Rainforest Rap — A Conservation Program for Kids

High overhead vines draped with oddly-shaped flowers and sausage-shaped fruits, on the ground a collection of overgrown houseplants, and in the understory, plants with leaves so big you can hide under them. The tropical rainforest? No. A kids’ adventure delight? Yes. This is Rainforest Rap, an action-packed school program introducing children to the tropics with an emphasis on conservation.

With the tropics in the news almost every day and conservation groups working fervently to raise awareness of tropical issues, it seemed time for the Botanical Garden to take on the job of providing teachers and school children with up-to-date information. Here we have a collection of several thousand tropical plants and a well-labeled tropical greenhouse. We’re one of the few temperate gardens in the world with a sister garden in the tropics, the Wilson Botanical Garden, part of the Organization for Tropical Studies.

Curriculum materials and field trips about tropical rainforests are still scarce in the United States. Only a few museums have taken on the challenge of replicating a live tropical forest. The Baltimore Aquarium offers a superb rooftop exhibit complete with mists and high humidity, brilliantly-colored birds, and excellent table displays among the greenery. But nowhere in the wider Bay Area can you see such a rainforest education exhibit, though the zoos and Marine World can give you a glimpse of tropical animals, especially the favorite monkeys. Here was an educational niche unfilled, so we decided to fill it.

Hands-on Excitement

The first challenge was to transform the Meeting Room into a tropical lab. Instructor Chris Pires and I, with help from gardener Jerry Parsons, pulled together sample plants from the Garden’s various greenhouse collections. What would best illustrate tropical plant defenses against herbivory? We looked for spines, milky sap, hairy leaves, and ant-patrolled acacias. What pieces of the forest could we bring in with drip tip leaves and stilt roots?

On two tables we set up demonstrations of pollination strategies using microscopes. There are blue and yellow composite flowers with landing platforms and nectar guides for bees, long tubular-shaped red flowers for...
hummingbirds, smelly brown Aristolochia and Tacca flowers for flies and beetles, and more for moths, butterflies, bats, and rodents. The centerpiece of the next table is a sprouting coconut, surrounded by large tropical hardwood seeds and winged beans. Avocado, papaya, and mangos represent seed dispersal by fruit-eating birds and mammals.

And what about people and the rainforest? We filled another table with tropical products from balsa wood to patchouli oil, burlap to rattan (from climbing palms). Jerry even brought us an entire palm frond that reached from floor to ceiling! Palms are, after all, among the most abundant and highly-used tropical trees.

From the Meeting Room, we direct students to the steamy Tropical House to get a better picture of how the tropics might actually look. Despite the fact that few of these species naturally grow side by side in nature, they are displayed together here to suggest the density of vegetation, the layering of understory and canopy, and the dense growth of epiphytes on the limbs of trees. We’ve added a few life-like touches such as plastic ants on the Bullhorn Acacia and a frog in the most accessible tank bromeliad. But the real fun for the students in the Tropical House is finding all their favorite breakfast foods.

“Hey, bananas grow upside down! Wow, I didn’t know chocolate grew on trees! Vanilla comes from an orchid?”

What’s the Message?

In a program lasting a little over an hour, students are exposed to tropical biology, pollination ecology, economic plants, and conservation issues. We have offered teachers a preliminary training session with background materials so they can prepare students for the field trip, and we encourage them to follow through with specific conservation activities upon their return to school. We want children to consider how rainforests are a part of our fabulous heritage of biological and cultural diversity. And we also want them to realize children can play a role in conserving these forests.

The message is about interdependence — plants and animals, plants and people, temperate people and tropical plants, temperate cultures and tropical conservation. Tropical forests are different from temperate forests and can’t be studied or conserved in the same ways. Conservation requires local efforts as well as global concern. Tropical forests are in the news right now, but we can use their “sex appeal” to raise awareness about forest conservation in our own backyards. Children can plant trees, and children can raise money for things they care about. Children from Sweden raised over $500,000 to help buy land in Monteverde, Costa Rica adjacent to the cloud forest preserve to start the first Children’s International Forest.

We forget sometimes that children have sensibilities and compassionate hearts and are also affected by the environmental concern felt by the general public and the news media and decision-makers. We want them to know they are part of the solution. We also want them to remember botanical gardens are an important resource for learning about conservation. Rainforest Rap is only a first introduction to the wonderful world of the tropics, but we hope it is one that will leave classes with curiosity and concern for the fate of the world’s rainforests.

—Stephanie Kaza

Editor’s note: Rainforest Rap runs through mid-March. For tour reservations, call 642-3343.

Distribution of the world’s remaining rainforests. (Source: Rainforest Action Network)
South American Rarities in the Garden

The Garden has many rare and endangered species from all over the world. Many of them have come from seed lists circulated by institutions in the plants' native areas, some have been distributed by scientific groups such as the International Organization of Succulents in Switzerland, and others were collected by private collectors or U.C. Botanical Garden expeditions in the 1930s (one wonders if they were rare at the time!).

As a member of the Botanical Gardens Conservation Secretariat (BGCS) of the International Union for the Conservation of Nature and Natural Resources (IUCN), we receive lists of the current status of rare and endangered species in each country the world over. We have used these lists to determine which plants in the garden should be given special attention or "star status." Once we have checked the lists against the garden collection, we return them to the BGCS so that they can update their computer database on the distribution of these species in botanical gardens around the world.

The IUCN uses several categories to indicate degree of rarity. "Endangered" refers to plants most in danger of extinction, "vulnerable" indicates plants that may become endangered if not protected, and "rare" is used for plants that are not quite as seriously threatened as those in the first two categories. There are rare and endangered species throughout the Garden, more than we can list here. The following is a selection of listed species from South America. [Garden beds in the 600-699 series are for South American plants.]

