Cover Painting
by Carol Foster 1994

The newsletter is published by the Friends of the Botanical Garden, a non-profit organization that provides support for the U.C. Botanical Garden. Articles may be reprinted with credit to the authors and the U.C. Botanical Garden. This special issue of the Newsletter features Carol Foster’s painting “Cactus in the Mist.” Carol is a Docent whose artistic abilities often benefit the education program, as she develops props for tours. Carol notes that she finds artistic inspiration on the Garden grounds.
HOW DO FLOWERS WORK?
A bird’s (and bee’s) eye view of pollination at the Garden

Flowers are the trading posts for plants and the various birds, insects, and animals that visit them. The flowers offer nectar, pollen, and additional inducements to visitors in exchange for cross-pollination. In order to attract the visitors, flowers act as nature’s advertisements: the particular color, shape and scent of a flower act as neon signs that exclaim “GET YOUR NECTAR HERE” to the passing bumble bee. Once the flower has attracted the visitor, it deposits pollen on the visitor’s body and the visitor leaves. The visitor finds another flower and inadvertently deposits pollen there, completing the sexual cycle and stimulating the second flower to produce seeds and fruits. Hence, the flowers with beautiful colors and odors that we enjoy in the garden serve as feeding centers for insects, birds, and animals and are the reproductive apparatus for the plants.

WHAT IS POLLINATION?
Pollination is the transfer of pollen from one flower to another so that the flower may produce embryos inside of seeds, these inside of fruits. The seed protects and nourishes the embryo, and controls its initial growth. The fruit is a protective package that encases the new seeds and aids in their distribution. The general process of pollination is as follows:

Flowers tend to be arranged so that the visitor must contact the pollen-producing part of the flower in order to reach the nectar. Hence, some pollen adheres to the visitor when it leaves the flower. The visitor carries this pollen as it searches for another, nectar or pollen-rich flower on which to feed. Then as the visitor probes a new flower, it leaves pollen behind on the sticky or fuzzy pollen-receiving surface.

A threadlike tube grows from the pollen grain to the young seeds, delivering sperm to the eggs within them and causing them to mature inside the ovary. As the seeds grow, the ovary matures in to the fruit and the remaining parts of the flower wither. The final product may be the cherry or peach we see in the grocery store.

THE SYNDROMES OF POLLINATION
Since flowers are immobile, they depend on birds, bees, butterflies, moths, beetles or wind for transporting their pollen. Flowers possess a set of characteristics specific to their pollinators. The floral requirements vary greatly from pollinator to pollinator and are easily identified. Hence, you can become an instant expert on pollination simply by knowing a few facts about floral characteristics of each broad category of pollinator!

HUMMINGBIRDS are attracted to flowers with the following characteristics:
- red colors (or orange and bright green)
- no fragrance
- no landing platform (hummingbirds generally hover while feeding)

BEES generally favor flowers with:
- blue or yellow colors
- patterns of lines, contrasting colors, or ridges that lead to the nectar
- landing platform
- sweet fragrance

Examples: blue salvias, snapdragons

BUTTERFLIES are attracted to flowers with:
- vivid colors, often pastels, or sometimes red
- flowers that look like upside-down witch’s hats with rims and narrow peaks
- long, thin tubes (Butterflies have long tongues!)
- flowers clustered
- mild sweet scent

Examples: heliotropes, phloxes

MOTHS visit flowers with:
- white or very pale coloration
- strong fragrances
- conspicuous silhouettes
- no landing platforms
- often very long, narrow tubes that contain nectar (up to about one foot!)

