ADVANCED Organism Information for A.R. Docents rev. 6.1.23

This document provides background information about many organisms found at Armstrong Redwoods and Pomo Canyon. As a docent, do not feel that you need to know all of this information in order to successfully help visitors learn about and appreciate our wonderful redwood forest. Start with the basics and build your knowledge over time.

The Organism Cards are divided into two major groups. Docents should become familiar with the **BASIC** Organisms first. They are the most common organisms that visitors will notice at Armstrong Redwoods. They are in a different document.

These **ADVANCED** Organism Cards provide information about other organisms, including some found in Armstrong Redwoods SNR on the hillsides around the canyon, in Austin Creek SRA, in the Willow Creek/Pomo Canyon area, and along the coast.

A caution: It is good for a docent to have lots of knowledge. We must, however, not yield to the temptation to be just a lecturer…a "sage on the stage." Our purpose is not just to inform. More importantly, our purpose is to help people come to love and understand the habitat and to care for it so that they want to become stewards… caretakers. Your job is not to be a font of knowledge. It is to be someone who helps people develop an appreciation and understanding…a "guide on the side".

And…rather than just telling facts and names, we should be encouraging people to think and wonder. One way to do that is to ask them questions and encourage them to try to figure out answers.

The following pages include photographs and information about many of the organisms that one might find in Armstrong Redwoods or the Willow Creek/Pomo Canyon area. The images and information are laid out in such a way that you can print a page and then cut it into two 5" x 7" sections, glue them back-to-back and then laminate them so that you can easily carry them with you as you learn about the organisms.

This is a "living document." It will periodically be updated and revised.

Credits:
This document was prepared by Mike Roa, Stewards docent, with help from:

- Leslie Carrow, Rachel Hallaway, and Scott Lawyer, Stewards staff
- Hollis Bewley, Greg Corby, Karen Gebbia, Beth Lamb, and Nina Lowrey, Stewards docents
- Sources of images are indicated on the "cards."

Organism Information for Docents

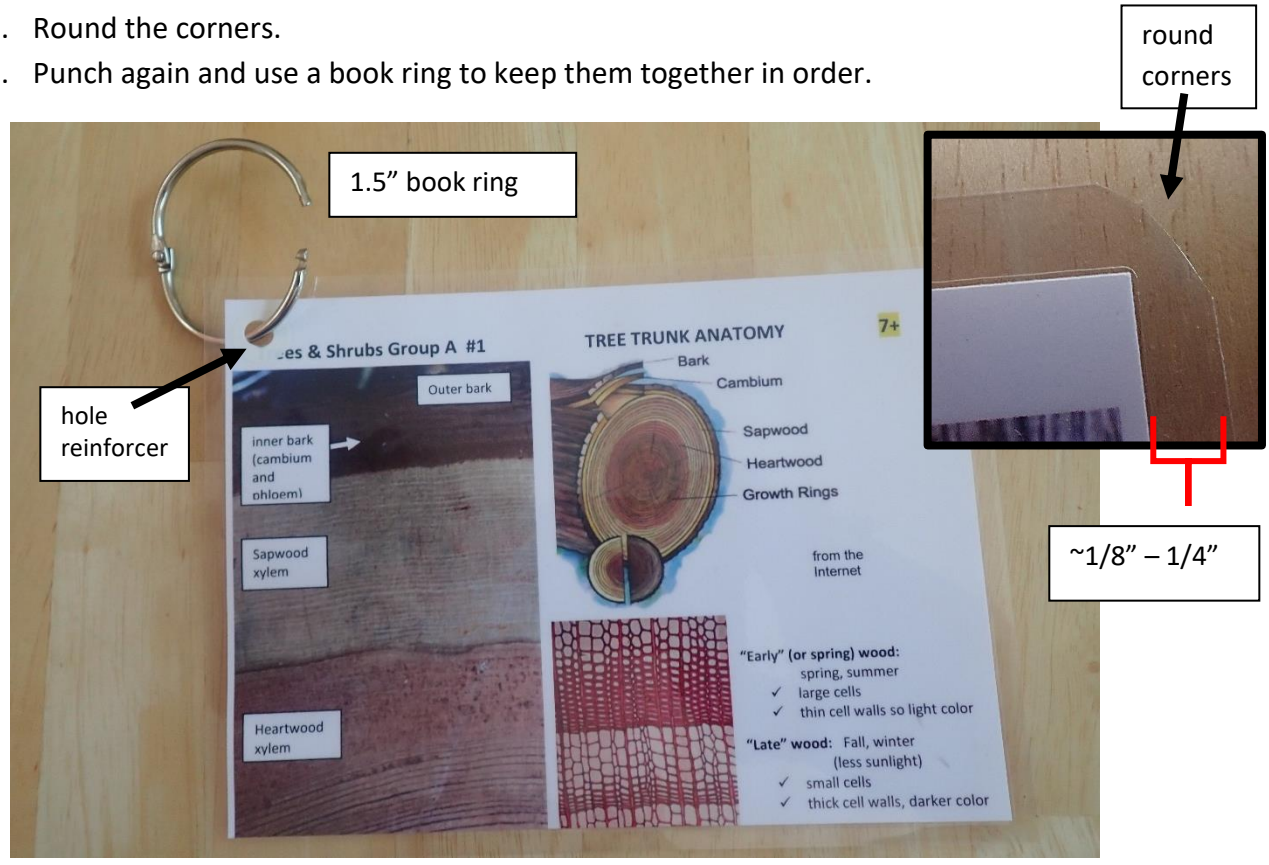
rev. 6.30.21

The following pages contain photographs and information about many plants and animals found in and around Armstrong Redwoods and the Willow Creek/Pomo Canyon area. Don't worry about trying to learn all of them.
If you're interested, you can do that over several years. The **most common** ones are in the Basic Organism set. The Advanced Organism Card set includes many others that you can learn about over time.

Each page has one or more photographs on the top half and some information and possibly more photographs on the lower half. This is so that you can make them into 5" x 7" laminated cards that you can carry with you if you want to.

Laminating and Binding Cards:

1. Print the cards; cut to size (5"x7").
2. Glue the information to the back of the photo.
3. Punch a hole in the upper left corner. Leave at least 1/4" of paper around the hole.
4. Add a hole reinforcer. (Clear reinforcers look better but are harder to attach than white.)
5. Laminate.
6. Cut so that there is a 1/8" – 1/4" margin of laminating material all around the paper.
7. Round the corners.
8. Punch again and use a book ring to keep them together in order.



