Conserving California's Endangered Flora:  
A Race Against Time

Species, like individuals, have limited lifespans. Extinction is a natural process but due to the activities of human beings, this process is now taking place at frighteningly unnatural rates. We don't have to look to the tropical rainforests for examples; there are many threatened species in the United States and the list is growing. To help preserve the diversity of the California flora, the U.C. Botanical Garden works with the Center for Plant Conservation as part of a national effort to save endangered plant species.

The Center for Plant Conservation (CPC) is a network of 19 botanical gardens and arboreta in the United States, coordinated by a nonprofit foundation based at the Arnold Arboretum in Massachusetts. Its purpose is to conserve the nation's endangered plant species through propagation, research, and education. Under a grant from the W. Alton Jones Foundation, the CPC surveyed 89 local and regional authorities on rare plants. The purpose was to determine which taxa (species, subspecies, or varieties) of native plants are considered most at risk of extinction in the next decade. Those responding to the survey identified 253 plant taxa that may become extinct within the next five years, and 427 additional taxa that may become extinct in 10 years, totaling 680 taxa that are thought to face possible extinction before the year 2000.

The survey brought the problem of plant extinction into sharper focus by clarifying the time constraints. Previous lists based on size and numbers of populations of endangered plants did not communicate the urgency of the problem. Scientists estimate that as many as 200 plant species have become extinct since botanists and naturalists began to document the flora of the lands now encompassed by the United States. The CPC survey suggests that number could double by the early 1990s.

The survey also determined five "Priority Regions"—states and territories accounting for 73% of the 680 taxa in danger of extinction during the next 10 years. They include California, Florida, Hawaii, Puerto Rico, and Texas. Under a second grant of $100,000 from the W. Alton Jones Foundation, the CPC will establish a Priority Regions Program to convene regional planning meetings of government and private organizations. These groups will propose conservation plans for each taxon under immediate threat of extinction. The U.C. Garden will collaborate with Rancho Santa Ana Botanic Garden in Claremont, California and the Berry Botanic Garden in Portland, Oregon to organize the California program.

Diverse but Vulnerable

Why does California rank high on the list of Priority Regions? Our 129 critically endangered plant taxa rank second only to Hawaii's 143. A primary factor is the number of plant species in the state that have naturally restricted ranges. California's diversity of climates and landscapes and the barriers to plant migration between adjacent regions (oceans, mountains, and deserts) have led to the evolution of many species and varieties found only within the state.

The Endangered Plant Project of the California Department of Fish and Game estimates that of the nearly 8,000 types of plants in California, over one third are endemic to the state, that is, not found anywhere else in the world. Many of these endemic species are restricted to specific
habitats such as serpentine soils or vernal pools. As habitats shrink due to urbanization, agriculture, grazing, inundation by reservoirs, quarrying, and poor land management, endemic species become more and more rare.

As a participating member of the CPC, the U.C. Botanical Garden has agreed to grow and study the most threatened plant species of northern California. On the basis of information provided by the Center, conservation agencies, and regional botanists, we select and locate populations of rare plants, and then gather seeds or cuttings for off-site preservation. In order to maximize the genetic diversity of our population samples, we collect material for propagation from many different individuals. The basic guideline is at least 10 seeds from 50 different plants. We retain some seed for study and ship the remainder to a USDA facility for storage.

Seed storage is one form of off-site preservation but it is a last line of defense. It would be tragic to retrieve a batch of stored seed after the last wild population of a species had become extinct, only to find you couldn’t get the seeds to germinate. It is necessary, therefore, to study the propagation and cultivation of each threatened species and to demonstrate the ability to grow specimens to maturity. This is a much more time consuming and expensive process than seed storage but in most cases it is essential. We will also study the reproductive biology and genetic variability of selected rare species, monitor the status of natural populations, and provide plants for re-establishment in the wild.

**Two Rare Examples**

Each rare species presents a different challenge, requiring modification of the general approach described above. For example, two of the species we added to the CPC permanent collection last year are so rare that seed collection was not permitted. The Large-flowered Fiddle-neck, *Amsinckia grandiflora*, is an attractive annual species known only from two populations on the property of Lawrence Livermore Laboratories in Contra Costa County. One of the populations consists of less than 25 individuals. The other fluctuates greatly in size from year to year. Recent counts have ranged from 23 to 400 individuals. Garden director Robert Ornduff studied the fiddleneck in the 1970s and collected seeds which he passed on to the garden. We have been growing plants for several years, steadily increasing our supply of seed and studying the general growth requirements in cultivation. We have also provided mature plants to Dr. Bruce Pavlik of Mills College who is studying the demography of this species.

An even more extreme example is the Presidio Manzanita, *Arctostaphylos hookeri* subsp. *ravenii*. This taxon is known in nature from only a single plant growing in serpentine soil in the San Francisco Presidio. The principal strategy for maintaining this species is re-establishment of additional plants in the natural habitat, grown from cuttings taken from the remaining wild individual. We have propagated plants for this purpose in an effort involving the Golden Gate National Recreation Area, U.S. Fish and Wildlife Service, San Francisco Presidio, and California Department of Fish and Game.

**Investing in the Future**

Conservation activities with the CPC require a considerable time investment by garden staff. Holly Forbes coordinates collection and documentation of rare plants for the garden under the CPC program. She prepares proposals for review by the Center’s Scientific Advisory Committee, obtains collection permits, and
organizes field trips to scout populations and collect seed. Last year the Richard & Rhoda Goldman Fund of San Francisco provided a grant to the CPC of $10,000 for collection and study of rare species in the San Francisco Bay Area. The funds will enable us to hire a student intern to assist with conservation projects and will fund additional research.

The ultimate goal of the Center is to establish an endowment of $5,000 for each species in the permanent collection to provide for its long-term maintenance. We are grateful to four local chapters of the Garden Club of America (Hillsborough Garden Club, Woodside-Аtherton Garden Club, Piedmont Garden Club, and Orinda Garden Club) for endowing the Presidio Manzanita, one of our most threatened taxa. Educational programs are the final component of our conservation activities (see page 5).