Examples: jasmines, nicotianas

BEETLES prefer flowers with these characteristics:
- white, meat-colored, or yellow-orange flowers
- large bowl-shaped flower (beetle bumbles into the bowl)
- no nectar (the beetle eats the flower or the pollen)
- heavy, sweet scent

Examples: tuliptrees, magnolias

WIND generally pollinates flowers with:
- small, greenish or drab colors
- no petals
- vast quantities of pollen
- ability to capture pollen floating in the breeze, usually with long, antennalike stigmas

Examples: grasses, oaks

Now that you are an expert in pollination, try to identify which method of pollination each flowering plant employs as you walk along the paths in the garden. Nature offers fascinating examples of how flowers have evolved their own version of "artistic license" to ensure pollination. A few particularly interesting flowers and their pollination mechanisms are described below. Now that you have a basic understanding of each pollinator's preferences in flowers, you might develop a greater appreciation for some of the flowers commonly appearing in the UC Botanical Garden, and for others you see wherever you go.
**ANTHRURIUM**

Many people associate the flower of anthurium with the tropics. With its distinctive red “flower” and yellow rat-tail shaped flowerering spike protruding from the center, it’s easy to understand why. However, this exotic flower has a common pollinator: the fly. 

Anthurium attracts flies by fashioning itself after a rotting piece of meat and presumably smelling like one at times (at least to a fly). Some flowers that attract flies even have petals that appear as though several flies are perched on them, giving the passing fly the impression that a feast of flesh is taking place. In reality, the true flowers of the anthurium are located on the rat-tail and are the hundreds of little bumps on it. The red part is a large leaf. Pollination occurs as flies attracted to the anthurium walk around the rat-tail (spadix) and pick up and deposit pollen as they tramp around on large numbers of the tiny flowers. This should supply you with good conversation material the next time you find an anthurium in the centerpiece! See anthuriums in the Tropical House.

**THE BUCKET ORCHID**

The bucket orchid (*Coryanthes* species) is both impressive in its construction and its method of pollination, creating intricate flowers which depend on trapping and releasing one species of uncommon bees to pollinate them.

The two petals at the base of the flower look like wilted butterfly wings and arch back to reveal an object similar to a bucket with steep sides. The bucket has a structure that looks like a mushroom growing out of it. Just behind the butterfly wings are two knob-shaped glands that secrete a liquid in a slow continuous stream down the sides of the bucket. After a shallow pool of fluid forms at the bucket’s base, the glands cease their secretions and a small, tunnel-like opening appears in the side of the bucket. On the ceiling of this tunnel are pollen clumps.

Bees attracted to the strong sweet scent of the orchid swarm around the flower and and on the rim of the bucket, gathering an oily substance. Occasionally, a bee loses its footing and falls in. In it’s struggle to find a way out, it finds a "step" to the tunnel and clammers toward the opening. The tunnel is snug and just as the bee thrusts its head through the opening, the tunnel constricts, holding the bee securely while the pollen clumps are glued in place. After about ten minutes, the bee is released. Once one bee has taken the pollen, other bees pass through unhindered unless they are carrying pollen from another bucket orchid. If the bee has pollen, a hook positioned on the ceiling of the tunnel picks the pollen off whereupon pollination is complete.

Though the chances of all these processes happening often are rather slim, when pollination does occur, the flower produces hundreds of thousands of seeds which are distributed by the wind. See a bucket orchid in the orchid collection displayed in the Rainforest and Succulent House.

**CALYCANTHUS**

*(Spicebush)*

Calycanthus, though an intricate-looking flower, has among the most primitive methods of pollination. Like the first flowering plants, Calycanthus is pollinated by beetles. The Calycanthus flower resembles steak in color. The flower has a cup into which a beetle bumbles, contacting pollen-producing and pollen-receptive parts of the flower. The flower offers no nectar. Instead, the beetle often must eat its way out of the flower! Look closely at the center of a calycanthus flower for special "food bodies" over the top of the bowl. See Calycanthus in the Eastern North American Area and in the California Area.

**IRIS**

The parts of the iris flower are intricately arranged to maximize the flower’s success in pollination. Pollinated mostly by bees, the iris flower offers three enclosed passageways that allow just enough room for the bee to squeeze through in its search for nectar. Notice the three tongue-shaped units that arch out of the flower's center: each "tongue" forms one passageway.

As the bee enters the passageway, a flap located on the interior roof of the passageway scrapes off pollen stuck to the bee’s back. Separate the two petal-like structures that form the passageway and take a look inside. You’ll find the tiny flap hanging down from the ceiling close to the passage opening.

Once inside the passage, the bee nudges itself forward to reach the nectar at the base of the flower, contacting the pollen-producing structures located deeper in the passage. By opening the passage gingerly, you can see the long pollen sacs, and can sometimes "pollinate" the tip of your finger.

