

VOX DOCENTIVM

THE DOCENT VOICE

A NEWSLETTER BY AND FOR THE DOCENTS OF THE REGIONAL PARKS BOTANIC GARDEN. VOLUME 1, NUMBER 4. WINTER 2001

ENDANGERED PUBLICATION ALERT

Because Heather Marsters has had to cut back on her work hours and will no longer be able to coordinate the collection of articles, now is a good time for a new person to become involved with THE VOX.

Job description: Contact contributors (writers and artists), collect work, coordinate word processing for those articles that require it.

We already have a group of willing word processors. We want the job to be pleasurable, not daunting!

Contact either Jo McCondochie, 510-531-8122, or Celia Ronis, 510-526-0906, celiaronis@yahoo.com.

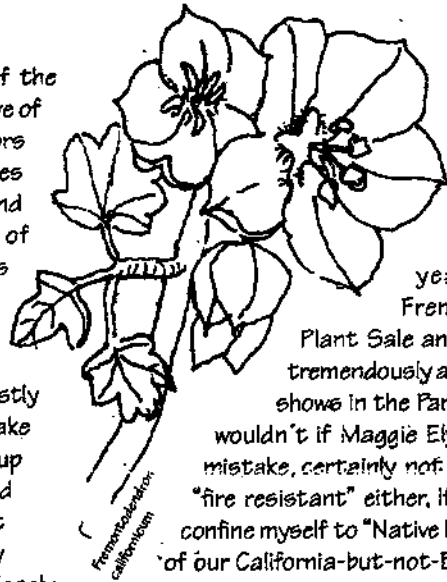
Jock's Corner

"ANDERSON HILL"

Twenty years ago the small hill on the north side of the Shasta Road entrance to Tilden Park sustained a grove of eucalyptus trees. Under them could be found survivors of the native plant community — melic grass and lupines by the side of the trail; poison oak, coyote brush, and brambles elsewhere; and a splendid growth of *Arctostaphylos pallida* facing Shasta Road. (But is this original? I suspect the hand of Jim Roof both here and along Golf Course Road.)

The eucalyptus trees presented a fire hazard of which Dr. and Mrs. Larsen, the nearest neighbors, were justly afraid. At last they persuaded the Park District to take the trees out, creating an open space much chewed up by heavy machinery and presenting a splendid seed bed of which exotic thistles took full advantage. By the first summer an area of nearly one hundred yards by fifty yards was covered with thistles six feet tall and so closely packed that it was impossible to move through them. Somebody (who?) asked Esperance what to do now, and she confidently replied: "Plant low-growing, fire-resistant natives."

But first something had to be done about the thistles, and for MONTHS (or so it seemed in retrospect; perhaps it was only weeks) I was set to work with an increasingly blunt sickle. Soon there was a lot of clear space below the trail, which Esperance began to plant up. The Larsens too had worked valiantly and installed a temporary watering system which kept the earliest plantings alive until the rains. Now would have been the time for a Master Plan. Unfortunately our combined resources only allowed for a few plants at a time — except for what kind people gave us — Jenny Fleming's pink onions still brighten the trail side every spring, and Margo Gwynn's big sword fern lends interest to the north face. Not far off is the one survivor of the leatherwoods grown from seed presented by — I think — Bert Johnson. Mostly though we bought shrubs — sages, silk-tassel, coyote mint, and flowering currants as we could afford them and planted them haphazardly. Then I discovered, to my subsequent regret, an endless supply of matilija poppies (poached egg plants as we botanists call them) growing on a vacant lot whose owner was prepared to give us as many as we were prepared to take. I was protesting to Esperance, not merely because "my task" (the thistles) "exactly is performed, but here's MORE work", but



because the wretched things spread EVERYWHERE, and every time I tried to check them she scolded me for rooting up her favorites.

About the end of our second year there were A LOT of small *Fremontodendrons* left over from the Plant Sale and we took them all. They have grown tremendously and are now one of the best late Spring shows in the Park, though I say it who shouldn't (and wouldn't if Maggie Ely didn't say so too). But they are a mistake, certainly not "low growing" and I would guess not "fire resistant" either, if I had it to do all over again I would confine myself to "Native Here" like Charlie Danielson does. Some of our California-but-not-Bay-Area mistakes are not really our fault; *Salvia leucophylla* we honestly believed belonged in Tilden Park because of the splendid growth at the head of Big Springs Trail. Jim Roof again! As for REMOVAL of locally flourishing natives, people who complain about the Poison Oak along the upper trail should have seen it before there was an upper trail. "If you'd seen these roads before they were made..." In those days I was still immune and ripped up masses with my bare hands until I had come within a few yards of the peak. But Esperance stopped me before I finished the job. On the very highest rock a cock quail used to stand every day, monarch of all he surveyed, watching over the welfare of his family in the poison oak below. So I was very properly forbidden to break into the quail's home.