—Jim Affolter

The Tactile Garden

Plants don’t run away. This is very important if you are in love with nature and visually impaired. Most animals are out of reach for those who wish to find their sense of connection to the natural world, but plants stay put, especially in a Botanical Garden. And plants offer a very rich experience for all other senses which sighted visitors may overlook. Recently the Garden has made these plants accessible in a new way.

For years, Mark Sutton, a recent UCB graduate, had been in love with plants when a botany class inspired him to find a way to be with plants and share his love with other visually impaired people. However, just getting to the Garden presented some challenges — catching the bus, finding the way through the parking lot, avoiding ditches and other obstacles, and then trying to read the plant labels — impossible! Mark began by exploring the herb garden, compiling a list of species with interesting stories. He also wrote to other gardens and parks for information on interpretation for visually impaired people for other ideas to incorporate into the Garden.

During the fall docent class, Francine Henderson and Dana Smith joined this project, developing a list of Garden plants of interest to the non-visual senses. Francine spent hundreds of hours orienting Mark to the Garden, trying to give him a picture of this complex place. Realizing the limitations of verbal description, she experimented with tactile maps, finally designing one which could be reproduced with braille text. For both Mark and Francine it was a major breakthrough to “see” the herb garden and get a sense of its layout. Mark translated the text of the Garden’s map brochure into braille and pilot tested the materials on several blind friends. The tactile tours were a rave success. One blind visitor, Kathleen Allen, wrote of her walk:

"With the expertise of Mark and the enthusiasm of Francine, the gardens became a tactile wonderland. The geranium plants had leaves very soft like velvet. After touching them my hands smelled like lemon. One flower was so soft I thought it was a lotion at first. I must say the cactus garden is an interesting place for a blind person. I wanted to touch the plants but I was afraid to. Mark said that ‘feeling the cactus plants made his adrenaline start flowing’. Since I was there for a tour of the garden, I thought, what the heck. I touched all the cactus plants. It was fun but I had stickers all over my hands.”

Mark Sutton and Francine Henderson plan to make more plant information available by translating library sources into braille or tape.

There are many steps still to go to make the Garden safe for blind people, but the first step of welcome has been taken. With braille maps and translations in the Visitor Center and a list of plants for sighted guides, anyone can now share the Garden with a visually impaired friend. With enthusiasm and inspiration from this team effort, Mark and Francine look forward to sharing the rich tactile world of the Garden with visitors of all abilities.

—Stephanie Kaza
Computerized Plant Records

The Garden staff held a spirited party on February 1st, 1989 celebrating our accomplishment of completing the computerization of the plant records—a milestone in Garden curatorial history. It will be significantly easier to keep the records up-to-date from now on.

Since 1890, the garden's records have been typed and kept in card files, accession books, and bed maps. When we bring a plant into the garden we assign it an accession number. For example, the first plant brought into the garden in 1989 was assigned the number 89.0001. In 1988 the last plant we accessioned was 88.1390. Each 4 x 6 filecard contained everything we knew about a plant—its accession number, family, genus, species, author, who collected it and when, where it was collected, any habitat information, and in which beds it was planted at the Garden. The accession books usually contained the same information without the bed numbers. The bed maps are hand-drawn for each bed and are accompanied by a bed list of everything in the bed. Because all of our information was on paper only, each record change had to be done in several places. By "record change" I mean recording the moving of a plant from one bed to another, removing it from a bed or planting it out from the nursery, or listing it as dead.

A Modern Garden

All this changed in 1982 when the garden began its computerization efforts with a grant from the National Science Foundation. We used a CompuPro microcomputer for data entry and hired temporary staff to enter information from the thousands of cards. When the software used for this job was upgraded to dBase III Plus, we bought two personal computers (IBM PC/AT) with a grant from IBM in 1987, and a Hewlett Packard laser printer. UCB's Administrative Information Services wrote custom programs for the garden's record keeping system—the Plant Record System (PRS). This has been generally very successful for us, though as with any new system, there were a few "bugs" to work out.

The standard reports we generate include the accession records, List of Living Accessions, and Bed Lists. As you might imagine, a lot of paper can be involved in this process. The latest List of Living Accessions, printed on January 26, 1989, is 594 pages long. This list contains 15,036 accessions in alphabetical order by family, genus, and species, and includes the accession number and bed number(s). Printing all the Bed Lists takes even more paper, approximately 800-900 pages, for 16,886 entries. Each bed has its own list in order by genus, species, and accession number. We have invested in a sophisticated back-up system as protection for the records. Everything on the computer can be copied onto a high density cassette tape that will hold 60 million bytes of information. The PRS takes up about 20 million bytes at this time and is backed-up daily. Back-up copies are kept safely in two locations away from the Garden and one on-site.

Easy List Access

The PRS allows us a great deal of flexibility in finding records, creating lists by particular criteria, and grouping data in almost any way imaginable. The system allows easy access to the records by staff, volunteers, and the public. We can use the List of Living Accessions to see if we have the plant and where it is and from there we can go to the accession books to determine its history. Before computerization we could not produce a list of everything in the garden without a monumental effort that would be immediately out-of-date. If someone is interested in the camellias in the garden we can produce a list of them in a few minutes. Researchers wanting to know what plants we have in a certain group can receive a list within a short period of time. Before, we had to compile a list from the cards by hand—a time-consuming process. For example, Dr. Ornduff needed a list of all the Garden's cycads for use in a collaborative study of chloroplast DNA. We were able to provide one with a minimum of effort. With the card files all on computer, we are now seeking grant money to computerize the bed maps—the next major task in modernizing our extensive record system.

— Holly Forbes
Conservation Teaching Themes for the Garden

Conservation Education is a new phrase around the Garden, introduced from last fall's docent training class on campus. Offered through the Conservation and Resource Studies program, the course was a big success, attracting 25 community members and 20 undergraduates, many of whom are now completing their docent training at the Garden. The course focused not only on relevant content, but also interactive and value-oriented education techniques. In each class session, students learned by doing — often trying to teach the content themselves in a simplified way.