When the bee backs out of the passage, the flap that had scraped off the pollen earlier folds up against the ceiling to prevent self-pollination by the new pollen just dusted onto the exiting bee.

You might wonder about the sharply contrasting colors on the lower petal of each "tongue." Notice how the part with the most color extends beyond the mouth of the passage. These colors serve as both attractants for bees and as guides to the nectar, just as lights on a landing strip guide an airplane to a safe landing. The petal protrudes from the tongue so that the bee may have a landing platform.

Use your finger to mimic the path a visiting bee might take inside the flower, noticing how the various parts of the iris work together.

The iris, incidentally, played a historic role in France, as it was the model for France's *fleur-de-lys*. According to one legend, the *fleur-de-lys* originated from a battle between the Franks, led by King Clovis, and the Goths in the early sixth century. Clovis saved his army from destruction by the Goths when he noticed yellow...
iris growing in the middle of the river. From this he deduced that the river was shallow enough to cross and led his army to an escape. Hence, the iris was honored as the army's salvation and became the symbol of the royal family. See splendid irises by the Japanese Pool.

**MILKWEED**

Milkweed (Asclepias) transfers its pollen conservatively, wasting very few grains. The flower, visited by butterflies (and other insects), has a flat, slippery top and slits on the sides which serve as access points to paired pollen clumps. The legs of the visiting insects slip off the top of the flower, into the slits where they catch on a string connecting two pollen clumps. The visitor carries these clumps as it flies to the next flower. Often, insects caught in meadows have such sacs on their legs.

As the pollinator alights on the next flower, its legs slip again into the slits, this time depositing the clumps of pollen into the cavity and completing the process of cross-pollination. You can attempt to achieve pollen removal with the tip of a sharp pencil. See milkweeds in the Eastern North American Area.

**MOTH-POLLINATED FLOWERS**

Moths, often derided for their sometimes bland colors and blamed for those small holes we find chewed out of our clothing, are a group that includes the more interesting pollinators. They have extremely long "tongues," (proboscises), which they use with superb marksmanship. They visit the sweetest-smelling flowers we use in our gardens and personal ornamentation, such as gardenia, jasmine, nicotiana, stephanotis, and white-flowered honeysuckles.

Flowers that employ moths as their main pollinators cater to their needs. By offering long tubes (up to one foot!) that contain nectar at the ends, they ensure only the right moths will visit their flowers, for pollinators with shorter "tongues" or too large to crawl into the thin tube will not reach the nectar. Since pollinating moths generally feed at night, the flowers must find some means of attracting the attention of their favored insects in the darkness. Flowers with strong, sweet scents we usually associate with night, such as jasmine, use their fragrance to attract moths. Some flowers even synthesize false moth mating hormones. Experiments show floral scents draw moths over great distances. Moth-pollinated flowers also have frilly edges or deep grooves that guide the way to nectar, casting a striking silhouette against the night sky. It's simple to identify which flowers in the garden are pollinated by moths just by looking at their white or pale coloration, seeing their profiles, and inhaling their perfume.

One of the more remarkable moth-pollination relationships is with yuccas. A single species of moth, known appropriately as the "yucca moth," has a co-evolved symbiotic relationship with yuccas. The moth gathers pollen from the showy white flowers and packs the pollen into a ball, carried by a special organ beneath the moth's "chin." The moth carries the ball to the recipient flower and packs it into a concavity, at the floral center effecting pollination. Why should the moth bother? It lays its eggs in the floral ovary, and the moth's larvae depend upon seed and fruit production for their nutrition. Look at yucca fruits to find the moth exit holes. Yuccas are scattered around the Garden. An easily examined clump is just west of the propagation house.
**SALVIA**

Salvia has a tricky means of transferring its pollen onto the backs of visiting bees. It’s secret for pollination is the use of a lever perched just above the entrance to the flower. On the upper end of the lever, just above the landing platform, resides the part of the flower that produces pollen. A bee climbing into the flower in pursuit of nectar pushes against the lever, causing the pollen-laden end of the lever to touch the bee’s back. Thousands of sticky grains of pollen rub onto the bee as it sucks up the nectar. When the bee leaves, the lever springs back into place.