I am now too old to do much more. Sue Rosenthal has organized some successful work parties, but the job of keeping the trails open has really passed to the professionals. Let me conclude by expressing my gratitude to Ed Leong and his crews.

Jock Anderson

Note to new docents: Es Anderson, Jock's beloved wife, passed away on April 15, 2000. She had been a devoted plant sale volunteer at the garden since the 1970's. As well as loving native plants and gardening, she was also a lover of horses, dogs, birds, butterflies, and grandchildren. She is utterly missed.



Jo McCondochie

Ione Barrens and Chaw'se

An eager group of early-rising docents joined Steve Edwards at Clement, CA on a hazy, golden October morning. From there we drove onto the Department of Fish and Game Preserve at Ione Barrens, where George Hartwell (former "native vegetation coordinator" for Caltrans' Office of State Landscape Architecture) waved us down and guided us in — disguised entrances being, he claimed, a key to environmental success in Amador County!

The soil of the Barrens, which represents the eastern rim of an Eocene era tropical sea (the western rim of which emerges in the Pygmy Forest area of coastal Mendocino) is highly acidic and virtually sterile. Almost all nutrient value was leached away during heavy rains over the last 35 million years, leaving a white powdery residue with a very high aluminum and iron content. That anything grows here is amazing — but two endemic species thrive.

One is *Arctostaphylos myrtifolia*, low growing and bushy, with small brightish green leaves on reddish stems which have a white, waxy coating, and the other is, *Eriogonum apricum*, a tiny mounded plant with miniscule pink flowers and typical wishbone branching. Ants are the pollinators of both. A great service is done for the *Arctostaphylos* by a lichen (*Cladonia*) which grows underneath the plants and, when burnt by fire, produces huge amounts of aluminum. The ash makes a perfect

environment for the germination of fire-scarred seeds.

Our next stop, via Jackson, was Chaw'se (the Miwok word for grinding rock) where we visited first the superb regional Indian museum. The museum was designed to reflect the architecture of a traditional roundhouse and to demonstrate,

through its outstanding collection of artifacts, both past and present native American skills. Steve used the "hands on" area to teach us about native American music, diet, games, beliefs and everyday activities, so that the landscape round us came alive.

Nearby, in a central meadow studded with the huge valley oaks that once supplied the Miwoks with acorns, is preserved the great horizontal limestone outcropping (Chaw'se) with its thousand-odd mortar holes — a stunning testimony to the vigor of the past. After dark, our flashlights

illuminated the ancient petroglyphs (circles, spoked wheels, wavy lines, bear paws and other animal and human tracks) which had been chipped out of the rock with pieces of quartz. Steve demonstrated a "magical" or sacred quality of quartz by rubbing together two flat pieces making them glow in the dark!

When one adds our exploration of the restored Miwok village, our half-mile walk through regenerating forest on one of the Chaw'se trails and dinner in Jackson, this was indeed a full and perfect day!

View From Within

Ione and white-leaved.
Two distinct Manzanitas
Living, side-by-side
in knife-edged Balance.

On Eons of stark, dry-docked Marine soils.
Ageless relationship
Freeze-framed
for our personal.

Caught and released.
Who are we against

Kate Partridge

Alison Rayner-Hooson
Jo McCondochie

Advanced Docent Training

Advanced docent training this year will consist of a series of four Monday field trips to local natural habitats in the Bay Area. We will focus on learning to identify plants in their winter condition; learn about mosses, ferns, and lichens; observe plant adaptations; and recognize plant communities.

Dates

January 14, 21, 28, and February 4. All Mondays, meeting at 10 a.m. and going to 1:30 or 2:30 p.m.

Cost

\$60. You can also sign up for individual sessions at \$20 each.