**Southern Specialties**

One particularly pretty and rare bromeliad, *Tillandsia lindenii*, can be admired just to the right of the pond in the Tropical House. Its purple flowers emerge from a pale pink inflorescence. It is a native of northern Peru and southern Ecuador, and because of its large pretty flowers it is a widely cultivated species. While you’re still in the Tropical House, take a look at another rarity from Peru, *Begonia geraniifolia* located on the right-hand side in a rock with several other begonias, not far from the door.

Several palms in the Palm Garden near the Tropical House are of special concern. The Chilean Wine Palm, *Jubaea chilensis*, is widely cultivated in warm temperate regions but is vulnerable in its native habitat in central Chile. In the past, these palms were cut down and the trunks were tapped for making wine and sugar. A close relative, *Parajubaea cocoides*, is vulnerable in Ecuador and was originally described from high elevation (9,000 ft.) in the eastern Andes.

You may have noticed the beginnings of a Chilean Pine forest adjacent to the Garden of Old Roses. The Chilean Pine or Monkey Puzzle Tree, *Araucaria araucana*, is vulnerable in its native Argentina and Chile, where it is used for lumber and pulp products, and its seeds are harvested and sold for food. These trees can be very long-lived, perhaps reaching ages of 1,000 years. Seeds for this planting were collected by Garden Director Robert Ornduff in Chile in 1983.

A member of the cypress family, *Fitzroya cupressoides*, is also listed as vulnerable in Argentina and Chile. While seldom growing over 50 feet tall in cultivation, in its native habitat the largest tree measured 240 feet tall with a diameter of 15 feet. Like its fellow conifer the Chilean Pine, Fitzroya can live to be 1,000 years old and is a valuable source of lumber. The garden’s specimen can be found in Bed 607 of the South American area.

The Soapbark Tree, *Quillaja saponaria*, is vulnerable in Chile. A member of the rose family, Soapbark Tree can reach heights of 60 feet and grows in areas of mild climate (little or no frost). In cultivation it more commonly reaches 25-30 feet tall. Its bark contains saponin, a good lathering agent. The large garden specimens in Beds 603 and 605 were collected in Chile by James West in 1936.

We encourage you to visit these plants on your garden walks. If you have any trouble finding them, please stop by the office for assistance.

—Holly Forbes
Early History of the Botanical Garden

Editor's note: This is the first of three articles in a series by Lincoln Constance, Professor of Botany Emeritus, on the history of the Botanical Garden over its first one hundred years.

Long before the first shovel of dirt was turned, a number of dedicated professors of botany laid the groundwork for the establishment of the U.C. Botanical Garden. In tracing the history of the Garden, the first in this lineage of visionaries was Eugene W. Hilgard, father of plant science on the Berkeley campus. In 1875, only two years after the University had occupied its present location, the College of Agriculture and Agricultural Engineering was officially launched, and with Hilgard's appointment, the Agricultural Experiment Station established.

One of Hilgard's first objectives was to obtain a legislative appropriation to permit the "continuation and expansion of the experimental cultures on the grounds and the establishment of a garden of economically important plants, both for experiment and for the instruction of classes by actual demonstration and exhibition of the growing plants." Some one and a quarter acres adjacent to Strawberry Creek and the West entrance of campus were designated by the Regents and a "competent gardener" appointed.

The First Gardens

A garden of economic plants was established in 1879. That same year, Hilgard proposed creation of a botanical garden for native California plants. Also he pleaded for a permanent provision for instruction in botany. Though money was not available for either of these at the time, in 1884-85 the President finally responded to his requests. "It is important that a separate department of general and economic botany should be formed, and that a Professor of Botany should be appointed at a salary of $3,000 a year. He will require an assistant for the purpose of taking charge of the herbarium and aiding in instruction of the classes at $600 a year. The formation of a large herbarium should be seriously begun. The annual expenses will be $200 a year. The cost of the department of Botany then should be $4,000 per year."

Despite this generous allotment, conditions were not ideal for establishing a botanical garden. In his 1887 report to the Regents, Hilgard noted that "1) The entire establishment of greenhouses is too small and imperfect.

Classes in botany had been initiated earlier by Joseph LeConte, M.D., Professor of Geology, Natural History, and Botany. In his report for 1872-73, President Daniel Coit Gilman had requested "a professor whose province it is to teach the Laws of Vegetation — all that pertains to the growth and structure of plants, or Botany, in its scientific and economic aspects; and there should also be a competent gardener, and perhaps a forester employed at once to take charge of the grounds." Hilgard taught these early botany classes from 1875 to 1882, much as LeConte had before him, using Asa Gray's text, Structural and Systematic Botany, and illustrating his lectures "by the use of the magic lantern (March's Sciopticon)."

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The first campus garden and conservatory, 1904.
The first Garden Conservatory, situated on campus and modeled after the famous London Crystal Palace.

for our purposes, and should be materially enlarged, both in horizontal and vertical space. Our best greenhouse plants must now be currently disposed of by exchange as soon as they become of respectable size, because there is no room for them. 2) The heating apparatus of the warm houses is in the last stages of decay, and, while it may be nursed through this season, will certainly not be able to resist another winter... A structure reasonably adequate to our requirements would cost not less than $5,000, and would be advantageously extended to $8,000. If the needful amount cannot be obtained by appropriation, it might, perhaps, be obtained as a gift from some public-spirited citizen.” [This might be the first intimation of the creation of The Friends.] A year later the heating apparatus had been replaced, the greenhouses repaired and improved, and an arboretum established in three plots, one at the mouth of Strawberry Canyon.