ADVANCED ORGANISM (AO) CARDS (This document.)

After becoming familiar with the Basic Organism Cards, at their own pace, docents should become familiar with these organisms as they develop their knowledge.

The Basic Organism are a different document.

Key to numbering: The "AO" indicates that it is an "Advanced" Organism Card. The next letter(s) indicate which group of organisms the organism/card belongs with. Within the group, the organisms are in alphabetical order. (The organisms are broken into groups so that if we add or delete organisms, we only have to change the subsequent numbers in that group rather than the numbers on all of the organism cards.**)**

Trees and Shrubs
AO-T&S-1. Bishop Pine
AO-T&S-2. Blackberries
AO-T&S-3. Calif. Black Oak
AO-T&S-4. Calif. Buckeye
AO-T&S-5. Calif. Nutmeg
AO-T&S-6. *Ceanothus* (Wild Lilac)
AO-T&S-7. Coyote Brush
AO-T&S-8. Evergreen Huckleberry
AO-T&S-9. Live Oak
AO-T&S-10. Madrone
AO-T&S-11. Manzanita
AO-T&S-12. Monterey Pine
AO-T&S-13. Red Alder
AO-T&S-14. Red Elderberry
AO-T&S-15. Thimbleberry
AO-T&S-16. Toyon
AO-T&S-17. Willow

Flowers
AO-F-1. Andrew's *Clintonia*
AO-F-2. Cow Parsnip
AO-F-3. Fairy Bell
AO-F-4. False Solomon's Seal
AO-F-5. Fetid Adder's Tongue
AO-F-6. Miner's Lettuce
AO-F-7. Redwood Violet
AO-F-8. Stinging Nettle

Flowers, continued
AO-F-9. Trail Plant
AO-F-10. Wild Ginger
AO-F-11. Wood Rose

Ferns (and fern relatives)
AO-Fe-1. Five-Finger Fern
AO-Fe-2. Giant Chain Fern (*Woodwardia*)
AO-Fe-3. Goldback Fern
AO-Fe-4. Horsetail (*Equisetum*)
AO-Fe-5. Maidenhair Fern
AO-Fe-6. *Polypodium* Fern
AO-Fe-7. Wood Fern

Animals
AO-A-1. Beetles that feed on Redwood
AO-A-2. Some Insects
AO-A-3. Moths and Butterflies
AO-A-4. Amphibians
AO-A-5. Reptiles
AO-A-6. Wild Pig

Fungi and Lichens
AO-F&L-1. Some Fungi
AO-F&L-2. Some Fungi
AO-F&L-3. Crustose Lichens
AO-F&L-4. Fruticose Lichens
AO-F&L-5. Foliose Lichens

A Few Words About Names

Is it important for docents to know the names of organisms found in our area?

The answer is yes – and no.

To paraphrase Juliet: "A wood rose by any other name would smell as sweet."

So, we could call the flower at the right a wood rose, a bald hip rose, *Rosa gymnocarpa,* or that plant with the small thorns and pretty pink flower, or Bob. It would still be the same plant.

But there are a couple of reasons to know the names of organisms.

1) Knowing the name facilitates communication. If I want to talk about the plant, it is easier to say "wood rose", or "*Rosa gymnocarpa*" than "that plant with the small thorns and pretty pink flower." Also, there are several plants with small thorns and pink flowers.
2) Knowing the name of something helps establish a connection. Visitors to any environment often ask the name of a plant, animal, kind of rock, or something else in the environment. Wanting to know the names of things seems to be a natural desire.

Many people are content to just know the name of an organism. But that is probably the least important thing to know. It is far more interesting, and important, to know something about the organism. What does it eat? What eats it? Why does it live here and not there? Do people use it for something? What other organisms live in the same environment? To what is it related?

As docents, it is useful to know the names of organisms, but it is at least as useful to know something about the organisms.

The "scientific," or binomial name of an organism has two parts: the genus name and the species name. A genus is a group of closely related organisms. The species is the particular kind of organism. Members of the same species can mate and reproduce fertile offspring with each other, but not with other species.

When written, the genus name is capitalized and the species name isn't. To identify the name as a scientific name, it is italicized or underlined. So, for the wood rose, the scientific name is *Rosa gymnocarpa.* It is a different species than *Rosa californica*, the California wild rose, or *Rosa nutkana*, the Nootka rose. The genus name, *Rosa*, tells us that it is closely related to other roses. The species name, "*gymnocarpa*," tells us something about it. In this case, the fruiting body or rose hip, quickly loses its sepals, leaving it "naked." "*gymno*" means naked, and "*carpa*" refers to fruit. Another common name for the plant is "bald hip" rose.

When a visitor asks the name of a plant, it can be interesting to ask them to look at it and think of a name that would help them remember what it looks like. You can even use that name the next couple of times that you encounter the plant before telling them the "real" name.

Citations

The vast majority of the photographs were taken by Stewards docents or staff. The photographers' names are indicated. Some were taken by other people; their names are also indicated. Many were taken from the iNaturalist or Flikr web sites. In those cases, we used only images for which use is allowed.

A few images were taken from the internet without permission, but we feel that "Fair Use" allows for that, as we are not benefitting financially, and the images are being used for educational purposes. Those images are indicated with an "I" notation.

AO-T&S-1 **BISHOP PINE** ***Pinus muricata*** **9+**

note the old cones still on the tree

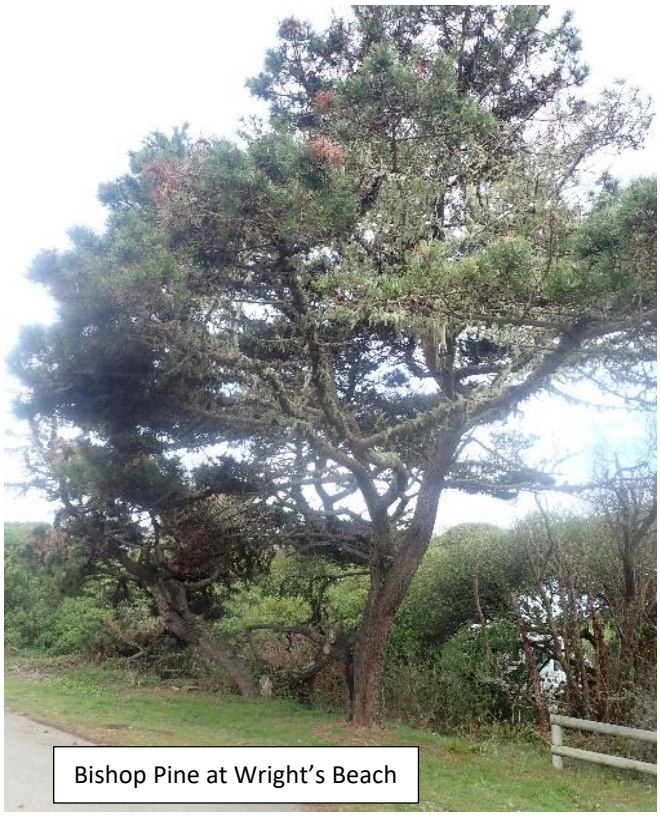
Also known as the Prickle-cone pine.