Schedule

January 14. MT. DIABLO

January 21. MONTARA MOUNTAIN

January 28. DIABLO FOOTHILLS PARK

February 4. HUCKLEBERRY PRESERVE

If you are interested in participating contact Glenn by phone (510-527-9802), mail (1455 Catherine Street, Berkeley 94702), or e-mail (gkeator@aol.com). Please send checks to his home address.

Hidden Treasures and Docent Delights:

Tips for Tours from the Docents' Reference Collection

Look in the "Docent Supplies" and "Docent Interpretive Aides" cupboards under the displays in the auditorium, and in the glassed-in case in the lobby, for these helpful materials:

FIND a plant that matches the picture, an idea from *Sharing the Joy of Nature*, by Joseph Cornell, a member of the Ananda World Brotherhood village near Nevada City. The "Path to Knowledge" tour exemplifies his spiritual approach.

ASK what does Mother Nature give so plants and animals can live? *Nature Loves a Detective* is an activity book from the Santa Barbara Botanic Garden.

TWINE In *Native Plant Fibers Used for Cordage*, docent Susan Bolton shows uses of dogbane, milkweed, evening primrose, iris and hemp fibers (with samples), and provides information about other traditional Indian arts and crafts.

FEEL *Activities for Docent Tours* is a collection of ideas in a blue pressboard binder. The Sensory Tour uses the "scientific equipment" of smell, hearing, touch, etc. Learn to see differences: smooth-rough, dull-shiny.

GROW *Garden Crafts for Kids*, by Diane Rhoades has many wonderful projects — cold frame, bathtub garden, worm farm and seed caddy — that could be done at home or school. The toilet paper seed tape project might be done here at the garden.

COOK *Protectors of the Land*, by Burrill offers lessons in how to cook with sunlight (p. 264-265) and a recipe for acorn mush (p. 166). Does Black Oak mush taste the best? (p. 96)

LEARN *The California State Environmental Education Guide* (1988) offers curriculum ideas for use in schools. See the life cycle of a plant on p. 37. (Also look over *Environmental Education in Botanic Gardens: A Resource Guide* by docent Irene Winston.)

FIND a large plastic tub of teaching aids containing a soaproot brush, a clapper stick, baskets and flutes, and a digging stick (actually outside the tub) all made from California native plants. It is located in the "Docent Supplies" cupboard. These are useful for demonstrating native uses of California plants.

Nancy Smith

gravel
for acorns



NEW MATERIALS FOR DOCENTS

A small but dedicated group of docents spent many moons collecting ideas and information for use in garden tours focusing on specific themes. Their wonderful creative efforts have been collected in a binder, "Theme Tours for Docents," which is now available to all docents.

There are four "theme tours" included in the binder: Indian Plant Uses; Pollination, Seeds, and Reproduction; Plant Adaptations to Habitat; and Sensory Exploration. Each theme tour includes information about several plants in each section of the garden that can be used to illustrate the particular theme, as well as a map to the individual plants and a list of references. Although this information lends itself well to group tours that focus on a single theme (such as school tours), any of it can be used on regular weekend tours. Over the next few months, we will be introducing the various theme tours in docent enrichment sessions.

Many thanks to Gert Allen, Jock Anderson, Ron Clendenen, Jo McCondochie, Miriam Pollock, Celia Ronis, Neta Villalobos-Bell, and Irene Winston (editor's note: and to Sue Rosenthal) for their excellent work in creating the tours and to Janet Herben for moral support and the all-important task of producing the binders.

The theme tours binders are being offered to all docents (please, only one per docent) for a donation of \$10. If you would like a binder, please call Janet Herben at 510-524-7972. If you would like to help develop further theme tours, self-guided tours, or materials for teachers to use before and after tours, please contact Sue Rosenthal at 510-547-0433 or rosacalifornica@earthlink.net.

Sue Rosenthal

Did You Know?

The following interesting facts were garnered from a wonderful book entitled, *Gardening With a Wild Heart*, by Judith Larner Lowry.

Wilson's warblers, and Swainson's thrushes, those forest birds who sing in wonderful ascending, liquid spirals, build their nests in elderberry and sword fern near coastal creeks.

Wrentits, chaparral dwellers with descending "ping-pong-ball-like" songs, build their nests from scrapings of California sagebrush bark, bound together with cobwebs.

Hollywood was named for the toyon that grew in the hills in that area. (Toyon's more common name is California Holly.)