A Quilt of Many Colors
In 1890 the University established a College of Natural Sciences with the Department of Botany as a founding unit. Edward L. Greene, a Wisconsin-trained Episcopalian cleric and Rector of Berkeley’s St. Marks, joined the department as Associate Professor and wasted no time in planning for a garden. “The botanical garden has always and everywhere been recognized as a most important adjunct to a thorough and efficient course of instruction in the knowledge of plant life in general. It is proposed, first of all, to form a living collection or garden of the native trees, shrubs, and herbaceous plants of the State of California, gathering in at the same time, as rapidly as our limited facilities will permit, those of our neighboring States of the Pacific Coast. No region of the world has a more interesting or varied native vegetation than this coast, and scarcely more than a beginning has been made at the scientific study of it as a whole.”

During the spring of 1890, a spring garden of native plants was designed by Greene’s assistant Willis Linn Jepson. A rather fanciful figure-eight layout was prepared by student assistant Ivar Tidestrom for the site now occupied by the present Moffitt Undergraduate Library. In his journal, Jepson wrote that in December 1890, “Professor Greene and I planted the first beds with seeds of native annuals — with our own hands! Soon we had a garden. A great quilt of many colors, beds of color furnished by the native annuals, although there were many herbaceous perennials and a few trees and shrubs were added each year.”

The size of the garden doubled in the next two years, and by 1892 contained 600 kinds of native plants. Greene observed that, “While the garden is not primarily designed to be ornamental in any way [which must have been news to Tidestrom!], but only useful from a botanical point of view, yet even our small beginnings have elicited admiring comment from many visitors; and the garden is sure to become, within a very few years, one of the most generally appreciated ornaments of our institution.”

The following year foundations were laid for a new greenhouse for the Agricultural Department to cost some $13,500 and modeled (like many botanical garden conservatories) on the famous London Crystal Palace. San Francisco’s conservatory in Golden Gate Park is essentially a twin of this early greenhouse.] Situated on the slope between the Students’ [Astronomical] Observatory and the Botanical Garden, the conservatory proved to be a popular campus attraction. In the mid-Twenties, however, this lovely building was demolished, pane by pane, to make way for parking.
When Greene left Berkeley in 1895 for another position, he left behind two people important to the future of the Botanical Garden: Willis L. Jepson and Joseph Burtt Davy, who managed the actual operation of the Garden. A tug-of-war developed between the Colleges of Agriculture and Natural Science as to the future of botanical instruction. This was resolved by the appointment of William A. Setchell, a Yale and Harvard-trained student of seaweeds and fungi, as Chair of Botany and botanist in the Agricultural Experimental Station. Under Setchell and Davy, the plantings, which now numbered some 1500 species, two-thirds of them native to California, were rearranged to show their relationships, a change deemed "absolutely essential" for the student and a convenience for the visitor.

In 1897, Setchell and Davy reported that "some 700 packets of seed were sown out of doors this spring, but the lack of all rainfall but one slight shower since the latter part of March makes it probable that very few of them will germinate this season, if at all." They made a general appeal throughout the state for seeds of California wild flowers and the following year issued two seed exchange lists.

Growth and Expansion

The Garden exchanged hands in 1902 with Davy's resignation, passing on to Harvey Monroe Hall, Instructor in Economic Botany and botanist at the Experiment Station. Hall became keenly interested in botanical gardens as an important part of every botanical institution and sought official recognition of this need, proposing a new, expanded site in Strawberry Canyon. Although the Board of Regents did set aside an area for development, no funds were made available to implement Hall's vision before he left in 1919.

However, Setchell accomplished this vision through his interest in research on native and horticultural Nicotiana species, relatives of commercial tobacco. As early as 1904, Setchell had begun to cultivate Nicotiana and later involved two of his young protégés, Roy E. Clausen and T. Harper Goodspeed. Goodspeed's thesis on inheritance in Nicotiana hybrids in 1912 made him the Department's seventh Ph.D. (Hall had been the fifth.)

When the University purchased the Strawberry Creek watershed in 1909 (in the interest of obtaining a more ample and reliable water supply), Setchell implored President Wheeler to set aside some of this area for a botanical garden, as the current garden was seriously crowded by new construction on campus. "It is most desirable that we have for our use two or more acres of fairly level land, protected from the more violent winds and of sunny exposure... [Strawberry Canyon] has the advantage of being accessible, varied, protected, with good soil and reasonably isolated." Wheeler personally inspected possible sites and Setchell was encouraged to submit plans for a "Botanical Institute" encompassing most of the canyon. By the end of 1912, the Department had been authorized to "develop botanical gardens and experimental plantations" on a small part of the property. In 1920 a small tract east of the University Dairy Farm [formerly the Stutt Dairy] was finally made available for carrying out the tobacco experiments and for propagating class material. A new chapter in the garden's history was about to begin.

—Lincoln Constance
Strawberry Creek Restoration

Garden visitors have long been drawn to the lovely waters of Strawberry Creek, one of the best known and most loved of Berkeley's streams. Both in the canyon and on campus, the creek plays a major role in establishing the character and form of the Berkeley landscape.

Recently the University has undertaken major restoration and clean-up efforts on Strawberry Creek, in response to management recommendations from the Chancellor's Advisory Committee and planner Bob Charbonneau. The lower campus creek was polluted with chemical runoff, sewage, and unidentified toxic wastes. In the last year, efforts have been made to eliminate sources of discharge, to stabilize eroding creek banks, and to decrease pollution. The University's goal is to restore the aquatic and riparian habitats and return the creek to a state healthy enough to support small fish populations present in earlier times.

In conjunction with these efforts, the Botanical Garden has decided to open up public access to the lower stretch of Strawbery Creek below the Meeting Room bridge. The Garden is an obvious showplace for this lovely creek since aside from the lower forks that run through the campus and the small public park on Bonar Street, the creek runs mostly underground through hidden sewage and runoff culverts.

