders by high mountains and/or deserts and on the west by the sea. These



barriers help to produce a wide range of isolated physical environments. Of the thirty percent of California native plants endemic to the state, the largest number are found in southern California, followed by the central coastal area. These plants range from evolutionarily “old” species on the natural road to extinction—such as the *Cercocarpus betuloides* var. *traskiae* found only on Santa Catalina Island—to several recently evolved *Clarkia* species, such as *Clarkia springvillensis* in Tulare County.

The garden’s careful emphasis on documenting each plant’s origin supports the efforts of conservationists, who struggle to protect fragile habitats from being destroyed by urbanization, farming, grazing, flooding by reservoirs, quarrying, and poor land management in general. When the conservationists lose, as they so often do, the garden’s specimens may be the only hope of saving a plant from extinction.

Botanical gardens throughout the world, in fact, are increasingly seeing themselves as reservoirs for endangered plants. Nineteen in the United States, including the University of California Botanical Garden, have joined the Center for Plant Conservation, located at Harvard University’s Arnold Arboretum, which is establishing permanent, cultivated populations of endangered U.S. plants. The gardens know that the preferable means of protecting these

plants is *in situ* conservation in the wild. But they are also realistic enough to recognize that such protection often is not enough; hence their involvement in *ex situ* or off-site conservation as well.

The nineteen members of the Center for Plant Conservation network have divided the United States into fourteen zones based on weather patterns and plant species. Each year, each member institution submits proposals to the center regarding species they would like to protect. From those lists, the center’s Scientific Advisory Council selects the plants it wishes the member to concentrate on.

The University of California Botanical Garden has agreed to grow and study the most threatened northern California plants by locating wild populations and then gathering seeds or cuttings for *ex situ* preservation. If they can, they collect material for propagation from at least fifty different plants to allow for genetic diversity. They keep some of the seed for study and ship the remainder to a U.S. Department of Agriculture facility for storage. In 1988 they added six species of California native plants to the Center for Plant Conservation’s National Collection of Endangered Plants, including the endangered mint, *Acanthomintha obovata* subsp. *duttonii*, collected by Raiche, Zadnik, and Holly Forbes from Edgewood County Park in San Mateo

County. They distributed their biennial seed exchange catalog, which included 430 different California native plants in addition to the giant bromeliad *Puya raimondii*, a rare native from Peru, to hundreds of botanical institutions worldwide. In six months more than 10,000 seed packets were sent to 356 institutions, a monumental effort that promotes the display, propagation, and research of California native plants throughout the world. Members of the public also have the opportunity to obtain some rare California native plants—such as the Chinese camp brodiaea (*Brodiaea pallida*), as well as seeds of California native wildflowers, bulbs, shrubs, trees, and succulents—when the Friends of the Botanical Garden holds its annual spring, fall, and winter plant sales.

To help educate visitors about its recreated natural plant communities of California, an exhibit entitled “California Plant Life”—six outdoor table displays spaced throughout the native plant area—explains California plant communities in general and coast redwoods, the pygmy forest, chaparral, serpentine, and California islands in particular.

The pygmy forest area illustrates isolated areas along the Mendocino coast of northern California that have incredibly acid white soil, making it inimicable to most plant life. Plants that do grow there, such as the pygmy cypress (*Cupressus pygmaea*), are dwarfed by the conditions. Surprisingly, the same cypress, grown in normal soil, is the largest of the California cypresses. The garden’s serpentine area features serpentine columbine (*Aquilegia eximia*), one of the unusual and, in many cases, endemic species produced by this high magnesium silicate soil.

Another interesting area is the vernal pool, a small depression that fills with rainwater during the rainy fall and winter. At that time the seeds germinate, mostly underwater, and grow for several weeks until the pool begins to dry up during the warmer, longer days of spring. This is when the vernal pool is at its loveliest, with sev-

### Want to Visit or Learn More?

The University of California Botanical Garden is open to the public free of charge from 9 a.m. until 4:45 p.m. every day of the year except Christmas. Free, docent-led tours are offered year-round on Saturdays and Sundays at 1:30 p.m. For further information on special tours, weekend classes and workshops in botany, horticulture, and other topics write to the U.C. Botanical Garden, Centennial Drive, Berkeley, CA 94720 or call (415) 642-3343.

For those who wish to learn more about California native plants, *California Plant Life*, written by the garden's director Robert Ornduff, is highly recommended.

eral species of goldfields and meadowfoam. If conditions are just right in the drying pool bottom, it may be covered with the deep blue flowers of *Downingia*.

Not all the native California plants are found in the Californian area or the Mather Redwood Grove. The Fern and Insectivorous Plant House contains a fascinating collection of unusual insect-eating plants from around the world, including one of California's most interesting and striking wildflowers, the giant pitcher plant (*Darlingtonia californica*). The New World Desert area, one of the oldest and best known collections, contains a mix of cacti and other succulents from North, Central, and South America. While most of the specimens are from Latin America, a careful observer may also find a few California cactus species in the genera *Echinocereus*, *Ferocactus*, and *Opuntia*, and some agaves. In the North American section there is a fine specimen of Santa Lucia fir (*Abies bracteata*), an endemic tree from the Santa Lucia Mountains in Monterey County.



The garden also cultivates several native annuals in boxes in their research area, which is not open to the public. These include the large-flowered fiddleneck (*Amsinckia grandiflora*), known only from two populations on the site of Lawrence Livermore Laboratories in Contra Costa County and one of the species added to the Center for Plant Conservation's permanent collection last year: the endangered *Presidio clarkii*; and Burke's goldfields (*Lasthenia burkei*).

The University of California Botanical Garden's meticulous attention to labeling all plants with complete names and geographical origin makes it easy for visitors to learn a tremendous amount on their own. But the garden employees will provide more information on request and there are two free docent-led tours each week-

### Roger Raiche collecting seed of native plants.

end. There are also special classes and tours, and suggestions on subject matter are welcome.

Even if you come to the garden with little interest or knowledge of California natives, you will go away a convert, concerned about the conservation of all native plants. That is exactly the University of California Botanical Garden's goal. It is only by educating a wide spectrum of society about the importance of saving native plants that we will be able to reverse the disastrous policies of most countries toward their natural plant communities.

Marcia Bonta is a frequent contributor to American Horticulturist.