A major task of the course was to develop teaching themes that were broad enough to cover the wide collections of the Garden, yet specific enough to focus the attention of visitors and give them a clear take-home message. We considered six major themes:

1. Plant Diversity — morphology and taxonomy of the plant kingdom;
2. Plant Ecology — plant associations and adaptations to environmental conditions;
3. Evolution and Biogeography — changes in distribution and structure over time;
4. Plant/People Interdependence — the use of plants for medicine, food, shelter, clothing, fuel;
5. Conservation — protecting and managing plants and plant habitats for a sustainable future;
6. Environmental Ethics — developing values that include the environment.

I wanted to provide frameworks of thinking that would be useful in meeting the conservation challenges of today.

We are now working with many of these themes as the basis for new docent tours in the Garden, and we are reviewing the Garden collections by themes for clarity of educational presentation. This will allow us to plan for specific accession needs, as we see which concepts we can demonstrate effectively and naturally in this Garden setting. Already, for example, we have four collections that present an ethnobotany theme — the Tropical House, Western Herb Garden, Chinese Medicinal Garden, and the Slosson Garden of Economic Plants. By presenting our collections thematically, we emphasize our role as a teaching garden and resource for University students, staff, and faculty as well as the general public.

A Teaching Garden

As I see it, we have two obligations: 1) to provide useful information within coherent frameworks of understanding, and 2) to encourage environmental awareness based on understanding of values. The Garden education efforts are part of a large-scale public shift in values and perceptions about the environment. We are helping to develop an environmental social ethic that reflects the sum of our individual concerns about the state of the world. In his *Sand County Almanac*, conservationist Aldo Leopold wrote,

"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."

Through education efforts at the Garden, we can work with people to increase their knowledge about what is healthy, stable, and functional in the environment while also encouraging the values of beauty, integrity, a sense of place, and relationship that grow naturally out of a love for plants. By focusing on key teaching themes, we offer people a systems perspective they can take out into the world and into their everyday lives.

In the end, we teach best by example, demonstrating an attitude of care and attention that can sustain us and other living beings under increasing environmental stress. Botanists and botanical educators have a great deal of understanding and knowledge to offer the world which we can present clearly and thoughtfully. We are just testing these teaching themes now, but it seems promising that they will have a major influence on the shape of the Garden in the future.

—Stephanie Kaza

*Conservation Education, the course reader for the fall class, is available for purchase from the Garden Visitor Center. Contents include sections on each of the key teaching themes plus environmental education.*
Three Jewels of California

Visitors to the garden this spring and summer will notice a major project going on at the entrance to the California Area — the new alpine fell-field bed. For years we have grown plants from the high peaks of the Sierra, Cascades, and other mountains in the state, some originating from as high as 11,000 feet where the growing season is counted in days and the winters are long and brutal. Despite the garden's location only a few hundred feet above sea level, these “rock plants” thrive in our Berkeley climate provided they are given proper care.

Many of these alpines need to have their roots growing in dryish, gravelly soil so they are not overly wet either in summer or winter. Though Berkeley winters are seldom severe (this last one excepted), the long winter periods of below-freezing temperatures characteristic of the alpine habitat do not seem to be required by many high altitude plants. As a result, visitors can see a representative sample of alpine plants that they otherwise would have to travel many hundreds of miles to see in their natural haunts.

The alpine scree that we have attempted to duplicate and enlarge with the help of many generous donors will convey the bleakness of the high slopes that these colorful alpine plants inhabit. Called the Alpine Fell-field, this is the formal ecological designation of the native areas of these plants. Fell is an archaic English word meaning barren ground or a high rocky hill. We have intentionally created this barren aspect to make these plants look as well as feel at home.

Mendocino Dwarfs

Next to the vernal pool is still another unusual and (mostly) successful recreated plant community. This is the Pygmy Forest, which in nature is found on the white soils along the Mendocino coast. Our Pygmy Forest likewise is a managed community; the concrete basin in which it resides mimics the thick layer of hardpan found a few inches below the soil surface in nature. The white soil, which is among the most acid soil known anywhere on earth, has been imported from Mendocino County. The relatively few plants in our display reflect the sparseness of the natural community.
Ironically, the Pygmy Cypress (Cupressus pygmaea) is the largest of California cypresses if grown in “normal” soils. In the wild, where these trees grow in acid, shallow, waterlogged, sterile soils, they are environmental dwarfs or natural bonsais. Pygmy Cypresses only two feet high may be 50 or 60 years old. If you look carefully at our cypresses, you may notice that their pygmy stature has been “enhanced” by the pruning shears of the garden staff. At one time, I found this practice something of an embarrassment: here we had created as best we could the really awful conditions under which the Pygmy Forest trees and shrubs grow in nature, and the Pygmy Cypress would not cooperate! I finally decided that I could not in all honesty pull the wool over students’ eyes, so now I point out to them that the uncooperative cypresses have been maintained in their miniature status by the skilled pruning of the gardeners and also by adding iron sulfate to the soil.

Why do these trees “bolt” in our carefully contrived ecosystem? Roger Raiche believes it is because the bed receives nutrient-enriched runoff water from the Mesoamerican area above it. My own guess is that the explanation may, in part, lie somewhere else. The concrete basin that forms our mock hardpan is made out of a substance that contains very high levels of calcium, and consequently likely has a basic pH level. If so, the high acidity of the Pygmy Forest soil may drop as calcium salts leach out of the concrete. The soil becomes enriched with calcium salts that promote plant growth, and other scarce nutrients usually inaccessible to plants in highly acid soils also become available for more lush growth. That’s my explanation — what do you think?

—Robert Ornduff

Wild Collected Seeds?

A long standing policy of the Garden is to acquire plants only of known wild origin. Exceptions exist for some special collections such as the Garden of Old Roses, which contains many complex hybrids and the Garden of Economic Plants with many cultivars unknown in the wild. Our policy exists because the Garden’s plants serve researchers who need to know the origin of the plants with which they work.

Sometimes we stretch our policy a wee bit. We recently acquired seeds through a rather unusual route. In October 1988, I attended the annual Systematics Symposium at the Missouri Botanical Garden and was seated next to Bill Culberson, Director of the Sarah B. Duke Gardens at Duke University. Bill was handed a packet of seeds by a former student, then on the Missouri Botanical Garden staff. I discovered that these were seeds of the Florida Corkwood (Leitneria floridana), the sole member of its family, an interesting plant not represented in the Berkeley collection.