Last spring, Dr. Ornduff, Daniel Campbell, and I began brainstorming about new trails, teaching areas, and interpretive materials for the creek. Elizabeth Hammond kindly offered a generous gift in seed money for a preliminary design plan. We were fortunate in obtaining the landscape design talents of Elise Brewster and David Kahn, two graduate students in the U.C. Berkeley Landscape Architecture program and local urban creek supporters.

Intimate Encounters

The completed plans and pink-flagged trails trace a secluded walk with many detailed elements. Crossing the paved bridge below the Asian section, the creekside trail runs below the Palm and Cycad Garden. Here, sheltered by a row of several California buckeyes, are plans for a deck near the water under these graceful spreading trees. The path joins up with the present footbridge and crosses the creek, connecting to a boardwalk over the boggy area carpeted with abundant horsetails. The planking ends at the checkdam where a waterfall fills a small pool. The plan calls for a small deck near the edge of the creek where children's groups can dip for dragonfly larvae and water beetles.

Farther downstream, the path wanders through curving bay trees and coast live oaks, dropping deeper into the narrow canyon. A side link crosses the creek by stepping stones, connecting the California section with the North American area. Here a retaining wall topped with stone is designed to seat a tour group for a view up and downstream.

The trail emerges slightly uphill below a gracious coast live oak on the lower side of the California area. This is a good place for bird watching and listening, for the overhead oak provides cover that connects to the stretch of natural canopy in the Oak Knoll. Jays, robins, nuthatches, and warblers abound in this quiet corner of the Garden. Here we plan a bigger deck with interpretive tiles and table displays that can accommodate tour groups for a view up the canyon. Across the way is the Ecological Study Area, no longer a barren dairy pasture but now a thickly grown-in forest: a wonderful example of the possibilities for reforestation of once-cleared lands.

Generous Gifts for the Creek

In December, we were extremely pleased to have found two generous donors to support the project. Dick and Marianne Peterson have pledged $20,000 towards the building of the large watershed deck as a holiday gift for her mother, Elizabeth Hammond, bird and creek enthusiast herself. Bill Weeden secured an additional $20,000 gift from the Weeden Foundation which will be used to construct the trails and other decks and boardwalk.

The project will soon be underway, with a target goal of early September, 1990. We are hoping for assistance from the East Bay Conservation Corps in the trail clearing and construction. We have also applied for a grant from the California State Department of Water Resources to repair flood control devices and develop biotechnical measures for managing erosion along the creek banks.

On September 8th, the Education Program will host a symposium on Strawberry Creek at the Garden, complete with docent-led tours along the new trail and most certainly a festive ribbon-cutting ceremony. If all goes well, we might even be able to release a few small fish back into this creek — once again healthy, once again enjoyed by water plants and animals and people.

—Stephanie Kaza
Out of Africa

Winter is a time of dormancy for much of the Botanical Garden. On African Hill, however, plants are at their peak of growth and flowering. Aloes, Oxalis, Lampranthus, and a wide array of bulbs contribute to the tapestry of color and texture. Representatives of many plant families, especially the succulent groups, reveal the great variety of species and adaptations to the climate and geography of South Africa, one of the most botanically rich areas in the world.

There are three regions in the southern hemisphere with Mediterranean climates similar to ours in California, marked by overall mild weather, summer drought, and winter rain. These are central Chile, southwestern areas of Australia, and the southwestern Cape region of South Africa. For this reason, most of our outdoor plants on African Hill are from South Africa. We also have a small collection of plants from the Canary Islands, which also has a Mediterranean climate.

A California Climate

While both South Africa and California are rich in annuals, South Africa has a strong edge on bulbous plants — Cachaeidas, Oxalis, Watsonias, and Gladiolas, among others. Many of these African species begin flowering with the first autumn rain, whereas the California peak flowering period for bulbs is spring and early summer. Since the climates are so similar, some South African species have escaped to California and been quite successful as invasive plants — most notably Oxalis pes caprae, the weedy Bermuda Buttercup.

The Africa section is roughly divided into areas of woody, shrubby, and succulent plants, with plants segregated according to whether they originate in regions of summer or winter rainfall. Plants from parts of Africa with wet winters and sometimes regular frosts, such as the southwestern Cape Province, are bright highlights in the winter show on African Hill. The spectacular display of brilliant yellows, oranges, and neon pinks comes on with the first chilly weather in fall and lasts until the drying warmth of late spring. Plants from dry winter areas, such as some Aloes, bloom as well in January and February — what is normally their dry season. Barring a severe frost, these plants will often flower abundantly all winter.

Almost 20 years ago, a severe cold spell dealt a serious blow to the African collections. In December, 1972, the famous “big freeze” exterminated over 1500 species in the Garden, many of them on African Hill. Temperatures dropped to 14°F (-10°C) for two nights in a row at a time when the ground was very wet due to heavy rains. We have recovered some species since then, but this area is still vulnerable to extreme cold anomalies in winter.

The extensive rock work in both the African and the New World Desert areas was created in the early thirties, a few years after the Garden moved to its present site in Strawberry Canyon. James West (an alias for the European born nobleman, Prince Egon Von Ratibor) did the majority of the stone work, planting it with accessions from a number of University of California expeditions. Many of the older specimens came from Berkeley-trained botanist Robert J. Rodin’s travels through South Africa in 1947-48. Garden staff members Jack Whitehead and Myron Kimnach, along with other plant explorers, actively enlarged both the outside and greenhouse collections, seeking especially a diversity of succulent species. The oldest accessioned plant, Podocarpus gracilior, is on African Hill, brought into the Garden in 1928.

Convergent Evolution

African Hill is a study in contrast and comparison to the New World Desert across the road. The similarity in habit between the Aloes and the succulent Euphorbias of Africa with the Agaves and Cacti of the Americas is striking. This is a result of convergent evolution rather than close common ancestry. Because of similarities in climate and geography, unrelated plants with widely different evolutionary histories have developed very...
similar sets of characteristics. Both Africa and America have arid and semi-arid climates to which plants of several families have slowly adapted.