"Indian paintbrush...hosts a particular kind of aphid-eating mite. This mite lives in the flower, where it eats nectar, till a hummingbird comes along to share the nectar. At this juncture, the mite runs up the hummingbird's beak and into its nostril, where it sits tight while the hummingbird flies down to Baja California. As the hummingbird approaches a nectar-producing plant, the mite gets ready, rears up, and races from the nostril, down the beak, and into the flower. Since it must move so quickly this creature is equal in speed to the fastest animal on earth, the cheetah."

I hope these little stories will help to spice up your tours!

Heather Evergreen

A Lovely Day

The weather was extra sultry and unusual the day of the annual docent gathering mid-October. We were in need of protection from intense solar rays, and Sue chose the right spot — under the giant sequoias. There was room for all twenty-five of us (including several docent trainees), three large tables and two large tarps on the ground to sit on and be quite comfortable. There was a good balance of salads and desserts (doesn't happen all the time) and good convivial feelings and conversation. It was a lovely day we all felt. Something a little special.

Kate Partridge

A Personal Problem

Attention: Docents and Docents-in-Training

I became a docent because of my love of and interest in plants and nature. As I sat in lecture and listened to Glenn, somewhere along the way I realized I too, was going to have to stand up and talk about the plants. My insecurities started to surface. Next came the phone call from Janet. I signed up for my tour and started to worry. Little did I know when I started the program that the bull-horn would cause me to break out in a cold sweat. If you find yourself in the same predicament as me, the solution doesn't have to be "abandon the garden":

Every Thursday morning from 9:00 to 12:00 a great group of plant lovers meets at the garden to work in propagation. We do everything from potting-up plants to starting cuttings, and we even do some weeding, etc. There is great camaraderie and always something new to learn.

Also the garden "Friends" can always use help in doing the many jobs of the organization. And the garden staff might even let you get dirt under your fingernails.

So — if this sounds like a personal problem to you, it is. One or two times around the block (garden) with a trusty mentor and you may be on your "touring" way. But if, like me, you break out in a cold sweat before a tour and feel you need a stiff drink, there is hope! THE GARDEN IS A WONDERFUL PLACE. FIND YOUR NICHE AND ENJOY.

Dede Heath

Have you seen?

The next time you are in Tecate, CA be sure to visit the Peninsula Range in San Diego County to see a grove of Tecate Cypress! Alternatively, you can see this beautiful tree in the Southern California Bed 13 of the garden, practically under the Grey Pine. *Cupressus forbesii* is notable for the color and character of its bark; the bark sheds like a madrone or manzanita and the under colors are red and green. After a rain it is especially lovely.

Jo McCondochie

Sudden Oak Death

In the last 50 to 100 years, several serious diseases have decimated populations of native trees in the United States. These include Dutch Elm Disease, American Chestnut Blight, Pine Pitch Canker, and Port Orford Cedar Root Disease. Now we in California are faced with the threat of Sudden Oak Death, perhaps the most devastating disease of all. Since it was discovered in 1995, this disease has killed hundreds of thousands of oak and tan oak trees in ten mainly coastal counties of central-northern California (now including Alameda County) and a small area of southwestern Oregon.

On November 10, the Friends of the Regional Parks Botanic Garden sponsored a presentation by Dr. Matteo Garbelotto on Sudden Oak Death. Dr. Garbelotto is a forest pathologist with the U.C. Cooperative Extension; an adjunct professor in the Department of Environmental Science, Policy, and Management at U.C. Berkeley; and a leading researcher in the effort to understand this new disease. His talk covered many aspects of Sudden Oak Death, including the plants it infects and the symptoms they show, its current geographic range, its ecological effects, the biology of the disease-causing organism, and experiments with treatments and controls. Although research on Sudden Oak Death began less than two years ago, our understanding of the disease is growing rapidly thanks to the efforts of Dr. Garbelotto and his colleagues. Many of their findings are somber and profoundly disturbing, but there is also hopeful news coming from their experiments with treatment and control measures.

Sudden Oak Death is caused by a fungus-like brown alga in the genus *Phytophthora*. Other species of *Phytophthora* have been responsible for the Irish potato famine and Port Orford Cedar Root Disease. The Sudden Oak Death pathogen (or disease-causing organism) is a new species and has been named *Phytophthora ramorum*. It is transmitted from plant to plant by spores, which are produced in huge numbers during the rainy season. These spores move in soil and rain splash and possibly also through the air.