After a little cajoling, I obtained some of these seeds for our Garden. Leitneria is a deciduous small tree or shrub that has an unusual disjunct distribution: southern Georgia and northern Florida, southeastern Missouri, and southeastern Texas. The species is of considerable botanical interest, but horticulturally is considered “an ornamental oddity”.

Although I received the seeds in Missouri, there is a bit more to the history of this particular accession. The Missouri Botanical Garden specimens came from cuttings sent there in 1972 from the Arnold Arboretum in Massachusetts. The Arnold Arboretum plants originated from a collection made in Dunklin County, Missouri by B.F. Bush in 1894, four years after UCBG was founded. So, we consider this accession to be “wild-collected”, though our seeds are descendants of a collection made in the wild nearly a century ago. Hopefully, our plant records computer can accommodate this somewhat unusual route from Missouri to Massachusetts to Missouri to California.

—Robert Ornduff
Spring Plant Sale
Saturday, May 13
Members' Preview 9am-12pm
Public Sale 12-2pm
Sunday, May 14
Public Sale, 10am-3pm

The Spring Plant Sale sponsored by the Friends of the Botanical Garden, will take place on Mothers' Day weekend, Saturday-Sunday, May 13-14th. This sale is the most extensive of the year, offering a wide variety of California natives, rock garden plants, roses, rhododendrons, houseplants, perennials, rock garden/alpines, ferns, grasses, orchids, and bromeliads. Memberships will be available on the day of the sale. Because of the severe cold this winter, we can't promise that all of these will be available, though we are coaxing them along. Please note that many plants will be offered for sale at the Visitor Center before the sale, especially those that bloom earlier than mid-May, so come by frequently and see what we have!

California Natives: In addition to those listed in the box, we will also have many understory plants from the Mather Redwood Grove, including Vancouveria hexandra (Inside-out Flower), Asarum caudatum (Wild Ginger), and Maianthemum dilatatum (False Lily of the Valley). We will again feature drought-tolerant plants for low-water landscapes, especially many species of Arctostaphylos, Ceanothus, Salvia, Artemisia, and the Matileja Poppy, Romneya coulteri.

CALIFORNIA NATIVE SPECIALTIES

The species below will be for sale at the Visitor Center as they come into bloom this spring. The Alliums and Brodiaeas are all grown from the U.C. collection.

- **Allium amplectens** (White Paper Onion) — select dwarf from Chico area
- **Allium falcofolium** (Sickle-leaf Onion) — broad-leaved variety
- **Brodiaea ida-maia** (Firecracker Flower) — showy red tubular flower with green tip
- **B. filifolia** — rare San Diego endemic with glistening blue flowers late in season
- **B. pallida** (Chinese Camp Brodiaea) — rare species with pale creamy-blue flowers in late June
- **B. peduncularis** (Seep Brodiaea) — large spidery flower heads, white inside, purple on back
- **B. pulchella** (Blue Dicks) — a giant Santa Cruz Island form
- **Bloomeria crocea** (Golden Stars) — delicate spheres of golden flowers
- **Delphinium cardinale** (Scarlet Larkspur) — bright red, 3-5’ tall spectacular form from S. California, late flowers, summer dormant
- **D. purpurii** — deep rose flower, endemic to Kern River area
- **Dodecatheon clevelandii** ssp. *insulare* (Shooting Star) — large flowered variety, easiest selection for gardens
- **Erythronium tuolumnense** (Tuolumne Fawn Lily) — from UCBG collection, pure yellow form
- **Odontostomum hartwegii** — from the Table Mountain area

These species will be available at the time of the sale:

- **Adiantum tracyi** (Five-finger Fern) — unusual natural hybrid between *A. pedatum* and *A. jordanii*
- **Coreopsis gigantea** — fascinating endemic from the Channel Islands with large succulent trunks and bouquets of large golden daisies
- **Eriogonum ovalifolium** — low-growing variety for the rock garden
- **Epipactis gigantea** (Stream Orchid) — delicate bloom
- **Geranium californicum** — showy pink flower over long season
- **Iris bracteata** — creamy yellow flowers with maroon venation
- **I. ‘Canyon Snow’** — large white flowers considered one of the best
- **I. douglasiana** — rich purple flowers
- **I. innominata x douglasiana** — exquisite hybrid with soft lilac and white flowers with intricate purple venation
- **Iris spp.** — various Pacific Coast hybrids
- **I. thompsonii** (innominata x douglasiana) — lavender flowers
- **Leucocoryne rediviva** — white flower, for the rock garden or pots
- **Linanthus nuttallii** ssp. *floribundus* — for the rock garden, brilliant mound of fragrant white flowers
- **Linnea borealis** (Twin-Flower) — dainty double white flowers for shade
- **Mitella breuerti** (Bishop’s Cap) — a woodland saxifrage with tiny green “snowlake” flowers
- **Spiraea densiflora** — deep rose flowers on low shrub
- **S. douglasii** — pink cones of flowers


**Fawn Lily**

**Erythronium multiscapoideum**


**Perennials:** Over 140 species and cultivars including *Adenophora*, *Anemone*, *Åster*, *Boltonia*, *Buphthalmum salicifolium*, *Campanula*, *Digitalis*, *Echinacea*, *Eryngium*, *Euphorbia characias*, *Geranium*, *Helleborus*, *Hemerocallis*, Iris (bearded and non-bearded), *Kniphofia*, *Lychnis*, *Morina*, *Penstemon* (‘Hidcote Pink’ and ‘Stapleford Gent’), *Phlox maculata*, *Salvia*, *Thalictrum*.

**Rock Garden/Alpines:** Over 78 species and cultivars including *Aquilegia*, *Calceolaria*, *Campanula*, *Coreopsis rosea*, *Dianthus*, *Geranium*, *Heuchera*, *Iris*, *Leontopodium*, *Potentilla*, *Primula*, *Pulsatilla*, *Trollius*, Viola.