Cacti and succulent euphors (often mistaken for cacti) have evolved such adaptive features as spines or thorns, waxy coverings, and ribbed fleshy leafless bodies that serve to protect them from hot summer sun and drying winds as well as from predators. They also provide a means of conserving water. The genus *Euphorbia* has a few succulent representatives in the Americas, but most of its succulent species occur in Africa. Cacti in contrast, are restricted almost entirely to the New World, except for one species that migrated by natural means: an epiphytic *Rhipsalis* most likely carried by birds to India and Africa. Likewise, the Aizoaceae or Iceplant Family is mostly an Old World family, but one of its members has not only escaped but prospered in the New World — the familiar iceplant, *Carpobrotus edulis*, growing in coastal strand communities from Oregon to Chile.

Agaves and Aloes are another study in similarity, with many but not all species having tall, columnar flower stalks and basal rosettes of leaves. Both genera have filled specific niches on their respective continents by developing succulent leaves, stems, and roots. This pattern of succulence as well as the rosette form are both adaptations for conserving water. These succulent plants have developed a special form of metabolism that allows photosynthesis to take place even when the stomata are closed, further conserving moisture.

**Unusual Biodiversity**

South Africa has a great abundance of plant species, due to its mild climate and diverse topography. This part of Africa has never been subjected to such extremes as glaciation. As in California, the plant species here have spent many millenia adjusting to the drying but varied climate, leaving a wide diversity of species on the mountains and coastal margins. The dramatic Proteas and some of the world’s most beautiful composites occur in Southern Africa as do such unusual species as *Welwitschia*, a strangely primitive cone-bearing plant (displayed in the Desert and Rainforest House), and the Baobab, a tree and probably the world’s largest caudiciform succulent.

The flora of the Cape Region is noted for its richness and high level of endemism. On the Cape Peninsula alone there are over 2200 plant species in an area of 180 square miles. That is as many species as in the entire British Isles. About 80% of the plant species in southern Africa are endemic, occurring only in this region. This compares with the figure of 30% endemism in California, already considered to be very high.

One of the most fascinating groups of South African succulents are the Stone Plants (*Lithops* sp.). These very low-growing, inch high plants grow buried among the rocks and pebbles, so only their tips are visible. Each species is distinctly colored to blend in with its surroundings. Because the plants are buried, breathing pores or stomata and chlorophyll cells are underground, away from air and light. To compensate, the plants are adapted to transpire through their sides and admit sunlight through translucent “windows” in the exposed leaf areas. These stone mimics inhabit some of the driest parts of South Africa where rainfall may be less than an inch per year. They can be seen on display in the Garden’s Desert and Rainforest House.

Few gardens have as varied a collection of African plants as the U.C. Botanical Garden or as beautiful a stage on which to display them. Plans are under way now to further divide African Hill into areas of climate, geography, and natural plant associations. Walk through African Hill on a dreary winter day and this will surely bring you a little bit of summer.

— Sean Hogan, African Hill gardener
GARDEN NOTES

Good-byes and Hellos

Staff Changes: Garden Curator Jim Affolter is leaving the Garden this spring after six years in the curatorial and grant-writing chair. He has accepted the position of Director of the botanical garden, arboretum, and natural areas of Cornell University in Ithaca, New York. Cathy Pringle, his wife, will continue her stream ecology work there as a senior research associate in the Section of Ecology and Systematics. We wish them both well in their new job challenges.

Cindy Rasicot has joined the staff as Development Coordinator. She has come to the Garden from Stanford University where she also worked in the Development Office. Cindy and her assistant have settled into office space in the newly installed temporary modular unit (e.g. trailer) next to the Visitor Center. Gerald Ford is a new member of the garden crew. He will be in charge of the shop equipment and maintenance responsibilities.

Congratulations go to Toni Kafton, Garden Administrative Assistant, on receiving her 20-year pin from the University. Toni has worked in Personnel, Accounting, and the School of Business before joining the Garden in 1979. Also congratulations to Dr. Robert Raabe on his appointment as Associate Director of the Garden. Professor of Plant Pathology in the College of Natural Resource, Dr. Raabe is a long-time supporter of the Garden. His ideas and assistance will be invaluable in charting the direction for the Garden's next 100 years.

Projects: The 1990 Seed List is printed and off the press, and soon the requests will pour in from all over the world for our unusual California natives. Gardeners Roger Raiche and Kurt Zadnik with Curatorial Assistant Holly Forbes, and several volunteers have done a fine job pulling together the entries and seed packets for this year's offering of 171 species, most of them California natives collected in the wild.

Volunteers Linda Price and Peggy Grier have been diligently recording flowering and fruiting periods for plants in the California Native Area each month for an entire year. This information will be entered into the Garden's computer data base and will eventually be available to researchers, docents, garden staff, and visitors. We appreciate their efforts and look forward to analyzing the results at the close of the second year of the project.

Docent Training: This year's fall class, Conservation Education (CRS 190 in the Conservation and Resource Studies Department) has concluded, and new docents are finishing out their training with on-site learning in the field this winter. They will get their first taste of working with school groups during Rainforest Rap. By June, their apprenticeship will be complete. Congratulations to Susan Kahn, Diane Kothe, Lois Paul, Katie Szaky, and Jackie Vittori — welcome aboard!

—Stephanie Kaza

Friends' Member Survey

Six months ago, you may have received a questionnaire distributed to all members of the Friends of the Botanical Garden via the newsletter. We were pleased with the fine return of 134 surveys which were tallied in detail by Friends' Assistant Deborah Darnell and Board Member Elly Bade. The purpose of the survey was to gain information for planning future programs and publicity, and to find out more about the Friends' membership.