Although Sudden Oak Death was first discovered in coast live oaks (*Quercus agrifolia*) and tan oaks (*Lithocarpus densiflorus*), it is now known to infect a number of other plants. The list grows almost weekly and currently includes California black oak (*Quercus kelloggii*), Shreve oak (*Quercus parvula* var. *shrevei*), madrone (*Arbutus menziesii*), bay laurel (*Umbellularia californica*), buckeye (*Aesculus californica*), bigleaf maple (*Acer macrophyllum*), common manzanita (*Arctostaphylos manzanita*), California rose-bay (*Rhododendron macrophyllum*), western azalea (*Rhododendron occidentale*), toyon (*Heteromeles arbutifolia*), pink honeysuckle (*Lonicera hispidula*), evergreen huckleberry (*Vaccinium ovatum*), and California coffeeberry (*Rhamnus californica*). The Sudden Oak Death pathogen also has been found in ornamental rhododendrons and viburnums in Germany and The Netherlands. In California, Sudden Oak Death has been found only in wildland plants or those in developed areas that border wildlands, with the exception of some ornamental rhododendrons in one Santa Cruz County nursery.

Among the affected plants (hosts), so far only the oaks and tan oaks are known to be killed outright by the disease. The pathogen penetrates the intact bark of these trees, enters their

vascular cambium (the water- and nutrient-conducting tissues), and girdles them by colonizing the cambium in a ring, thus preventing the movement of water and nutrients. An entire tree may turn brown and die very suddenly, and it is from this symptom that the disease gets its name.

The other plants infected by Sudden Oak Death are mainly foliar hosts, meaning that the disease infects their leaves or small stems but in most cases does not kill the entire plant. The spores that transmit *Phytophthora ramorum* are produced on the leaves of the foliar hosts. This characteristic is particularly troubling in evergreen foliar hosts like bay laurel, because their leaves persist throughout the rainy season when the pathogen is most active and thus provide a huge "reservoir" of the disease.

Along with the devastating news of more host species and more infested counties comes hopeful news of experimental treatments that seem to have some effectiveness in protecting individual trees. These include a trunk-coating compound that prevents spores from penetrating a tree and an injectable antifungal agent that boosts a tree's resistance to the pathogen. These treatments are not yet developed for general use and are not suitable for treating large wildland areas, but they are early and promising signs that the disease may be at least partly controllable.

In the meantime, there are things we can do as individuals besides wring our hands and mourn the loss of our beautiful oaks and the ecosystems they support. First and foremost, we can educate ourselves. For more information about Sudden Oak Death and ongoing research and monitoring efforts, visit the web sites of the California Oak Mortality Task Force (www.suddenoakdeath.org) and Dr. Garbelotto's lab (www.cnr.berkeley.edu/garbelotto) or contact your county's Cooperative Extension advisor. We can also take steps to avoid spreading Sudden Oak Death ourselves. Thoroughly wash soil off your shoes, pet's paws, bicycle and car tires, etc., when visiting areas infested with Sudden Oak Death and do not move plant material such as firewood, leaves, cuttings, mulch, or green waste out of those areas.

The role of humans in the transmission of this disease remains to be seen. But our manipulation of nature through fire suppression, development that encroaches on wildlands, human traffic in and around forests, global trade in nursery plants, and widespread movement of wood and green waste may not be without serious consequences. There is much to be learned about Sudden Oak Death, including perhaps some hard lessons about our human impact on the natural environment.

Sue Rosenthal

Threads from the Web

The Friends' web site gets e-mail (www.nativeplants.org) and Nancy Mulvany answers it, if it seems interesting! Recently a request came from the head gardener at the University of Durham in northern England asking where to get seeds of California Native plants. Nancy's response was to mail a packet of *Eschscholzia californica* seeds with instructions.

A few months later Nancy received photos of brilliant California poppies growing in an English garden and providing images of much appreciated sunshine!

J.McC.

Additional Resources on California Indian Culture

In recent months docents have been inspired by a number of excellent programs concerning California Indians. These have included the field trip to Chaw'se (the Miwok grinding rock site) and the engrossing presentations by Regional Park rangers Bev Ortiz and Norm Kidder (as part of the new docent training). This issue of the **VOX DOCENTIUM**, also mentions the box filled with teaching aids made from native plants found in the docents' cabinet, docent Sue Bolton's handbook on making cordage, and the new "theme tour" binder which includes a tour of the garden centered around Indian uses. If you are interested reading more about Indian uses of native plants I'd like to suggest the following books and article:

Early Uses of California Plants by Edward K. Balls (U.C. Press, 1962).