After the pollen is taken, the levers wither. Then you will see a fine thread extending the length of the flower between the levers. The sticky, pollen-receiving tip of the thread touches the back of the bee, picking up the pollen that had been deposited there by the previous flower.

Most salvias are bee pollinated, as you can tell by the landing platform, nectar guides, and bluish color. However, some species, e.g., *Salvia officinalis* (a popular, bright red garden flower), are pollinated by birds, yet possess the same lever mechanism. Remove the lower petals of a flower in your own garden and try activating the lever mechanism with your finger!

**WATER LILIES**

Water lilies, those lovely, brightly colored and sweetly scented flowers that we often associate with the peaceful refuge of a pond, are actually among the most treacherous of flowering plants. They murder their pollinators. The water lily opens for three or four consecutive days, closing each night when the temperature drops. During the last few days of the flower’s life, the pollen-producing parts, which form concentric circles around the center of the flower, offer a bounty of sticky pollen that beetles, bees, and hoverflies find irresistible.

However, this is no more than a deceivingly perfect haven for pollen gatherers, for on the first day of opening, the water lily does not offer such a friendly face. Instead of the pollen-laden palisades around the center of the flower, the lily extends waxy, slippery spikes, devoid of pollen that surround a deadly pool of liquid. Insect visitors look for pollen on the inner spikes of the lily but lose their footing and drop into the pool and drown. Any pollen stuck to the back of the insect from previous visits to water lilies washes off in the pool and sinks to the bottom onto the pollen-receiving surface. The next few days the lily assumes a kindlier stance toward visitors, who leave dusted with pollen, only to fall into the trap of a different water lily flower. See water lilies in the Japanese Pool, and in the upcoming Aquatic Plant Exhibit.

This knowledge will help you understand flowers on a higher level as you walk through the Garden. It’s worth making another trip up to the Botanical Garden to test your knowledge on the flowers especially in the Mesoamerican section where the air is alive right now with bees and hummingbirds chasing each other from flower to flower.

———Jill Guenza, Lincoln Constance Interpretive Intern

**BOTANY BITS**

The Aztecs and Mayans used it for money. Europe didn’t have it until 1502, and it did not appear in candy bars until 1893, but last year the world used more than 2.4 million metric tons, consumed 4 billion pounds of the finished product, and the US. and Canada enjoyed 20 billion dollars in retail sales...Cocoa. One ounce of milk chocolate contains 6 mg of caffeine—little more than the amount in a cup of decaffeinated coffee. A milk chocolate bar 1.5 ounces contains more protein, calcium, and riboflavin than the same amount of pretzels. Each cocoa bean weighs about a gram, and it takes 35 grams of beans to make a 100-gram chocolate bar.

I keep referring to the cocoa bean, but it’s not a bean! The cocoa “bean” is actually a seed from the fruit of Theobroma cacao. Same thing with the coffee bean. It’s not really a bean; rather it is the seed of the coffee fruit. Doesn’t matter...did you know that the word “tree” is not a scientific term? Anything can be called a tree. Bamboo Tree or Tomato Tree. Still not confused?

Wild rice is not a rice and most of it is not “wild.” Rice is an aquatic grass in the genus Oryza. Wild rice is an aquatic grass in the genus Zizania, and most of it is grown in California, and is planted with airplanes.

Back to coffee. It was indigenous to Ethiopia, popularized in Yemen, introduced to Europe in the 1500s, and brought to the New World in the 1700s. Coffee was a constant concern to religious leaders in Europe, because of their view that coffee houses would breed disrespect. Perhaps they did. Lloyds of London began as a coffee
house. The city of Mocha in Yemen enjoyed the monop-
ooly of the coffee trade until the 1700s when coffee was
taken to India, Sri Lanka, and South America. Disease
devastated many coffee plantations throughout the
Indian subcontinent, and consequently tea was planted
in its place. The genus Coffea includes more than 70
species, but only C. arabica and C. canephora have com-
mmercial value.

Much of the world’s cashew crop is grown in Africa
and Madagascar and shipped to India where they
remove the nut from the hull by baking and then crack
the hull with a chisel in the same manner as a diamond
is cut. The nuts are then sent to the rest of the world.