A Typical Member

While Friends' members come from diverse backgrounds and certainly have individual tastes and interests at the Garden, an "average" or typical member looks like this: She is in her late 40s or early 50s and lives less than ten miles from the Garden. Well educated, she holds a postgraduate degree and is associated with U.C. Berkeley, most likely as an alum. She has been a member for 2-5 years and supports the Garden at the $20 individual rate. She has no children at home currently but is an avid home gardener. She visits the Garden on a more or less monthly basis and develops her gardening interests through reading Pacific Horticulture, Sunset, and the San Francisco Chronicle.

Our "typical" members gave us a good idea of how they use the Garden. The main reasons for visiting the Garden are to learn about plants and for relaxation, though many others also come to buy plants or to host guests and relatives. Not so many members bring families here or come for study or exercise. Most people gain the greatest benefit from the Garden and greenhouses, the Visitor Center/Book Store, and the Plant Sales. Only a fourth of the respondents took classes or attended lectures or symposia.
Helpful Comments

The surveys yielded a number of helpful suggestions for future education programs and volunteer activities. Ideas included expanded children's programming, volunteer work days in the Garden, and more classes on horticulture and plant identification, among other things. Many of the comments were thought-provoking and heartening to read. Here are a few of the many that caught our attention:

"The Friends of the Garden is a splendid organization. The contributions made by volunteers have immeasurably improved the Garden. The classes, sales, symposia, and docent-led walks give the dedicated plant lovers and casual visitors wider experience in the world of plants. Children exposed to garden activities must surely be richer."

From one respondent, "I love the variety of plants, the accessibility, the friendliness/helpfulness of volunteers when I have questions, and the fact that this resource is so close to my home. One thing I would appreciate is a better more consistent labeling system of the plants. And from another member, "While I love to learn Latin names, I would like to know common ones as well. Though it is not always practical to put

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Popularity of areas in the Garden, according to the survey.

<table>
<thead>
<tr>
<th>Area</th>
<th>Rank</th>
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<tr>
<td>California Native Area</td>
<td>1st</td>
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<td>Japanese Pool</td>
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<td>New World Desert</td>
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<td>African Hill</td>
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<td>Western Herb Garden</td>
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<td>Garden of Old Roses</td>
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<td>Asian Area</td>
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<td>Tropical House</td>
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<td>Strawberry Creek</td>
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<td>Desert &amp; Rainforest</td>
<td>4th</td>
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<td>Chinese Herbs</td>
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<td>New Zealand/Australia</td>
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<td>North America</td>
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<td>South America</td>
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<td>Economic Plants</td>
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<td>Mather Grove</td>
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<td>Lawn</td>
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<td>Mesoamerican</td>
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<td>Fern House</td>
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<td>Palms &amp; Cacti</td>
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<td>Europe</td>
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EVENTS

Centennial Programs

A HUNDRED YEARS OF HISTORY Sun, FEB 4
Dr. Lincoln Constance, Emeritus Professor of Botany, will offer a historical perspective on the people and events that have set the direction and development of the Botanical Garden. Dr. Constance is the author of our three-part newsletter story on the history of the Garden and has written other accounts of the history of botany at Berkeley. Bring a bag lunch to this free lecture in the Meeting Room, 12noon.

PLANT EXTINCTION RATES IN CALIFORNIA Thurs, FEB 22
Niall F. McCarten, Environmental Consultant, will speak with members of the California Botanical Society and the general public on the outlook for the future of California rare and endangered flora. Because of its diverse topography and climate, California has a high number of threatened plants, second only to Hawaii in the United States. Free lecture in Mulford Hall, Room 159 at U.C. Berkeley, 8pm.

RHODODENDRONS AT UCBG Sat, MAR 24
Hadley Osborn, Emeritus Director of Filoli Gardens and a devoted member of the Rhododendron Society, will discuss the many species of rhododendrons at the Garden. This unusual and historic collection includes species from Asian botanical expeditions by George Forrest and Joseph Rock, among others. Rhododendron Dell has long been a central and well-loved feature of the Garden; species here represent a diversity of trees and shrubs from Nepal to Burma, from high altitude scrub to lowland understory. Free lecture in the Meeting Room, 12noon.

THE BIOSPHERE IN CRISIS Sun, APRIL 8
Two special guests of international reknown will address the imperatives of global conservation issues. Dr. Peter Raven, Director of the Missouri Botanical Garden with special interests and expertise in tropical forests, will discuss problems in terrestrial ecosystems. Dr. Sylvia Earle, widely-known marine biologist and oceanographer, who will speak on challenges to marine ecosystems. This is an unusual opportunity to gain some insight into the big picture of the state of the earth and its environments. Fee, time, and location to be announced.

CENTENNIAL BIRTHDAY PARTY Sun, April 22
In honor of Earth Day and the 100th anniversary of the Garden's first flower display, the Garden will host a grand scale party and open house. The day will be filled with music, food, art exhibits, tours, and special activities for children, as well as an enormous birthday cake, of course! Bring your friends and family to celebrate this wonderful occasion of the Centennial anniversary. Garden Lawn, Meeting Room, and all 33 acres, 10am-4pm.

Classes

WATERCOLOR PAINTING Sats, FEB 24-APRIL 7
A seven-Saturday series offering a view of the Garden through painter's eyes. Judith Corning will introduce basic watercolor techniques for practice in the Garden. Beginners and all skill levels are welcome. She will provide information on materials, composition, color, and strokes over the sessions, as participants explore the most paint-able spots in the Garden. Meeting Room, 9:30am-12noon. $45 members, $50 non-members.

DRAWING PLANTS IN PEN AND INK Sat, MAR 3
Introduction to botanical illustration using pen and ink. Various approaches including hatching, crosshatching, stippling, and diluting ink will be demonstrated and taught by instructor Annette Goldberg. Meeting Room, 1:00-4:30pm. $15 members, $18 non-members, does not include materials. Limit 12.