Indian Life of the Yosemite Region: Miwok Material Culture by Samuel A. Barrett and Edward W. Gifford (Yosemite Association, 1933).

It Will Live Forever: Traditional Yosemite Indian Acorn Preparation by Beverly Ortiz, as told by Julia F. Parker (Heyday Books, 1991).

"A World of Balance and Plenty: Land, Plants, Animals, and Humans in a Pre-European California" by M. Kat Anderson, Michael G. Barbour, and Valerie Wentworth in *Contested Eden* (U.C. Press, 1962).

Celia Ronis

Seedy Friends

'All is safely gathered in 'ere the winter storms begin' we would sing lustily at harvest time' (everything done in the nostalgic past was done lustily).

The Seedy Friends, the group who gather seeds in the garden, is almost finished collecting for this year but still need help cleaning, labeling and packaging the harvest. The group meets the third Monday of the month at 10 a.m. Contact Jean Atejevich at atejevich@earthlink.net and give her an e-mail address, or phone Carrie Sprague at 848-44690. Help is needed and you will be welcomed.

About This Issue of **VOX DOCENTIUM**

Editorial - Heather Marsters (a.k.a. Heather Evergreen)

Design - Jo McCondochie

Production - Celia Ronis

And many thanks to Susan Bolton, Wen Hsu, and Ron Sipherd for their help with the word processing.

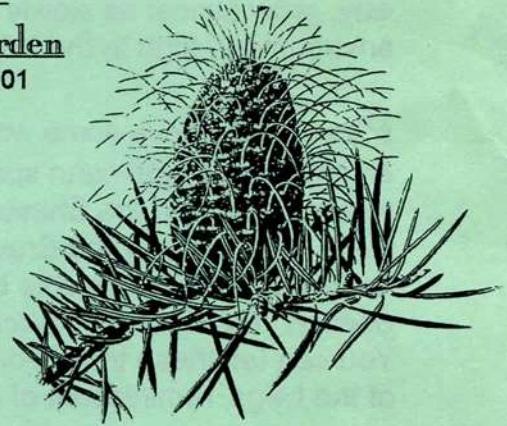
About The Drawings

The illustrations in this issue were drawn by Jo McCondochie.

Contact Celia Ronis or Jo McCondochie if you would like to contribute to the next, or a later, issue. The present intention is to prepare an issue for each season.



Conifers (Coniferophyta)
of the Regional Parks Botanic Garden
Heather Evergreen (Marsters) December 2001



General Characteristics:

- ◆ Evergreen (usually), needle- or scale-like leaves
- ◆ Hard or papery seed cones with woody scales
- ◆ Non-woody pollen cones

Selected Genera in the Garden:

Abies ◆ The most magnificent fir in the garden is ***Abies bracteata***, the Santa Lucia, or bristlecone fir. This is the most unusual fir in the world, having large, sharp needle-like leaves and cones with long, spine-like bracts that curve out from each of their scales (see illustration above). There are distinct white, waxy stripes on the backs of the leaves, and the new growth in spring looks so white that from a distance it appears as if there is a dusting of snow on the ends of the branches. I hope you all know the amazing story of the reintroduction of this tree, from the garden, back into it's limited home range. If not, I would be glad to share it with you. This fir is a rare species, found naturally only in the Santa Lucia range in a strip about 13 miles wide and 55 miles long. You will find two towering groves in the Santa Lucia section of the garden. Some other true firs to look for include ***A. concolor***, white fir, ***A. amabilis***, Pacific silver fir, and ***A. lasiocarpa***, subalpine fir, in the Shasta Section, and grand fir, ***A. grandis***, in the Rainforest.

Calocedrus ◆ Incense cedar, ***Calocedrus decurrens***, has ribbony, cinnamon-red, tannin-rich bark. Rather than the flat sprays of other "cedars", this species' fans out in all directions, appearing spiky, and to me is reminiscent of antlers. Young incense cedars are almost pyramidal in shape, while the older trees become rounded and flare out at the base of the trunk. ***C. decurrens*** can be found all over the Sierra Nevada, down into southern California, and up into Oregon. In the garden you will find three small trees in the Sierran Section, near the southwest corner of the fence. A larger specimen towers above the north lawn along with the pines that line the western edge.