Like Monterey pine, the bishop pine is a ”closed cone” pine, meaning that the cones may remain closed until a fire heats them up. However, bishop pines are quite variable in that regard. They may open on a hot day without fire, or may stay closed for decades until heated by a wildfire. The cones are held closed by resin, which is melted by the heat of fire.

Bishop pines always grow within about 12 miles of the ocean. There are two populations of bishop pines, separated by about 200 miles. Sonoma Co. is at the southern end of the range of the northern variety.
The southern variety’s range extends from San Luis Obispo Co. to southern CA. and into Baja.

Bishop pines are threatened by a fungal infection. Those at Salt Point have been devastated.

photos: by Mike Roa



Bishop Pine at Wright’s Beach

AO-T&S-2 **BLACKBERRIES** **Calif. (*Rubus ursinus*) & Himalayan (*R. discolor*)** **7+**

(The species name of the Himalayan seems to be unsettled. *R. armeniacus* and *R. bifrons* are other names)

California Blackberry
Note 3 leaflets and slender spines.

Himalayan Blackberry
Note 5 leaflets and stout spines.

California and Himalayan Blackberries 7+

The native CA blackberry is also called trailing blackberry because the stems (canes) tend to trail along the ground. To tell it from the non-native and very invasive Himalayan species, check for:

- CA. leaflets are in groups of three. Himalayans are usually in groups of 5, but may have only 3.
- CA. blackberry thorns are straight, much thinner and less robust than those of the Himalayan.
- CA. blackberry stems are round, while those of Himalayan are more stout and ribbed.
- CA. blackberries are dioecious, with male and female flowers on separate plants.
- The petals tend to be narrower than those of the Himalayans, but this is variable.

Both are "semi-deciduous," retaining some leaves in the winter. The winter leaves of the CA. tend to be a dark maroon-red color, while those of the Himalayans tend to turn yellow-red.

There are large thickets or "brambles" of CA blackberries in the Willow Creek valley. Look for red mounds of vegetation from winter to spring. Most of the blackberries around Pomo Canyon are CA.

California Blackberry

Himalayan Blackberry

credits: from iNaturalist**: CA.** fruit: garmonbOzia all others by Mike Roa

AO-T&S-3 **CALIFORNIA BLACK OAK** ***Quercus kelloggi*** **7+**

Above: young black oak trees in December

male (pollinate) "flowers" (catkins) in March

The black oak gets its common name from the color of the bark, especially when wet from rain or snow melt.

The CA black oak grows throughout the coast ranges and Sierra foothills.

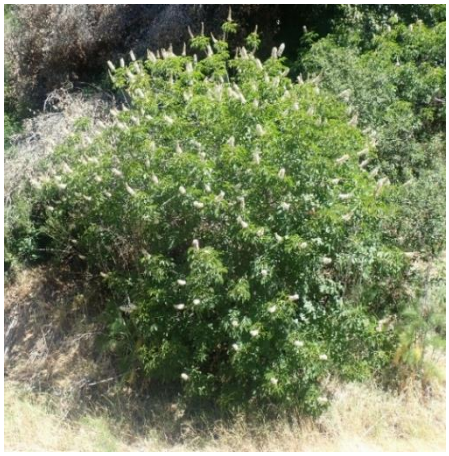
It is initially shade-tolerant, but becomes shade-**in**tolerant as it matures.

Native Americans made acorn meal from the seeds, and dyes from the bark. Some Native American groups feel that the black oak acorns are the best tasting of all acorns.

young black oaks (left) and live oak (right) in December

photos: by Mike Roa

AO-T&S-4 **CALIFORNIA BUCKEYE** ***Aesculus californica*** **7+**



above: Buckeye tree along River Rd., just east of Rio Nido, in: (left to right) November, March, and May (all same tree)

The California buckeye (*Aesculus californica*) is a different species from the Ohio buckeye, which is *Aesculus glabra*. California buckeyes can grow as single-stemmed trees, but often grow as multi-stemmed large shrubs or small trees. They are summer-deciduous, losing their leaves in mid to late summer. They are among the first deciduous trees to grow new leaves, often starting in Feb.

leaf with young floret in early April

flowers in mid-May

Young/developing seeds

Right: seed photos taken in early November

All parts of the tree are toxic.
Native Americans ground up the seeds and tossed them into the water to stun fish, making them easier to catch.

photos: young seeds by Karen Gebbia others by Mike Roa

AO-T&S-5 **CALIFORNIA NUTMEG** ***Torreya californica*** **9+**

young nutmeg tree in Guerneville

The California nutmeg (a.k.a. “stinking cedar”) generally grows as isolated trees in the coast ranges and western Sierra, but doesn’t form a continuous forest. It grows best in the moist understory of the redwood forest. They are very shade-tolerant and quickly resprout after fires. They can be found along the Islands in the Sky trail near Duncans Mills. (Before the Walbridge fire there was one growing not far from Bullfrog Pond Campsite.) It will be interesting to see when and if it regrows. There are quite a few on the Islands in the Sky trail near Duncans Mills.

California nutmeg is more closely related to yews than to the nutmeg used as a spice, which is in a different genus.

Due to its elasticity, the wood was valued by Native Americans for making bows. Native Americans roasted the rich, oily seeds to eat. Pomo Indians used the roots in basketry, and used the sharp needles to prick the skin in tattooing. They also ate the seeds, which supposedly taste like peanuts.

The wood is decay-resistant; early settlers used its timbers for making bridges.