**Grasses and grass-like plants:** *Carex* spp., *Bowler Golden Grass*, *Festuca californica*, F. *cinerea*, *Hystrix californica*, *Melica altissima*, *Miscanthus sinensis*, and others.

**Bromeliads:** *Abromeitiella*, *Aechmea*, *Ananas*, *Billbergia*, *Crassulina*, *Dyckia*, *Guzmania*, *Hechtia*, *Neoregelia*, *Nidularium*, *Orthotrichum*, *Pulicaria*, *Puya*, *Quesnelia*, *Tillandsia*, *Vriesea*. **Orchids:** *Cattleya*, *Cymbidium*, *Laelia*, *Paphiopedilum*, *Phalaenopsis*.

**Trees and Shrubs:** Because of the drought, there will be few plants available this spring, though by the fall sale there will be a large selection of choice plants.

**Volunteer Opportunities**

The Garden is always looking for volunteers to help with its many activities. If you enjoy coming to the Garden, you might like to be part of the following programs:

**Visitor Center:** If you like meeting people and are not intimidated by a cash register that does everything, this job is for you. Visitor Center volunteers work as sales people and hosts from 9:30am-1pm or 1-4:30pm once a week or once every other week. We especially need you if you can help on weekends.

**Plant Sales:** We can always use help at the Spring Plant Sale, our biggest of the year, especially as cashiers, runners, and security.

**Docent Training:** Another training will begin again at the end of August. This is an outstanding chance to interact with all kinds of people of all ages and to develop your knowledge of the Garden and its collections.

For more information on these volunteer opportunities, call Nancy Swearengen, Volunteer Coordinator 642-3343.
The Big Freeze: During the cold temperatures of early February, the Garden experienced several nights of 20°F chill. Daytime temperatures stayed in the 30s and 40s for almost an entire week, leaving the ground hard and frozen in places. Pipes burst and plant damage was extensive, especially in the South American area. Succulents were hard hit and subject to rot after thawing; others showed droopy leaves or burst stems. Among the possible dead: *Calceolaria tomentosa, Erythrina falcata, Bocconia frutescens, Dendroseris litoralis, D. prunata*, and many Fuchsias. This was a weather record for the Garden, the lowest temperatures since December, 1972.

New Plantings: The new Alpine Fellfield in the California Native Area will accurately depict the boulder topography of the high alpine rockfields. Fifteen tons of rock were brought in for this new bed, with conceptual design by Ron Lutsko Jr. and rock placement design by Philip Johnson. The new exhibit has been funded by donations from the California Native Plant Society, the Western Chapter of the American Rock Garden Society, Joan Mirov, Myrtle Wolf, Stella May Knause, Ron Lutsko, Jr., Philip Johnson, Warren Roberts, Olive and George Waters, and Friends of the Botanical Garden.

The Slosson Garden of Economic Plants has had its annual facelift, including the addition of two new mulberry trees at the entrance (*Morus alba*). Beds feature taxonomic groupings of common edible plants, including the Brassicas, legumes, cereal grains, and members of the Solanaceae (potatoes, tomatoes, eggplant, and bell peppers). We are also planning to incorporate species that represent conservation of agricultural genetic diversity through native seed heritage programs.

Education Projects: Due to the initiative and efforts of students Soozi deMille and Chris Pires, the campus Biology 1B lab manual has been revised to provide an updated field trip guide to the Garden for students. The new version offers an expanded introduction to California plant communities, a review of plant kingdom diversity and evolution, and a lab on pollination ecology. This much improved guide will provide 800 U.C. Berkeley students with a good look at the Garden. We hope they will return to visit frequently after this pleasant field trip!

For Summer Session, Education Coordinator Stephanie Kaza and Curator Jim Affolter will offer a six-week course on Tropical Conservation Education. A group of 8-10 students will spend 10 days at U.C. Botanical Garden and then head down to for La Selva Biological Station and the Wilson Garden, Costa Rica. Here they will prepare educational and curatorial materials to assist with interpretation of the grounds and arboretum.

New labels are in preparation for the Chinese Medicinal Herb Garden, courtesy of Barbara Wilt, acupuncturist in Oakland. For each plant, the label will indicate therapeutic functions and what parts of the plant are used, with the name in Latin, English, and Chinese. The labels are being produced by a metal photo method that can capture the fine detail of Chinese calligraphy.
Papers and Presentations: Jim Affolter spoke on the Garden’s conservation activities before the Western Regional meeting of the Garden Clubs of America. He also addressed the Stanford Medical School on the Garden’s Chinese medicinal herb project. In April he will present a paper at the Second International Botanic Gardens Conservation Congress on the Indian Ocean island of Reunion, describing “twinning” relationships between temperate and tropical botanic gardens.

Stephanie Kaza was an invited speaker for the February meeting of the American Association of Botanical Gardens and Arboreta, Western Region in Santa Cruz. She described educational strategies for botanical gardens in promoting Conservation Education. She also was a guest speaker for the Program Associate teachers of Project Life Lab in Santa Cruz, a National Science Foundation-sponsored curriculum teaching science through garden programs in elementary schools.

Holly Forbes, Curatorial Assistant, contributed a catalog of vernal pool plants to U.C. Santa Barbara’s report, Enhancement, Restoration and Creation of Vernal Pools at Del Sol Open Space and Vernal Pool Reserve, based on field work inventory of several pools and documentation of historical populations by herbarium study.

Awards: Roger Raiche, California Native area gardener, received yet another Education award from the California Horticultural Society for his collection of Fremontodendron at the Garden. Stephanie Kaza was honored with an award for her paper, Systems Theory and Ecological Restoration, presented at the first annual conference in Oakland of the Society for Ecological Restoration and Management.

Special Events: The Garden was pleased to host internationally-known botanist Dr. Armen Takhtajan, from Russia, author of several seminal books on plant classification, evolution, and geographical distribution. Dr. Takhtajan was delighted to see several genera of plants he had studied but never observed as living specimens, including many of the caudiciform species in the Desert and Rainforest House.