CHINESE MEDICINAL HERBS Sat, MAR 10
Herbalist and licensed acupuncturist Barbara Wilt will again offer her popular class on principles of Chinese medicine. Yin-yang balance, five element theory, and the basics of Chinese medicinal philosophy will be complemented by a sample of medicinal teas and simple remedies for everyday health ailments. Meeting Room, 1pm-4pm. $12 members, $15 non-members.
BOOK REVIEWS

Plant Propagation

For a new gardener, one of the most satisfying discoveries is the field of plant propagation. Here one can cut free from the limitations of seed catalogs and nurseries to start one's own collection of unusual plants. At the Visitor Center we try to supply a wide selection of books about plant propagation, with titles for beginners, skilled amateurs, and professionals, in several price ranges.


These are two of the best down-to-earth references for the home gardener written by English authors known for their propagation skills. They were published in Britain before later distribution by American firms. Each book is well illustrated with drawings to show exact procedures which are explained in detail. Instructions include how to prepare and sow seeds, make stem and leaf cuttings, and do layering, budding, and grafting.

The format of both books is similar — clear layout and well-written "how-to" texts. However, Plants Plus also contains photographs and information on handling specific plants in various categories (cacti, succulents, shrubs, houseplants, etc.) Nearly every California gardener begins gardening with the Sunset Western Garden Book. As your gardening skills increase, you can add these two books to your bookshelf or propagating shed for further joy and discovery in the world of unusual plants.

—Elly Bade

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 642-3352, Mon.-Wed.-Fri. mornings.
CONTRIBUTIONS

New Members

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

Judy & Andy Adler  Richard M. Eakin
Paul Anderson  Marlene Jensen Eastman
Dr. & Mrs. Stephen Arnon  Marilyn W. Ehrlich
Donna J. Buesing  Stan Farwig & Vic Girard
Ray Colvig  Kathy Flynn
John Cummins  Marcia Gallo
George Dea and Janice Koyama  The Garden Conservancy

Robert E. Ghertner  Mr. & Mrs. Stephen R. Onderdonk
Luanne E. Gilbert  Roderic & Susan Park
John & Kitty Gurash  Dr. Robert Raabe
Holly B. Hanna  Margaret & Stephen Race
Lorraine Hasuer  Mrs. Cindy Rasicot
Doug Herman  Mrs. D.I. Robinson
Alan B. Hislop  Isabel M. Stampp
Eva Howarth  Julia Voorhies
Dr. Grace Hyde  Diane Wakelin
Richard & Betty Keatinge  Karen S. & Lynn Warner
John F. Kieser  Ken Weiner
Del Kimball  Dan Woodyatt
Taree Lyn Klausner  Nick Yoakum
Frank and Debbie Kluber
Donald Lindsdale
Livermore-Armador Valley Garden Club
Michelle Logan
Caroline McKee
Claude D. Meyers, Jr.
Mark Mischan
K.R. Oberhaus

In Memorium

The Friends offer appreciation and thanks for gifts from these donors in memory of Haruko Obata, for the Japanese Stroll Garden:

Mr. & Mrs. Hatsuro Aizawa  John & Victoria Mahon
Mr. & Mrs. W. H. Banks  Hoshito Miyamoto
Mr. & Mrs. Robert Barr  Mrs. Aileen Mohler
Barbara & Ed Barrier  Steward & Alice Nakano
Hilary, Valerie, & Mariece Batey  Yukio Nuriishi & Family
and Cecily Batey Muller  Mr. & Mrs. Fred Okuma
Mr. & Mrs. Glenn Brill  Mr. & Mrs. Bert Oldham
Bessie Chin  Col. & Mrs. P.B. Peabody
Rosaline & Douglas Crowe  Mr. & Mrs. L.H. Pharis
Kathleen & Daniel Date  Richard & Marjorie Reynolds
Takedo Enokida  Bernadine Prater
Michael D. Fejes  Larry A. Sauer
Mr. & Mrs. George R. Flannery  E. Y. Schelstraete
Mr. & Mrs. King Graf  Larry Self
Florence C. Holmes  Roger & Katherine Simpson
Kay Hom  Mr. & Mrs. Jerome J. Sincoff
Koichi Hosonome  Mr. & Mrs. Masahiko Suzuki
Mrs. Aiko Inouye  Harvey & Grace Suzuki
Marjorie Jackson  Mrs. Fumi Taniguchi
Arleen Jellinek  Leo Tataara
C.C. & Myra Jen  Toyoko Toppata
Pete I. Karamitsanis  Mr. & Mrs. Ted Tucker
Hellmuth, Obata, &  Mr. & Mrs. K. Uriu
Kassabaum, Inc.,  Mr. & Mrs. Nick Weisgerber
San Francisco office  Gordon & Joyce Wong
Tad Kikugawa  Koho Yamamoto
Dr. & Mrs. William Kiyasu  Mas & Yuko Yamamoto
Tadao & Grace Kogura  Ms. T. Zaima
Joe Korematsu
Mr. & Mrs. Susumu Maeda

Parry Manzanita
Arctostaphylos manzanita
Our thanks also for these donations given in memory of:
Irene Baker, from Bill & Barbara Donald, Bill & Eleanor Bade, and Dr. Baki Kasapligil
Clarinda Strickler Flehr, from Mary Shroter
Adolph A. Gotelli, from Duke & Marlene Leffler
Mrs. W. Laetsch, from Phyllis & Harry Agler

In addition to those donors mentioned in the last issue of the Newsletter, the following Friends have given to the Endowment for a bench in memory of Frantisek Wolf:
Stan Farwig & Vic Girard
James H. Jones
Mrs. T. ter Meulen
Mr. & Mrs. W.G. Waters
Myrtle Wolf