Compare the green nutmeg needles to the dead cost redwood needles.

photos: seeds from INaturalist, by Nature Ali all other images by Mike Roa

AO-T&S-6 ***Ceanothus* spp.: WILD LILAC or BUCK BRUSH** **9+**

There are at least 43 species of *Ceanothus* native to California.

The genus name, *Ceanothus*, is more often used than common names such as wild lilac or buck brush.

Flowers range from deep blue to pale blue, even to white.

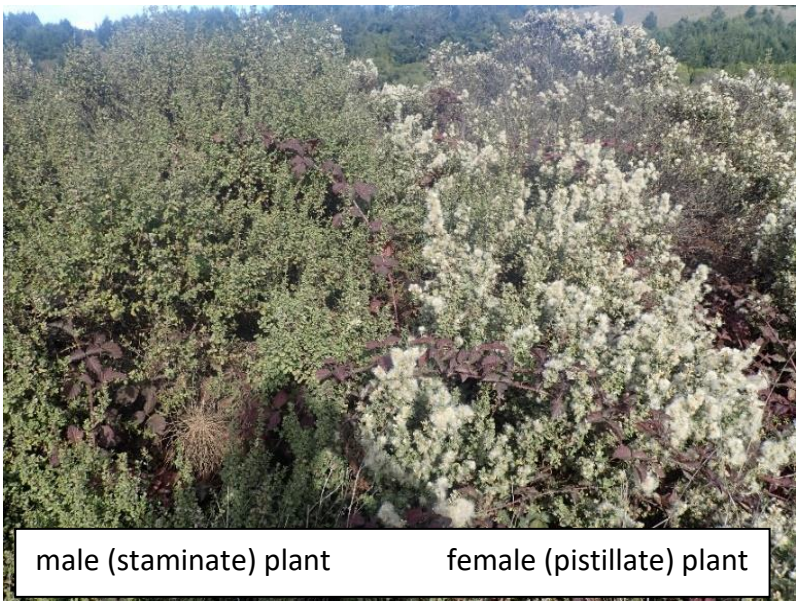
Ceanothus commonly sprout after fires. The heat cracks open their seed coats.

Several species of *Ceanothus* are used as ornamental plants.

photos: by Mike Roa

AO-T&S-7 **COYOTE BRUSH *Baccharis pilularis*** **9+**

Baccharis is dioecious, which means that the male and female flowers occur on different bushes.



male (staminate) plant

female (pistillate) plant

Coyote brush can grow to over 10’ tall, but it is usually 3-6’ in height. The shrub’s branches are “leggy,” meaning that the leaves cluster at the ends of stems that have few leaves. The leaves are somewhat variable in shape.

staminate (male) flowers

close-ups of male (left) and female flowers in August

female flowers in late September and late November

photos: staminate flowers at top left by Hollis Bewley all others by Mike Roa

AO-T&S-8 **EVERGREEN HUCKLEBERRY Vaccinium ovatum** **7+**

There are over 400 species in the genus *Vaccinium*, including the commercially grown blueberries and cranberries. At least five species of huckleberry are native to California. Most are deciduous, but the evergreen huckleberry is not, hence the name "evergreen."

All produce fruit that is prized by wildlife.

At Pomo Canyon, huckleberries often grow from stumps.

Credits: from iNaturalist: hand w/flowers by Al flowers closeup by zigy
berries by Hollis Bewley stump and leaves by Mike Roa

AO-T&S-9 **LIVE OAK: *Quercus* spp.** **9+**

bark of mature live oak tree

Catkin in March

Above: young live oak in December

There are several different species of "live oaks", and there is a great deal of hybridization, so their classification is not clear. Most common in our area are the coast live oaks, *Quercus agrifolia*, but others can be found.

The "live oak" is so named because it doesn't lose its leaves in the winter… it remains green all year.

Native Americans used the acorns for food, as they did other acorns.
The Spanish found that the wood made good charcoal for cooking and making gunpowder. It was even used as fuel to generate electricity at times.

photos: by Mike Roa

young black oaks (left) and live oak (right) in December

AO-T&S-10 **MADRONE (or MADRONO)** ***Arbutus menziesii*** **7+**

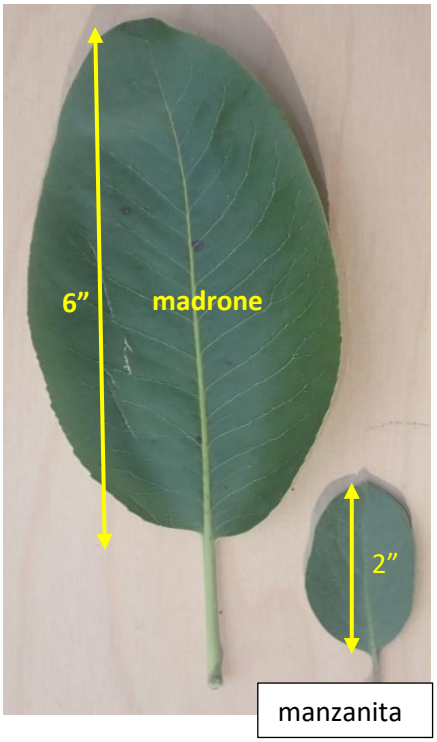
fruit in early November

The smooth bark of a young madrone ranges from green to orange-red in color.
Mature bark is reddish brown and peels (exfoliates) as it ages.
Madrone generally grows as a tree, but in poor soils it may grow as a shrub.

The flowers have been likened to "ivory urns."
They are very similar to those of manzanita.

Some confuse madrone with manzanita (*Arctostaphylos* spp.).

- Manzanita is generally more shrub-like than tree-like.
- Madrone leaves are larger than those of manzanita.
- Madrone bark is a lighter orange-red than manzanita, especially when young.
- See the manzanita card.



manzanita

photos: by Mike Roa

AO-T&S-11 **MANZANITA** ***Arctostaphylos* spp.** **7+**





There are 60 species of manzanita, and 56 of them are native to California!
Some of the species have several subspecies.

The fruit looks like little apples. ("Manzana" is Spanish for "apple", and the suffix "-ita" means "little".)