Cupressus ◆ Several Port Orford cedars, ***Cupressus*** (*Chamaecyparis* on the garden tag) ***lawsoniana***, can be found in the Rainforest, Redwood, and Shasta Sections, offering their layers upon layers of soft, fern-like sprays. Last spring, the tree in the Rainforest Section, down slope from the California nutmeg, was enchanting, tinged with its tiny pink pollen cones. One of the things I like to do on a tour is to compare the Mendocino, or pygmy, cypress, ***Cupressus goveniana ssp. pigmaea***, with the Bristlecone Pines across the driveway from it. The pygmy cypress is endemic to the Mendocino White Plains, where, because of lack of soil nutrients, soil acidity almost as low as vinegar, and a hardpan just below the soil surface, it reaches only 1-2 meters in height. Obviously this species is not genetically programmed to grow slowly, since the garden specimen is quite tall, and it is fun to ask visitors to read the label under the

tree that calls it "Pygmy Cypress". In contrast, the western bristlecone pines across the way, grow almost as slowly here in the rich soil of the garden as they do in their harsh environment, high in the White Mountains.

Picea ♦ We have some wonderful spruce trees in the garden, including two rare and endangered Engelmann spruce, *Picea engelmannii*, standing just outside of the visitor's center in the Shasta/Cascade Section. Their prickly leaves radiate around the twigs. Not far away the Brewer or weeping spruce, *P. breweriana*, bristling with softer leaves, relaxes its flexible branches in preparation for heavy snows. In the Rainforest Section you will find *P. sitchensis*, Sitka spruce, near the grand firs on the upper path. You can tell these trees from the other conifers in the section by the jointed appearance of the twigs, reminiscent of cholla cactus.

Pinus ♦ I recently discovered *Pinus contorta ssp. bolanderi*, beach or Bolander pine, a subspecies of lodgepole pine that grows with pygmy cypress and Bishop pine, (both closed cone conifers) on the Mendocino white plains. This subspecies has heavy, often serotinous cones and dark furrowed bark, rather than the small, dry cones and light, flaky bark of *P. contorta ssp. murrayana* (*P. murrayana*, on the garden tag). You can see *ssp. bolanderi* at the west gate, *ssp. contorta*, beach or shore pine, (*P. contorta* on the garden tag) at the Sea Bluff Section side of the main bridge, and *ssp. murrayana* on the west side of the pond, among the quaking aspens. Walk along the lower path of the redwood section, to near the WPA steps, to see the Bishop pine, *P. muricata*. Another interesting member of this genus that you may not have noticed is Torrey pine, *Pinus torreyana*. Several of these trees grow up slope from the back greenhouse/office in the northern Channel Island Section. They are tall and wispy with long leaves that are rough and triangular. Torrey pine is a rare southern California endemic. Two species are now recognized per the Jepson, *torreyana* and *insularis*.

Sequoia ♦ Inside the circle of redwoods (at the bench) is a great place to end tours. Gather your group into a circle, and ask them to hold hands, close their eyes, bend their heads back, then open their eyes to a cathedral-like view into the canopy. This never fails to elicit "oo's and ahh's" from the visitors, no matter what ages they are. The redwood grove is also a great place to talk about adaptations for fire, flood, and drought. The redwood, *Sequoia sempervirens*, has spongy bark with lots of tannin, both fire retardant characteristics. Latent buds, which are found all along the length of the trunk, wait for a flood to deposit new silt around the bottom of the tree, and then sprout new roots into this nutrient rich soil. And fog drip can add up to 10" of rain per year, keeping these moisture loving trees alive during our long dry season.

Tsuga ♦ In the wild, Western hemlock seedlings must have decaying logs to grow on, and they prefer douglas-fir. When mature, they appear "stilt-rooted". This species, *Tsuga heterophylla*, has the most delicate cones of any conifer in the garden. I like to compare their cones, and their needles which grow in uneven lengths along the twigs, with other conifers'. There are several of these trees on the middle path in the Rainforest Section. Conversely, the Mountain Hemlock, *T. mertensiana*, has long, spruce-like cones, and bristling needles, both traits uncharacteristic of the genus. The acclaimed beauty of this species is demonstrated in two petite specimens on the east side of the lodge, with delicate, bluish needles, and elegant branches, absent of cones.