A New Look at Trees, a symposium co-sponsored by Friends of the U.C. Botanical Garden and California Academy of Sciences, was an outstanding success. Organized primarily by June Falkner, the two-day event drew over 250 tree-pruners, nurserymen, gardeners, and tree enthusiasts from around the Bay Area to hear internationally-known experts Alex Shigo and Alan Mitchell as well as local speakers Frank Almeda, Robert Raabe, Carlton Koehler, Barrie Coate, and Warren Dolby. The program was sponsored in part as a tribute to Ted Kipping, who has donated many hours of volunteer work to the Garden caring for our trees.

---Stephanie Kaza
WILDFLOWER PHOTOGRAPHY  
Fri/Sun, MAY 19 & 21

John D. Smithers of DeHart Media, Texas will offer a lecture and workshop on the fine art of wildflower photography. John is a photographer and audio-visual producer for the National Wildflower Research Center, founded by Lady Bird Johnson in 1982. Friday night’s lecture, offered in cooperation with Strybing Arboretum, will be a multi-image presentation on composition, lighting, film, backdrops, and photographic ethics. Sunday’s workshop is a demonstration and hands-on photographic session at the best light of day. In mid-day, slide film will be processed before reconvening to review the day’s work. Two rolls of slide film are included in the cost of the workshop as a contribution from Kodak Film. Participants need to bring their own 35mm cameras and pay for film processing. Lecture is 7-10pm, Friday at San Francisco County Fair Building Auditorium. $15 members, $20 non-members. Workshop 7:30am-evening with afternoon break, Meeting Room. $25 members, $30 non-members.

CACTUS PROPAGATION  
Sat, JUNE 3

Fred Dortort and Kurt Zadnik are long-time cactus aficionados with large collections of their own. They will share their knowledge and experience in propagating cacti and succulents from cuttings and seeds, and will also demonstrate grafting techniques. This is an excellent workshop for anyone wishing to grow more cacti and succulents, with plenty extra to give away to friends. 10am-2pm, Meeting Room. $12 members, $15 non-members.

DRAWING PLANTS IN PEN AND INK  
Sat, JUNE 10

This class will offer an introduction to botanical illustration, using a controlled pen and ink technique that gives an elegant and professional look to drawings. Linda Cook, graphic designer and illustrator for this newsletter among other things, will demonstrate the techniques and provide individualized instruction. This is a chance to focus on the Garden’s beautiful spring plants in some detail and with assistance from a skilled illustrator. Most special art supplies will be provided, but students will need to bring a sketch pad, pencils. Limit 10. 10am-2pm, Meeting Room. $15 members, $18 non-members.

WATERCOLOR PAINTING  
Sats, JUNE 17-JULY 22

A six-Saturday series offering a new view of the Garden through painter’s eyes. Judy Corning will introduce basic watercolor techniques for practice in the Garden. Beginners are welcome. She will provide information on materials, composition, color, and strokes over the sessions, as participants explore the many paint-able spots of the Garden. 9:30am-12noon Saturdays, Meeting Room. $40 members, $45 non-members.

WILDFLOWER EXPEDITION  
Sat-Mon, JUNE 1-3

This two-night car camping trip is for the energetic and adventuresome. Roger Raiche and Kurt Zadnik will share more of their secret spots in California, this time in Cook and Green Pass in the Siskiyou Mountains. This area is considered one of the most floristically diverse areas for its size in northern California. Within just a few miles are lush forests of Brewer’s Weeping Spruce, open serpentine woodland and chaparral, rocky alpine fell field and talus slopes, floriferous mountain meadows, lakes and tarns, and many areas of spectacular scenery. This is one of the best areas to see spectacular displays of Lewisia cotyledon, Lilium wigginsii, Phlox adsurgens, and scores of other beauties. Be prepared for rigorous conditions and long hikes both on and off trails. Limit 15. $45 members, $50 non-members.

SUMMER BROWN BAG TOURS  
Weds and Sats, JULY 5 - AUG 12

Each week Garden docents will offer a free in-depth tour of one of the Garden’s special collections or teaching themes. This is a lovely way to spend an extended lunch hour while enjoying the highlights of the Garden. Each Wednesday there will be a new theme topic which will be repeated on the following Saturday. 11am-1pm, free. Tour Orientation Center.

July 5, 8
July 12, 15
July 19, 22
July 26, 29
Aug 2, 5
Aug 9, 12

Ethnobotany
California Plant Communities
Greenhouse Collections
Evolution and Diversity
Rare and Endangered Plants
Unusual Flowers and Seeds

For further information about classes, call 642-3343.
BOOK REVIEWS


This is a truly beautiful book. There are illustrations on practically every page, and even the endpapers reproduce paintings of two rainforest scenes. The text is based on journals by Margaret Mee of 15 expeditions she made to the Amazon rainforest between 1956 and 1988.

These lively stories of her adventures by land and water and of her encounters with people, animals, and plants, would make a fascinating book alone. But Margaret Mee was a very well educated botanist and a talented artist. She was not only able to identify the plants she found, but she had enough experience with the plants of the area to know which of them were so far unrecorded. She brought home examples of many of these, often with considerable difficulty, carrying them on small, crowded boats, once losing a precious collection when a boat capsized. When she discovered plants new to her, she made careful drawings and paintings of them. She often tried to time her journeys to reach a plant at the time it was due to bloom.

Her plant paintings have the quality of botanical illustrations in that they are always accurate and hence useful to botanists. Some species like the bromeliad Aechmea polyantha are known to us only through Mee’s illustrations. But these paintings, sometimes of single plants, sometimes of forest scenes, are more than scientific illustrations; they are exquisite works of art. The artist developed a style of painting which, though in the tradition of the greatest nature illustrators, is nevertheless highly original.

Although Margaret Mee embarked on her journeys light-heartedly and clearly enjoyed them to the full, she was very much aware of the dreadful plight of the rainforest in our time. On a trip to the River Preto in 1977, she noted:

"The new road was a disaster... both for destruction of the forests as well as for the resulting erosion, and many stretches of the dirt highway were flanked on either side by sheer precipices of eroding ground... We arrived at the River Preto, an igarape (a natural canal) which must once have been a lovely river, but instead was surrounded by mounds of earth and roadworks. Like most of the igarapes we passed on the route, it was choked by spoil from cutting the road across its course. The land could not be drained as nature intended. And great pools of stagnant water were collecting in which the trees rotted and collapsed. Thousands of trees must have perished this way, to which the tragic appearance of the scenery bore witness."