Do you suffer from drinking red wine? Switch to an
aged vintage as tannins may be the cause of your
headaches. They precipitate as the wine ages.

Crush garlic cloves before you cook them. The oil is
released and the flavor is enhanced.

The marigold flower and leaves are edible. It’s great in
salads and easy to grow. Despite extensive use in Asia,
chile peppers are indigenous to Mexico, Central America,
and the Caribbean. Columbus brought the first chile pep-
ners to the old world and they spread, like fire naturally,
through the Middle East, Asia, and the rest of the world.
The chile pepper belongs to the family Solanaceae, as
does eggplant, potato, tobacco, and tomato.

In addition to the plants mentioned above, the old
world did not have avocado, cashew nut, corn, lima
bean, pumpkin, peanut, or sunflowers.

Peanuts are indigenous to Brazil and come from a
bizarre plant. After pollination, the flowers turn down
and grow into the ground, and the fruit (peanut) matures
beneath the soil. Incidentally, 36-46 percent of the peanut
is oil.

Where does honey come from? Bees eat the nectar
from flowers, regurgitate the mass (that’s the polite way
of explaining it), and evaporate some of the water. That’s
honey. Can’t get more natural!

Is rayon “organic?” It’s made primarily from wood
pulp!

Thank you Russ Bianchi and Professor John West for
supplying me with my chocolate wisdom.

----Krishen Laetsch

VOLUNTEER PROFILE...

JIM VAN SICKLEN

Garden regulars all know Jim Van Sicklen. Jim is a
regular himself, having been a very active volunteer for
the last 12 years. There are very few things he has not
done in the Garden. He first entered the scene in 1983,
right after he retired. He was a willing and dependable
worker, pulling weeds, digging holes, raking paths, and
learning as much as he could about plants to supplement
his pursuit of a certificate in Landscape Architecture at
Cal Extension. (He was awarded the certificate in 1984.)
He soon added the Visitor Center to his repertoire, work-
ing a shift or more each week.

In 1983, Jim became a Docent. Old timers will recall
the controversy that ensued when it was discovered that
Jim was routinely giving his tour groups jelly beans on
the Five Senses Tour. “Five Senses” is a tour for kinder-
garten and first graders, in which the Docents focus the
children’s attention on plants, using sight, sound, smell,
taste and touch. No wonder his groups were always so
enthusiastic!

When the Friends took responsibility for the Visitor
Center, Jim was at the forefront as “Chief Financial

Jim Van Sicklen

Officer,” paying the bills, balancing the checkbook, mak-
ing the deposits, and trying very hard to teach the buyers
the difference between a statement and an invoice.

Jim currently serves on the Board of the Friends of
the Botanical Garden, and the Friends Project
Development Committee, a natural, because of his inter-
est in garden design.

Jim is an East Bay native, and a Cal alum, Class of
’39. He served as an officer in the U.S. Navy during
WWII, and has the distinction of having traversed the
Panama Canal twice in the same direction, once on a bat-
tleship, and once in a PT Boat. After the War, he married
Winnie. They have three children: Jim, a dentist in
Stockton; Isabel, a family counselor in Modesto; and
Susan, a busy homemaker in Davis. Jim and Winnie are
great travelers and avowed francophiles, also painters.
Jim has been taking at least two painting classes a week
for years!

While Jim is no longer an active Docent, we keep
him on “reserve” status, and he dutifully attends Docent
activities. He has recently turned over the Visitor Center
checkbook to another volunteer, but is still an active force
in Visitor Center operations, and a willing substitute in
the shop. He often says it’s time for him to retire, but we
just won’t allow it.

-----Nancy Swearengen
FALL BOOKS
FOR THE HOLIDAYS

Two books being published this Fall will interest gardeners in the San Francisco Bay Area. One is HERB GARDENING, EVERYTHING YOU NEED TO KNOW TO DESIGN, PLANT AND CULTIVATE AN HERB GARDEN ANYWHERE IN NORTH AMERICA, because one of the four principal authors is Jerry Parsons who cares for our own herb garden at UC. Jerry and his three co-authors, representing a variety of local conditions and climates, seem to have enjoyed their job. It is almost as though all four of them sat down together to talk about the challenge and joy of working in their herb gardens. Reading the historical, botanical and horticultural notes accompanying the beautifully illustrated text is a little like sitting in on a conference of experts, each with different experiences, preferences, and knowledge. The textual information is well arranged, with sections on plants, plant selection, garden design and special horticultural techniques and requirements. There is a glossary, a plant index and a plant sources reference.