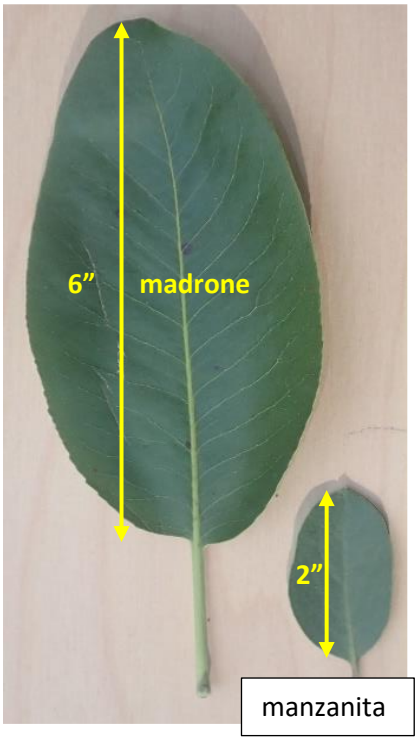
The fruits are a favorite of many animals during the summer. (The genus name means "bear berries".)

Native Americans used manzanita in many ways, including an anti-diarrhea tea, food, tools, and torches (the wood burns especially brightly.)

Manzanita readily grows in areas burned over by wildfires.

Manzanita looks somewhat like madrone.
See the madrone card.

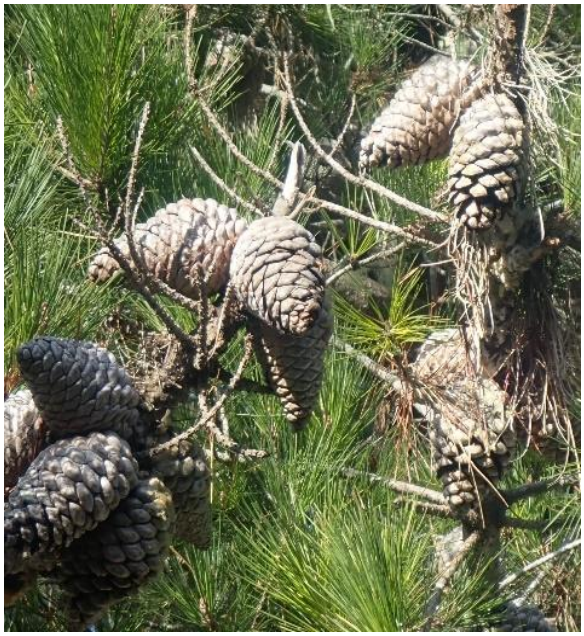
- Manzanita bark is a darker brown than that of madrone.
- Manzanita leaves are smaller than madrone leaves.



manzanita

photos: from iNaturalist: red fruit: (right) by Al Kordesch)
others by Mike Roa

AO-T&S-12 **MONTEREY PINE *Pinus radiata*** **7+**



Like bishop pine, the Monterey pine is a ”closed cone” pine, meaning that the cones may remain closed until a fire heats them up. However, they are quite variable in that regard. They may open on a hot day without fire, or may stay closed for decades until heated by a wildfire. The cones are kept closed by resin, which is melted by the heat of fire.

The cones are also “persistent,” meaning that they tend to stay on the tree. Note the cones that are still on the dead tree in the upper right above.

The native populations of Monterey pine are very small, but millions of acres of Monterey pine have been planted worldwide, including in the southern hemisphere, especially in Australia and New Zealand. It grows very fast, sometimes over 4’ in height in a single year! Most of the pines seen along Sonoma County roads are Monterey Pines.

It is used largely for paper pulp and as a decorative tree.

photos: by Mike Roa

AO-T&S-13 **RED ALDER** ***Alnus ruba*** **7+**

Alder in December (left) Alder in June (above and right)

last year's cones in Mar.

young cones in July

Alders are in the birch family.

Alders like lots of water, and are not very shade tolerant, so they usually grow along streams.

Nitrogen-fixing bacteria grow in alder root nodules. They add nitrogen to the soil.

Alder wood is used in furniture and in smoking fish and meat. Deer and elk. eat the buds, and birds eat the buds and seeds.

If beaver are reintroduced to Sonoma Co., streamside alders will be an important food source.

immature catkins in Dec.

last year's cones & mature catkins in Mar.

photos: by Mike Roa

AO-T&S-14 **RED ELDERBERRY** ***Sambucus racemosa*** **7+**

Red elderberry shrub near campsite 14 at Pomo Canyon in late April

photos: by Mike Roa

Red elderberry is a large shrub, growing to 25' tall. Leaves are deciduous and have 5-7 elliptical leaflets.

The small white flowers form dome-like clusters.

(Blue elderberries form flat-topped clusters of cream colored flowers.)

The fruits are red-black.

(Blue elderberries are dark purple with a waxy coating that makes them look blue.)

The fruits are eaten by wildlife but contain a cyanide compound and are toxic to humans unless properly prepared.

photos:
red elderberry flowers by Karen Gebbia
blue elderberry flowers and fruit by Mike Roa
red elderberries by Hollis Bewley

Red Elderberry flowers and fruit	**Blue Elderberry flowers and fruit**

AO-T&S-15 **THIMBLEBERRY** ***Rubus parviflorus*** **4+**

Thimbleberries are especially abundant at Pomo Canyon along the creek.

The plants grow to over 6’ tall. The thornless canes grow from the underground rhizome.

The deciduous leaves look somewhat like maple leaves and are soft and fuzzy.

Flowers range from white to pink, and may be present from late April into June.

The “berries” are scarlet red and soft when ripe. They have a mild taste. Many forest animals feed on them, and they can be made into jam.

Thimbleberries look like large, squat raspberries, to which they are closely related. Technically, both thimbleberries and raspberries are clusters of fruits, as opposed to true berries.

The leaves may exhibit green island fungus in the fall. (See Big Leaf Maple.)

photos: fruit by Hollis Bewley
all others by Mike Roa

AO-T&S-16 **TOYON** ***Heteromeles arbutifolia*** **7+**

upper leaf surface

edge of lower leaf surface

toyon bush and berries in December

toyon flowers in June

Toyon grows as a small tree or shrub, to 15' tall, but is usually smaller. It grows throughout much of California, especially in chaparral and woodlands.

Toyon is sometimes called Christmas berry because the red fruits ripen in winter. The winter-ripening fruit provide an important food source for birds, squirrels, and other wildlife.

(Common names can be confusing because sometimes different species or even different genera are called by the same common name. Although "toyon" is a common name (as opposed to the scientific name), it is a better common name than Christmas berry, because many plants produce red berries in the winter.)

photos: by Mike Roa

AO-T&S-17 **WILLOW *Salix* spp.** **7+**

Above and right: early February
Second from right: late March
Right: late March-early April

"male" (pollinate) flower

female flower w/seeds

seeds ready to be disbursed by the wind

There are many species of willow (30 species in California alone!), and they can be difficult to classify to species.