No doubt it was this knowledge that the life of the rainforest was endangered that led Margaret Mee to go back to the Amazon again and again, until she was almost 80, to record the forest in words and pictures. Certainly this book is a wonderful celebration of the rainforest and a fitting memorial to the author, who died only last year.

— Jacqueline Woodfill

Other books on the tropical rainforest available at the Visitor Center:

The Enchanted Canopy, Secrets from the Rainforest Roof by Andrew W. Mitchell. Stories from the naturalist who pioneered the use of lightweight aerial walkways in the rainforest canopy.

People of the Tropical Rainforest by Julie S. Denslow and Christine Padoch.

In the Rainforest by Catherine Caulfield. Revealing details on threats to the world’s tropical forests and indigenous tropical peoples.

Life Above the Jungle Floor by Donald Perry. More insights from climbing into the biologically rich and diverse canopy of the tropical rainforest.

CONTRIBUTIONS

New Members

The Friends of the Botanical Garden welcome the following new members:

Jean M. Andrews  
Stephen Batchelder  
Edwin L. Bedford  
Kirsten M. Berg  
Pamela D. Canales  
Rachel Carter  
Peggy Casey  
Alice Chan  
David J. Chick  
Grant Christie  
Charlotte Coomber  
Ralph H. Cross, III  
Michael & Anita D'Augelli  
Joan C. Davis  
Nancy Decker  
Barbara Dengler  
Nancy Florence  
Mr. & Mrs. James T. Fousekis  
Kris & Ernie Franco  
Christine Gentilhomme  
Erica G. Gordon  
Stephen J. Brummell

The Newsletter is published by the Friends of the Botanical Garden, a non-profit organization that provides support for the U.C. Botanical Garden.

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James Lattie  
Elmo R. Morgan  
Robert Ratcliff  
Dr. Robert Ornduff

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Dr. James Affolter, Curator  
Daniel Campbell, Manager  
Judith Finn, Assistant Manager  
Dr. Stephanie Kaza, Education  
Holly Forbes, Curatorial Assistant  
Toni Kafon, Administrative Assistant  
Deborah Darnell, Friends’ Assistant

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Jerry Parsons  
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David Coronado  
Elaine Sedlack  
Peter Klement  
Kurt Zadnik  
Frank Magtibay  
Tony Zerilli

Newsletter:  
Stephanie Kaza, Editor  
Linda Cook, Production

Printed by TechniPrint

(415)642-3343 Visitor Center  
642-0849 Administration  
643-8040 Curation  
642-3352 Education  
643-7265 Friends of the Garden

The Oregon Crabapple  
Malus fusca

Ron Grosjean  
Gail Hamilton  
George H. Hare  
Mrs. Joy Hoge  
Lydia S. Holdrich  
Helen Jones  
Terry Kelly  
James and Jean Leiby  
Barbara Lindsay  
Theresa Lipton  
Christopher S. Llata  
Ronald D. Lockhead  
Betty Lofesness  
Karen Moawad  
Dan Mullen  
David & Deirdre Myklebust

Oregon Crabapple  
Malus fusca

Orinda Valley Garden Club  
Bernhard Plagge  
Ann Rivenes  
Celia Ronis & Sandy Steinman  
G. “Slider” Samii  
Mrs. Lillian E. Severin  
Susanne K. Shields  
Birtue Skurdenis  
Harvey Stahl  
Mr. & Mrs. J. Ernest Westlake  
Betty & Richard Wren

Friends’ Budget Report

Fiscal year July 1, 1987-June 30, 1988:

Balance July 1, 1987  
$60,535.63

INCOME

Membership  
25,493.00

Gifts & In Memorium  
19,937.50

Program & Tour  
62,310.29

Symposium  
23,487.75

Plant Sales  
31,025.08

Visitor Center  
15,000.00

Donation Box  
3,542.85

Interest  
1,885.04

Total Income  
182,681.51

EXPENSES

Administration  
4,264.64

Printing  
7,970.00

Mailing  
1,876.08

Insurance  
2,018.00

Hospitality & Board Expenses  
952.39

Major Gifts  
893.58

Program & Tour  
60,659.11

Symposium  
15,398.74

Propagation/Plant Sales  
7,644.68

Total Expenses  
101,677.22

DISBURSEMENTS

Garden General Support  
42,834.94

Education Search  
1,254.35

Annex remodeling  
4,818.90

Japanese Stroll Garden  
1,627.80

Docent Support  
496.20

Disbursements from accounts at U.C. Foundation  
45,906.98

Total Disbursements  
96,939.17

Summary 1987-88:

Total income and funds in balance  
243,217.14

Total expenses and disbursements  
-152,709.41

Balance June 30, 1988  
90,507.73
Grateful Thanks

The Friends wish to thank these donors who have made a substantial gift over and above membership:

- Susan and Michael Addison
- American Rock Garden Society, Western Chapter
- Elly and Bill Bade
- Ruth Bancroft
- Alan J. Bearden
- California Native Plant Society, SF Bay Chapter
- Elizabeth Ridgway Carter
- Judith and Michael Ciraolo
- Elizabeth Hammond
- Francine Henderson
- Mrs. A. E. Howard
- David Shaw King
- Lewis and Adele Lawyer
- Mrs. Kenneth C. Mirov
- Piedmont Garden Club
- Robert and Evelyn Ratcliff
- Carla M. Reiter
- John and Mary Ricksen
- Bob and Kay Riddell
- Warren G. Roberts
- Jim and Georgie Robinette
- Geraldine Knight Scott
- Jim and Winifred Van Sicklen
- Olive and George Waters
- Jane and Nelson Weller

Our thanks also for these donations given in honor of:

- Elizabeth Hammond, from John and Josephine Shuman
- Joan Mirov, from the Orinda Valley Garden Club
- Myrtle Wolf and Roger Raiche, from Warren G. Roberts
- Roger Raiche, from Richard G. Turner, Jr.
- Myrtle Wolf, from Geraldine Knight Scott
- Mary and John Ricksen, from Mrs. and Mrs. Adolphus E. Graupner, Jr.