HERB GARDENING is one of four titles in the American Gardening Guides series published by Pantheon Books, Knopf Publishing Group. More than 30 respected gardens in North America are participating in this series, which covers how to design, plant and cultivate perennials, vegetables, herbs, shrubs and vines.

1. HERB GARDENING, EVERYTHING YOU NEED TO KNOW TO DESIGN, PLANT AND CULTIVATE AN HERB GARDEN ANYWHERE IN NORTH AMERICA; comp. by Cornell Plantations, Univ. of California Botanical Garden, and Matthaei Botanical Garden, in consultation with five other botanical gardens. Text by Patricia Hopkinson, Diane Miske, Jerry Parsons, Holly Shimizu; illus. by photos and drawings; Pantheon books, Knopf Pub. Group, New York, NY c1994; 224 pp., soft cover. $25.00.

2. VEGETABLE GARDENING; Calloway Gardens. Soft cover. $25.00.


The Mt. Diablo Interpretive Association is sponsoring the soon-to-be published PLANTS OF THE EAST BAY PARKS, by Glenn Keator. As population pressures have increased in the East Bay, the greater Mt. Diablo region has become an increasingly important (and greatly used) recreation and natural area. Naturalists have long described Mt. Diablo as a place where north meets south, and west meets east—an area where plants from southern California reach their northern limit, northern California plants reach their southern limit, and where coastal plants are found inland. This new guide is a long awaited up-to-date reference. A handy, backpack size, it includes an encyclopedia of over 200 plant species in the East Bay, sections on where to find these plants, descriptions of plant communities, and keys to trees, shrubs, vines, and wildflowers. The author is well known in the Bay Area and at UC Botanical Garden, having trained docents and having given workshops and courses.


BOOKS FOR CHILDREN

1. FAIRY DUSTERS AND BLAZING STARS, EXPLORING WILDFLOWERS WITH CHILDREN, by Suzanne M. Samson; illus. by Preston Neel; Roberts Rinehart Pub., Niwot, CO., c1994; 40 pp., $9.95. An imaginatively illustrated rhyming-memory book to introduce children ages 3-8 to wildflowers. Among the references used were SIERRA WILDFLOWERS, by T. F. Niehaus and A SIERRA FLORA, by N. F. Weeden.

2. THE SUNFLOWER, by Marliese Dieckmann; illus. by Christel Rosenfeld; text adaptation by Barbara J. Ciletti; Odyssey Books, Roberts Rinehart Pub., Niwot, CO, c1994; 22 pp., hardcover. $12.95. The story of the life cycle of a sunflower fruit dropped by a chickadee into a window box... and how a young boy then grows it to (in the end) feed the chickadee the next winter. Ages 3-8.


Remember, members of the Friends receive a 10% discount on all purchases made in the gift center.

---Elly Bade

Something New at the Garden---
Stop by the Visitor Center and try out some of our new brochures provided to help interpret the collections. Available brochures explain: the serpentine exhibit, Chinese Medicinal Herb Garden, Herb Garden, features of interest to children, legendary plants, pollination, and plants in human affairs.
The Indian summer commonly experienced by the Bay Area provides many afternoons to appreciate the beauty of the Botanical Garden. Taking a close look allows one to realize just how rich the collection is, and how much there is to explore. A good place to start an in-depth look is with the plant labels. A red dot on the lower left corner indicates that the species is rare or endangered. Conservation is a subtheme threaded subtly throughout the Garden, where there are some 500 rare, threatened, or endangered species, mostly in the California Area. Some of these were brought into the collection through the efforts and financial assistance of the Center for Plant Conservation (CPC), a national organization of botanical gardens dedicated to protecting rare species through protective cultivation.