The arroyo willow (*Salix lasiolepis*) is a common species.

Willows are dioecious, meaning that male (pollinate) and female (ovulate) "flowers" develop on different plants. The seeds develop tufts of white "hairs" that help with dispersal by the wind.

Willow sap contains salicylic acid, the active ingredient in aspirin.
(The leaves and buds taste like aspirin.)

Willows like water and are fast-growing. They also readily sprout from twigs or pieces. Therefore they are useful in streamside restoration and protection.

photos: by Mike Roa

AO-F-1 **ANDREW'S CLINTONIA** ***Clintonia andrewsiana*** **7+**



The leaves of this showy plant are typically 6-12" long and form a basal rosette from which a single stem emerges to support the umbel of flowers.

When ripe, the berries turn a dark blue, giving the plant its other common name: Blue Bead.

Photos: left and right by Karen Gebbia center by Mike Roa

AO-F-2 **COW PARSNIP** ***Heracleum maximum*** **ALL**





Leaves of cow parsnip are huge (3 large leaflets form a leaf that may be 12" wide), but the individual flowers are tiny. The flowers are borne in a large flat-topped cluster (umbel), so it looks like there is a large flower. The flowers are wrapped in a green sheath before opening.

Some people are allergic to the hairs that cover the plant and may develop dermatitis. Also, eating the outer skin can cause itching/blistering in the mouth.

Cow parsnip is a member of the carrot family. Another common name is Indian celery. Young shoots can be cooked and eaten, but the plant **resembles the poisonous *Ciocuta maculate***, a.k.a. spotted water hemlock - a relative of poison hemlock of Socrates fame. **Don't tell visitors that it is edible!** Native Americans had several medicinal uses for the plant. **photos:** by Mike Roa

AO-F-3 Fairy Bell: *Prosartes spp.* 7+

P. hookeri

Look for the tiny white flowers and red-orange berries under the leaves.

Hooker's Fairy Bell (above) is similar to the Largeflower Fairybell (*P. smithii*) (below).

P. hookeri's flowers (and fruits) (above) are generally in pairs, and the stamens project beyond the inner floral leaves (petals).

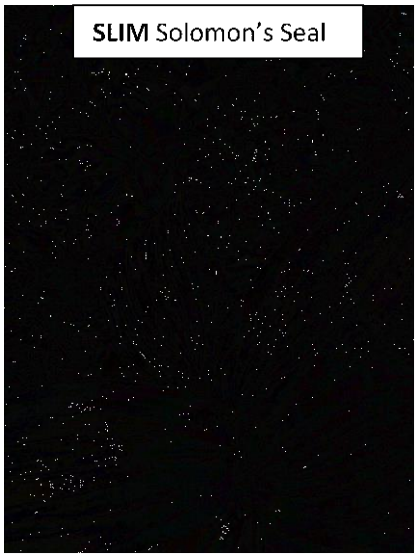
P. smithii's stamens are hidden within the floral leaves, and there can be from 1-7 flowers and fruits.

P. smithii

photos: *P. hookeri*: from iNaturalist: whole plant by Randal flowers by Alec Heyman
P. smithii: from iNaturalist: flowers by Kathy Fulton
P. hookeri fruit by Mike Roa *P. smithii* fruit by Hollis Bewley

AO-F-4 FALSE SOLOMON'S SEAL *Mianthemum* spp. 7+

SLIM Solomon's Seal

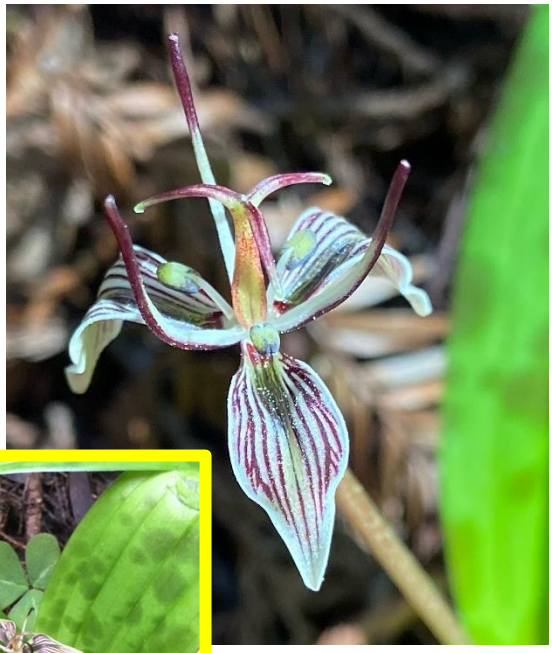


FAT Solomon's Seal

False Solomon's Seal resembles Solomon's Seal, an East Coast plant. The berries are bright red when ripe, in late summer or early fall. They are said to be tasty, but are cathartic (cause diarrhea). The plant also resembles the **toxic** baneberry, so don't tell people that the berries can be eaten.
SLIM Solomon's Seal (Star-Flowered-Lily-of-the-Valley) (*M. stellata*) has 3-9 flowers in a smaller cluster, not branched.
FAT Solomon's Seal (*M. racemosum*) has many small flowers on branches in a 2-4" cluster.

photos: from iNaturalist: FAT: whole plant by minttoothpick fruit by Heather Rowe flower by Mike Roa
SLIM fruit by kat_the_nat SLIM plant and flowers by Mike Roa

AO-F-5 FETID ADDER'S TONGUE (a.k.a. Slink Pod) *Scoliopus bigelovii* 7+



single flower (above)
by Rachel Hallaway

others by Mike Roa

Called "fetid" adder's tongue because the fresh flowers smell bad.
After pollination, the weight of the swelling seed pod bends the stalk do the ground, which gives it the other common name of slink pod.

Among the first plants to bloom each year.

To distinguish the leaves from other plants, look for the darker green mottling.

They are pollinated primarily by ant. The seeds have a fleshy covering called an elaiosome that is attractive to ants. After eating the elaiosome, the ants bury the seeds underground. This burial protects the seeds not only from rodents but from the fires that are a natural part of the environment.

AO-F-6 **MINER'S LETTUCE** ***Claytonia perfoliate*** **4+**




As it matures, the stem of the flower elongates.

The disc from which the flower stalk emerges is actually two leaves that are fused.