In memory of:

- Gregg Brochu, from Mr. & Mrs. Wilbur Leffler, Jr.
- Margaret Swift Noxon, from Elizabeth Ridgway Carter
- Joseph Precissi, from Mr. & Mrs. Wilbur Leffler, Jr.
- Oscar M. Price, from Elizabeth A. Hunt
- Miss Gretchen Jensen, from the Frederick W. Coe Family
- David P. Smith, from Evelyn and Robert Ratcliff
- Her mother, from Evelyn Givant

If you would like to make a special gift to the Garden on behalf of a friend or colleague, please send your contribution to:
Friends of the Botanical Garden, University of California, Berkeley, CA 94720. Gift memberships are also available.

Lifetime Members

At the December meeting of the Board of Directors, the Friends adopted a policy creating a lifetime membership category. Any member who has given $10,000 or more over the past ten years or who has given $10,000 or more in trust to the University for benefit of the Garden will be made a lifetime member. The Board at its discretion may also give lifetime membership in recognition of exceptional support.

We gratefully acknowledge the generous contributions of these lifetime members:

- Susan and Michael Addison
- William Stephen Allen
- Ruth and Verne Hendrix
- James H. Jones
- Mrs. Kenneth C. Mirov
- Bob and Kay Riddell
- Agnes Roddy Robb
- Mrs. Calvin Townsend
- Jane and Nelson Weller
- Alba and B.E. Witkin
- Myrtle R. Wolf

Friends of the Botanical Garden Membership Application

Yes, I would like to support the U.C. Berkeley Botanical Garden as a member:

- Student $7.50
- Individual $20
- Family $30
- Contributing $50
- Supporter $100
- Sponsor $250
- Patron $500
- Benefactor $1000
- Friends’ Circle $5000
- New
- Renewal

Name

Address

City/State/Zip

Telephone

Contributions are tax deductible. Please make checks payable to Friends of the U.C. Botanical Garden and mail to: Friends of the Botanical Garden U.C. Botanical Garden Berkeley, CA 94720
Calendar of Events

BIRDWALK AND BREAKFAST  Sat, APRIL 15
A walk through the garden observing dawn birds with Barbara Bedayn and Dee Mitchell, followed by breakfast. Limit 20. 7:15-10am, Meeting Room. $16 members, $20 non-members.

SPRING PLANT SALE  Sat-Sun, MAY 13-14
Members’ Only Preview Sale, 9am-12pm Saturday*. Unusual and hard-to-find perennials, herbs, houseplants, and California natives propagated by Garden volunteers. Public sale 12-2pm Saturday, 10am-3pm Sunday. * Memberships available day of sale

WILDFLOWER PHOTOGRAPHY  Sun, MAY 21
Join John D. Smithers of DeHart Media in Texas for a one-day workshop at the peak of spring on the art of wildflower photography. Slide lecture Friday evening at Strybing Arboretum in preparation. Workshop 7:30am-evening with afternoon break, Meeting Room. $25 members, $30 non-members for workshop; $15 members, $20 non-members for slide lecture.

CACTUS PROPAGATION  Sat, JUNE 3
Demonstration of vegetative and seed propagation as well as grafting techniques for cacti and succulents with Fred Dortort and Kurt Zadnik. 10am-2pm, Meeting Room. $15 members, $15 non-members.

DRAWING PLANTS IN PEN AND INK  Sat, JUNE 10
Introduction to botanical illustration using pen and ink. Linda Cook, graphic designer and illustrator for the Garden newsletter, will demonstrate techniques and provide individual instruction. Most art supplies provided. Limit 10. 10am-2pm, Meeting Room. $15 members, $18 non-members.

WATERCOLOR PAINTING  Sats, June 17-July 22
Introduction to the basics of water color techniques with Judy Corning, who will discuss materials, composition, color, and strokes over these six sessions. 9:30am-12noon, Meeting Room. $40 members, $45 non-members.

10,000 MILES OF BULBS  Wed, JUNE 21
Jim and Jenny Archibald will speak on their wide-ranging collecting trips for bulbs from the mountains of Europe, the Balkans, and Turkey, as well as the southwestern United States. 7:30pm, Lakeside Garden Center, Ebel Auditorium. No charge. Cosponsored by Western Rock Garden Society.

WILDFLOWER EXPEDITION  Sat-Mon, JULY 1-3
A car-camping exploration of Cook and Green Pass in the Siskiyou Mountains, one of the most floristically diverse areas in northern California led by Roger Raiche and Kurt Zadnik, is for the hardy and adventurous only, limit 15. $45 members, $50 non-members.

BROWN BAG TOURS  Weds/ Sats, JULY 5-AUG 12
Bring your lunch for a new tour each week, from 11am-1pm: 1 - Ethnobotany, 2 - California Plant Communities, 3 - Greenhouse collections, 4 - Evolution and Diversity, 5 - Rare and Endangered Plants, 6 - Flowers and Seeds.

CHINESE MEDICINAL HERBS  Sat, AUG 12
Principles of Chinese herbal medicine with a special emphasis on anti-viral and immune-enhancing herbs, with Barbara Wilt, licensed acupuncturist. 9:30am-12:30pm, Meeting Room. $12 members, $15 non-members.

FALL PLANT SALE  Sun, SEPT 24
Trees, shrubs, herbs, vines, and California natives available for sale in time for fall planting. 10am-3pm at the Garden.

THE PLANTSMAN’S GARDEN  Sat-Sun, SEPT 29-30
Learn about unusual plants and how to grow them at this symposium of special guests who specialize in a diversity of gardens. Speakers include: Jack Elliot from England; Marco Polo Stufano from Wave Hill, Bronx; Dr. J.C. Raulston from North Carolina; Stan Farwig and Robert Kourik from the Bay Area; and David Hockings from Australia. Cost $95 before Sept 14th, $110 after Sept 14th.

For information on classes and events, call the Garden Visitor Center, 642-3343. The Garden is open every day of the year except Christmas from 9:00am to 4:45pm. Free public tours led by docents are given on Saturdays and Sundays at 1:30pm. Admission to the Garden is free.