The CPC has described its efforts as the “backstop against extinction.” The work accomplished by this organization is crucial to the preservation of plant biodiversity. While building a National Collection of plants, the CPC researches both the ecological threats and the economic uses of plants. A goal of the Garden as a member in the CPC is to educate—to allow our visitors to see and learn about the rare species most of us never have the opportunity to encounter otherwise.

Two particularly endangered species in the Garden’s CPC collection flourish alongside the main trail in the California section. These are the Catalina Island Mountain Mahogany (Cercocarpus traskiae) and the Alameda Manzanita (Arctostaphylos pallida).

With only seven adult plants surviving in the wild, the Catalina Island Mountain Mahogany, which is a member of the Rose Family and not a true mahogany, is the rarest tree in California. It is amazing there exists a tree species represented by only seven individuals, and it is additionally impressive to discover where and how these plants survive. As the name suggests, the Catalina Mahogany is endemic to Santa Catalina Island, a popular resort island off the coast of Southern California about 25 miles south of Long Beach. Catalina is one of the eight Channel Islands and is about 22 miles (35 km) long and an average 4 miles (6 km) wide. The Catalina Mahogany trees are confined to a canyon occupying a small portion of the island. They occur near the canyon bottom, where the soil is derived from a rock type (igneous saissurite gabbro) found nowhere else on the island. The Catalina Mahogany population, originally of more than 40 trees, was first discovered by B. Trask in 1897 and has since declined to the seven survivors. This decline is largely attributed to feral goats, sheep, and pigs, and to the introduction of bison and mule deer.

The Santa Catalina Conservancy has fenced off some of the plants to minimize the damage. However, long term threats still exist. Hybridization with the more common Cercocarpus betuloides var. blancheae could dilute Cercocarpus traskiae into extinction. This genetic threat is sometimes underestimated when protecting rare plants. Island plants are especially susceptible due to geographic and edaphic limits to their range.

Research into genetic integrity has proven inconclusive due in part to the limited genetic diversity of the Catalina Mahogany. In fact, research raises new questions. Among them is the question of the taxonomic status of the tree. Is it really a species or is it better interpreted as a localized variant of a more widespread species?

The next featured species is a local plant also on display in the California section. The Alameda Manzanita (Arctostaphylos pallida) is known to exist in only two isolated stands in Alameda and Contra Costa counties, forming a population of around 20 plants. In Alameda County the main stand can be found in the East Oakland hills on the summit of Huckleberry Ridge, and the Contra Costa stand lives at the top of Sobrante Ridge. The Alameda Manzanita is a chaparral shrub with narrow environmental tolerances. Among them are its need of bare, sterile, siliceous mineral soil, an intolerance of shade, a need of summer fog, and a typical chaparral need of fire.

The ability of the Alameda Manzanita to grow on bare minimum soil lessens competition from other plants. Additionally, the understory of the Alameda Manzanita is usually free of vegetation. This is attributed to the naturally herbicidal effect of toxins produced by roots, fallen
fruit, and leaf litter. These toxins even prevent the germination of the manzanita's own seedlings, but do not seem to affect mature plants. It is believed the removal of the toxins by fire permits germination of dormant seeds.

The main threat to the Alameda Manzanita on Huckleberry Ridge has come from the onset of branch and stem dieback beginning after the wet winter of 1982-83. Over half of the plants have been affected. It is believed to be the result of a fungus that attacks the root system when moisture in the ground is abundant but drainage is poor. The fungus apparently attacks the roots and deprives the branches of water.

Manzanitas on Sobrante Ridge experience a phenomenon called striping, which is the development of dead or decorticated areas on the branches and trunk. This is believed to be an adaptation to the absence of fire and is more commonly found in larger older individuals. The Manzanitas attain sizes which strain their ability to maintain their entire bulk, and consequently will shut down portions to continue growth in other portions. The Manzanita at the Garden demonstrates striping on the lower and larger branches. During periods of freedom from fire, new branches will make contact with the soil and root in deep leaf litter which would usually removed by fire. This method allows the formation of a new base where new branches can be sent to fight for sunlight.