As its name implies, miner's lettuce is edible, a tangy addition to a salad, or cooked like spinach. **photos:** left and top center by Leslie Carrow right and bottom center by Mike Roa

AO-F-7 **REDWOOD VIOLET:** ***Viola sempervirens*** **7+**


Also called evergreen violet, the redwood violet is perennial; its leaves do not die back in winter.

4 petals point upward or to the side; one larger petal points downward. The 3 lower petals have purple-brown lines on them.

The leaves look similar to those of wild ginger, but are more pointed, have more scalloped edges, and are thinner.

wild ginger leaf

photos: by Mike Roa

AO-F-8 STINGING NETTLE: *Urtica dioica* ALL

Leaves grow on opposite sides of the stem, about 3-6” apart.

Flowers develop at the bases of the leaf pairs (as opposed to at the top of the plant.)

Hairs or spines on the leaves and stem contain a chemical that produces a stinging sensation that can last more than 24 hours, although the severity quickly diminishes.

flowers in late May
photos by Mike Roa

AO-F-9 TRAIL PLANT: *Adenocaulon bicolor* 4+

The underside of the leaf is light gray, distinctly contrasting with the dark green of the upper side. The 2 colors of the leaves gives the plant its species name, “*bicolor*.”

The common name derives from the notion of breaking the leaves so that the white side points in a direction.

The tiny flowers produce club-shaped fruits covered with glands.

photos:
whole plant with flowers (center)
by Hollis Bewley
others by Mike Roa

AO-F-10 WILD GINGER: *Asarum caudatum* 7+

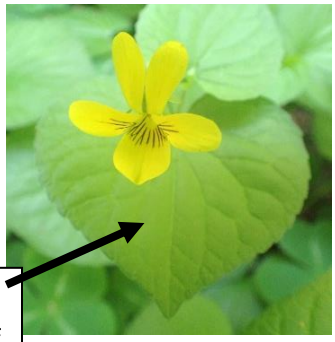
The leaves and woody rootstocks smell somewhat like ginger.

The flowers, which are generally hidden under the leaves, are pollinated by slugs and ants.

The "petals" of the flower are actually sepals. Their thin "tails" give the species name, "*caudatum*."

The leaves look similar to those of redwood violet, but are thicker, rounder in shape, and have smoother edges.

Photos: by Mike Roa



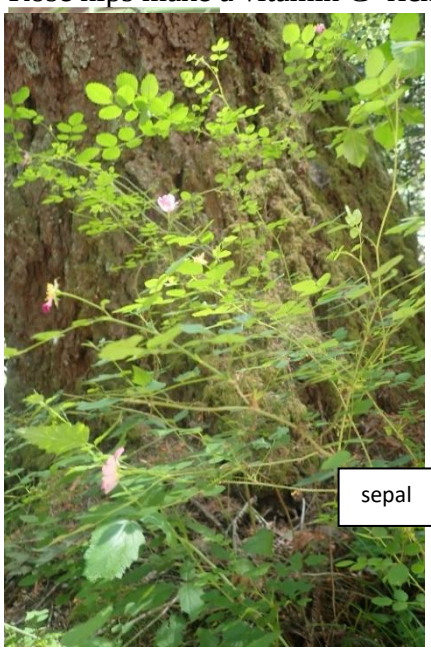
AO-F-11 WOOD ROSE (a.k.a. Baldhip Rose): *Rosa gymnocarpa* 4+

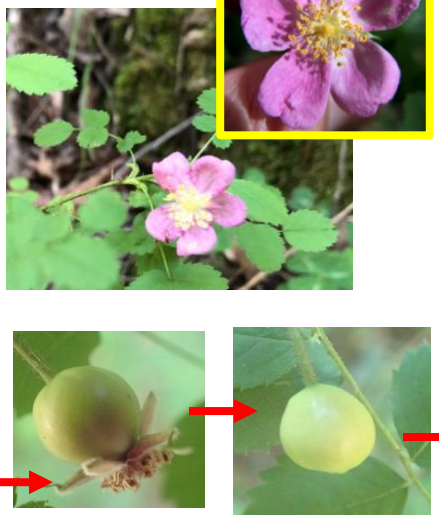
The flowers of the wood rose range from light pink to red.

The thorns are straight and slender, less robust than those of the California wild rose.

The sepals tend to fall from the fruit (rose hip) sooner than those of most other species, which gives it the common name of baldhip rose.

Rose hips make a vitamin C -rich tea.





Photos: single flower photos by Karen Gebbia
wild rose hip by Hollis Bewley
others by Mike Roa

AO-Fe-1 **FIVE-FINGER FERN: *Adiantum pedatum*** **7+**

The five-finger fern often grows along streams. The number of "fingers" varies; it is often more than five.

The pinnules change shape as the pinnae mature. They start out fan shaped and become more elongated.

The spore-producing sori are more or less hidden under the edge of the pinnae, on the lower (ventral) side. The curled edge is called a "false indusium."

June December

5-finger fern is closely related to the maidenhair fern. In fact, the 5-finger fern is also known as the western maiden hair fern.

photos: by Mike Roa

AO-Fe-2 **GIANT CHAIN FERN: *Woodwardia fimbriata*** **9+**

Above, right: Giant chain fern near creek at camp-site 16 at Pomo Canyon.

Left and left above: chain fern at Tomales State Pk.

Right: chain fern on Hwy 116.

The Giant Chain Fern is often called by its genus name, *Woodwardia*.

Woodwardia can get very large, with fronds to 9' long!

The sori are oblong and arranged in chain-like rows parallel to the midrib of the pinnae.

Woodwardia fiddlehead on Joy Road

photos: by Mike Roa

AO-Fe-3 GOLDBACK FERN: *Pityrogramma triangjularis* 9+

This relatively small fern is often found on roadcuts or rocky outcroppings.

As the species name indicates, the fronds are distinctly triangularin shape.

The stipes are dark. (Native Americans used them for designs in their baskets.)

The small triangular fronds tend to curl up when dry.

Credits: from iNaturalist: above left: view of several plants by Alex
above right: single plant: by Hollis Bewley
right (curled frond) by Mike Roa

As the common name implies, the underside of the Goldback Fern appears gold, or, sometimes, silver. (The color is caused by a waxy powder, which can be rubbed off , as opposed to being a color of the fern frond itself.)
The sori form a sort of brown network that may obscure the gold/silver powder.