Grateful Thanks

The Friends wish to thank these donors who have made a substantial gift over and above membership:
Barbara & John Bellamy
Helen Bragg
Melvin & Genevieve Calvin
Elizabeth Hammond
Mrs. Edward A. Howard
James H. Jones
James H. Lattie
Lewis & Adele Lawyer
Mt. View Cemetery
(John Siegfried)
Roderic & Susan Park
Mr. & Mrs. Richard H. Peterson
Margaret Newell
Stephen & Kay Onderdonk
Robert & Evelyn Ratcliff
Mrs. & Mrs. James Robinette
Mary Schroter
Mr. & Mrs. James Uren
Jim Van Sicklen
Myrtle Wolf

New Life Member:
Ted Kipping

The Board voted Ted Kipping—Tree Shaper a Lifetime Member of the Friends, in recognition of his many hours of service to the Garden. Ted contributed many volunteer hours himself as well as donating work time of his employees in the service of the Garden.

One for One
Membership Drive

Our contest to double our membership is off to a good start, but we still have a long way to go. The point of this drive is to encourage each current member of the Friends to bring in at least one new member by the end of 1990, the Garden’s Centennial. Contest or no, we need 1200 new Friends to keep pace with the ongoing and impressive accomplishments of the Garden, supported by the current membership.

There is still time to compete for the first 100 days’ prizes. The last date for prize-winning is March 10th. The top prize is a $100 gift certificate from the Visitor Center to the person who brings in the most new members. Other prizes include special plants, choice seeds from the Garden’s seed list, a century plant, and the beautiful Alstroemeria posters.

—Jim Van Sicklen, Membership Committee Chair

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  ☐ Sponsor .................. $250
☐ Individual .................. $20  ☐ Patron .................. $500
☐ Family .................. $30  ☐ Benefactor .................. $1000
☐ Contributing .................. $50  ☐ Friends’ Circle .................. $5000
☐ Supporting .................. $100  ☐ New  ☐ Renewal

Name __________________________

Address __________________________

City/State/Zip __________________________

Telephone __________________________

Was your membership stimulated by a current member? ☐ yes ☐ no
If so, please list name: __________________________

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

Membership

The Friends of the Botanical Garden offers public education programs and provides independent funding to support the many needs of the Garden. You can enjoy and support the Botanical Garden year-round by becoming a member of the Friends of the Botanical Garden.

Membership benefits include:
- Newsletter
- Workshops, lectures, and tours
- Discount on Visitor Center purchases
- Discount on educational classes
- Early admission to Spring Plant Sale
- Volunteer opportunities
Calendar of Events

RAINFOREST RAP  
Weekdays, JAN 8-MAR 16
Introduction to rainforest biology, pollination ecology, and the Garden’s tropical collections for schools and tour groups.
Meeting Room, 9:30, 11:00am. Requires pre-registration.

A HUNDRED YEARS OF HISTORY  
Sun, FEB 4
Dr. Lincoln Constance, Professor of Botany Emeritus, will offer a historical perspective on the events and explorations that have shaped the Garden’s collections. Meeting Room, 12noon. Bring bag lunch, coffee provided.

PLANT EXTINCTION RATES  
Thurs, FEB 22
Niall F. McCarten, Environmental Consultant, will speak on the outlook for the future of California rare and endangered flora, co-sponsored with the California Botanical Society. Mulford Hall, Room 159 on U.C. campus, 8pm. Free.

WATERCOLOR PAINTING  
Sats, FEB 24-APRIL 7
Introduction to the basics of watercolor techniques with Judith Corning, who will discuss materials, composition, color, and strokes. Beginners and all levels welcome. Meeting Room, 9:30am-12noon. $45 members, $50 non-members.

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Sat, MAR 10
Principles of Chinese medicine including yin-yang and the five element theory. Herbalist and licensed acupuncturist Barbara Wilt will offer sample medicinal teas and simple remedies for everyday health ailments using commonly available herbs. Meeting Room, 1:00-4:00pm. $12 members, $15 non-members.

THE GARDENS OF PORTUGAL  
MARCH 16-30
Patrick Bowe will lead this Friends’ tour to historic gardens and museums in Lisbon and Oporto. The journey will take us through the Lima Valley and on to the nearby mountains and remote villages of the Peneda-Geres National Park to see the native Mediterranean flora.

RHODODENDRONS AT UCBG  
Sat, MAR 24
Hadley Osborn, Emeritus Director of Filoli Gardens and rhododendron enthusiast, will discuss the many unique species at the Garden, including those from Asian collections by George Forrest and Joseph Rock, among other explorers and botanists. Meeting Room, 12noon. Free.

THE BIOSPHERE IN CRISIS  
Sun, APRIL 8
The Garden will host Dr. Peter Raven, Director of the Missouri Botanical Garden, and Dr. Sylvia Earle, internationally known marine biologist, to address conservation issues in terrestrial and oceanic ecosystems. Fee, time, and location to be announced.

BIRDWALK AND BREAKFAST  
Sat, APRIL 21
Professor Robert Middlekauff, Centennial Chair and bird enthusiast, will lead a birdwalk through the Garden observing resident and migrant birds, breakfast afterwards. Meeting Room, 7:15am -10am. Members $20, non-members $25.

CENTENNIAL BIRTHDAY PARTY  
Sun, APRIL 22
This is a special occasion to celebrate the Garden’s Centennial with music, food, art exhibits, tours, special activities for children, and a birthday cake, of course! Garden Lawn, Meeting Room and all 33 acres, 10am-4pm.

For information on classes and events, call the Visitor Center, 642-3343.

Friends of the Botanical Garden
University of California
Berkeley, California 94720
Address Correction Requested

Plants are for sale at the Visitor Center all year  642-3343

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