Cultivated manzanitas on or near Skyline Blvd. and Golf Course Road in Tilden Park have experienced problems in the shade of pines and eucalyptus. The manzanitas experience striping as they compete for sunlight with taller trees.

The Alameda Manzanita’s adaptations to its narrow habitat appear to be rooted in its exposure to fire. Fire recycles nutrients, consumes allelopathic litter, scarifies seeds for germination, opens the canopy providing light and space for seedlings, and reduces pests and pathogens. A problem arises from the closeness of the manzanita stands to fire-free residential areas. As demonstrated by the Oakland Hills fire, the property owners near Huckleberry Ridge live in an area where there is a risk of catastrophic fire. It is believed that well planned fire management programs can help revitalize the Alameda Manzanita populations, and can help reduce the fire hazard increased by years of leaf litter accumulation. In 1987, the Alameda Manzanita Recovery program was started by the Park District and the California Department of Fish and Game to oversee the conservation of the Alameda Manzanita.

Research and conservation efforts for the Catalina Mahogany and the Alameda Manzanita will continue thanks to state and local agencies, the CPC, the UC Botanical Garden, and others. You will probably never see the Catalina Island Mountain Mahogany or the Alameda Manzanita growing wild, but you can enjoy them readily at the Garden.

----- Eric Umemoto, UC Student
If your landscaping plans call for California natives, prostrate junipers, or plants native to the Mediterranean, South Africa, or southern Australia, consider planting them just before or during the early winter rains. This will allow plants to become established so that by summer they will not need water at a time when they normally do not have rain.

Christmas tree buffs will be interested in research that has shown trees kept in clear water or water with "keeps-it-green" hold needles better than trees kept in other suggested materials. It is important to make a fresh cut on the bottom of the stem before putting it in water. If the tree base is kept in water, do not let it dry. This usually breaks the transpiration flow and no more water will enter the plant. Spraying the tree with an antitranspirant also may help. Be sure to choose one recommended for Christmas trees; others may be toxic. If you are a white fir fan and if you plan on keeping the tree up longer than usual, you may have an aphid problem. The aphids will not hurt the tree but may give off honey dew which can spoil ornaments. A good water wash or insecticide before taking the tree inside may help.

If you like to leave your tree up longer, choose one that has good needle retention. Of the trees available here, red fir, noble fir and white fir retain needles well.

If your tomatoes, peppers, eggplants or strawberries did poorly, it could be because of Verticillium wilt. This a common garden problem, and once the soil has the fungus in it, it will stay there a long time. Do not put infected materials in a compost pile unless using the rapid method. Avoid moving soil from such areas to other parts of the garden. Rapid composting, by the way, can be done through the winter, providing the bins can be covered so that the compost does not become wet from the rain.

A common leaf spot on evergreen pear, Indian hawthorn (Raphiolepis), and pyracantha results from infection by the fungus Entomosporium. On those plants it causes considerable defoliation. Loquat and toyon may become infected, but they're not damaged as much. The fungus produces its spores in a sticky mucilaginous material, meaning it's dispersed by splashing rain. Sprays of benomyl, timed so that plants are sprayed at least every two weeks but only before rains should aid in control.

Plants vary in their susceptibility to attack by snails. It would be interesting to create a list of susceptible and resistant plants. With your help, I will do that. A list will help in knowing where to use baits or traps more effectively. As susceptible, let's start the list with common amaryllis (Hippeastrum vittatum) and pineapple-lily (Eucomis autumnalis). Let's hear your additions to the list. Please send them to me c/o the Botanical Garden.

If you are looking for a holiday gift that will be meaningful and useful year-round, call the Friends Membership office at 643-7265. Many Garden memberships are given as thoughtful gifts, and the Membership office hears how much they are appreciated. You may charge a gift membership on your VISA card.
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In Honor

A memorial bench has been donated by Robert E. Kroll to the memory of his mother Thelma Emas Kroll.

At the August meeting the Friends Board voted Ned Gould Heringer as the newest Life Member of the Friends.

A gift from Elizabeth Hammond in honor of Lincoln Constance to support an intern at the Garden.

A bench has been donated by Carole Ferguson-Page in honor of her parents, Marie (Holmes) '44 and John Ferguson '43, on their fiftieth wedding anniversary.
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