Credits: from iNaturalist: veined and brown ventral surfaces (left and center above): by Alex Heyman
silver ventral surface (right above): by Nathan Gonzales powder by Mike Roa

AO-Fe-4 **HORSETAIL or SCOURING RUSH: *Equisetum* spp.** **7+**

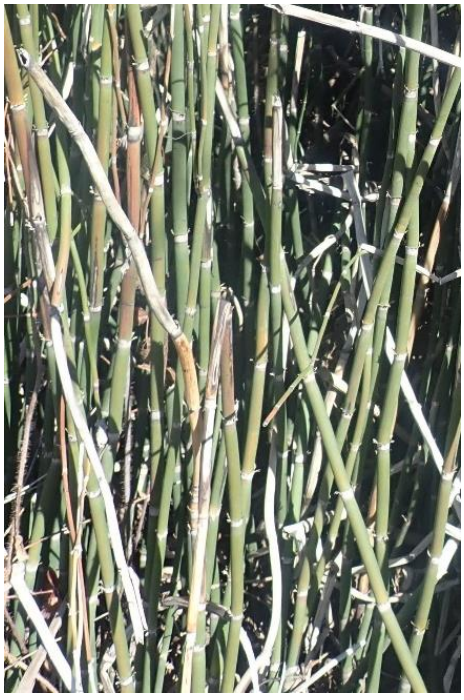
February/early March

late March

December

all images by Mike Roa

Although "horsetail" is a commonly used name, *Equisetum* is used almost as commonly. Horsetails are a very ancient group of plants. Students who are interested in dinosaurs will recognize them from drawings of dinosaur habitats. They prefer moist environments. They are sometimes referred to as "fern relatives" because, like ferns, they reproduce with spores.

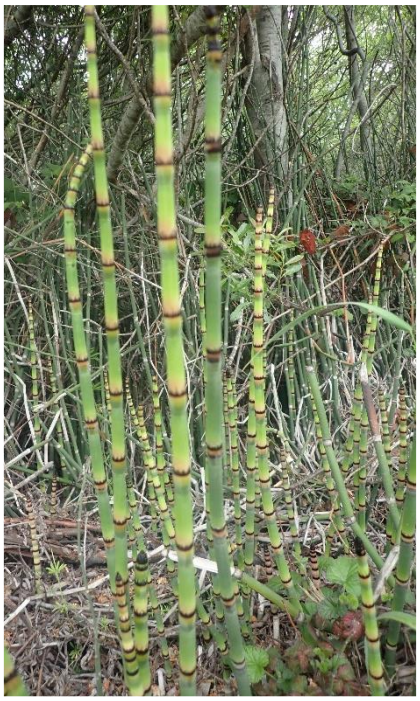


Scouring rush along Willow Creek Road
(less than 0.1 mi. beyond the barn as you leave Pomo.)

The unbranched species are known as "**scouring rush**".

They contain high amounts of silica, which they "mine" from the soil. This gives them a rough texture. Because the silica deposits make them rough, pioneers are said to have used them to scour their pots and pans. They were also used for polishing furniture and violins.

left: winter right: spring



AO-Fe-5 **MAIDENHAIR FERN: *Adiantum* spp.** **9+**

above left: dorsal (upper) side of pinnule
above right: ventral (lower) side of pinnule

The maiden hair fern is closely related to the five-finger fern. (They are in the same genus.)

The spore-producing sori are more or less hidden under the edge of the pinnae, on the lower (ventral) side. The curled edge is called a “false indusium.”

They are often found along rocky outcroppings.

Native Americans used the black stipes in decorating their baskets, and to keep body piercings from closing while healing.

photos: by Mike Roa

AO-Fe-6 POLYPODY FERN *Polypodium californicum* 7+

Polypody ferns generally grow on rock faces such as along road cuts, or on trees (Plants that grow on other plants are called "**epiphytes**".) The name *Polypodium* comes from the appearance of the rhizome branches, which are said to look like many (poly) little feet. They are popular ferns for shady garden areas.

CA. Polypody along Hwy 116

photos: by Mike Roa

Polypodium on oak (left) and bay tree (above)

Polypodium die back as the weather warms and their habitats dry out. (Photo above taken in May.)

Polypodium pinnae *look a little* like those of sword ferns, but they are smaller and lack the "hilt."

AO-Fe-7 **WOOD FERN** ***Diopterus* spp.** **4+**

Note kidney-shaped sori and toothed edges on pinnae.

fiddlehead in Feb.

Many wood fern fronds emerge from the ground at the same place.

The big structure that looks like a big feather is called a frond. The leaflets projecting out from the side are called pinnae, which means feather-like. **(Ask students why they are called this.)**

The frond has many pinnae projecting out from each side

Sori (singular sorus) can sometimes be found on the back of the pinnae. When they develop depends on the species of fern. These dark brown structures contain sporangia (singular: sporangium), which produce spores, which are sort of like seeds, but they don't need to be pollinated.

As the frond grows, the tip forms a "fiddlehead." The fiddleheads of some ferns are edible **<u>when prepared properly</u> (and toxic if not) and eaten in moderation**, but **not all are.** Some ferns also have edible tubers.
Of course, we don't pick any plants in Armstrong.

Wood ferns look much like bracken ferns. (See the #3 fern card.)

wood

bracken

- Wood Ferns stay green all year; bracken ferns turn yellow and die back in the fall
- Several wood fern fronds emerge from the ground at one place; bracken fern fronds emerge individually.
- When present, wood fern sori are kidney or horseshoe shaped and found in rows along the center of the pinnae; bracken ferns' sori are found along the edges of the pinnae.
- Wood Ferns' pinna edges are toothed; the edges of bracken Ferns' pinnae are rounded, although this is quite variable.

photos: by Mike Roa

AO-A-1 BEETLES That Feed on Redwood 7+

The female bark beetle burrows through the bark and feeds on the cambium and wood just under the bark as she lays eggs in an "oviposition gallery". When the eggs hatch, the larvae burrow outward from that oviposition gallery to form a sort of centipede-like pattern. (The redwood bark beetle below is about ¼" long)

There is a good example of this to the west (left) side of the Pioneer Trail just north of the redwood that fell in 2019. You won't be able to show this to a large group of people, but if you have only one or two, they can look at it from the trail.

(For a specimen to carry with you, you might look for a branch along the roadside. If you peel the bark back, you may find galleries.
See photo at lower left.)

photos: Bark Beetle: Forestry Images.com, by Javier Mercado Others: Mike Roa

Powder Post Beetles (center) burrow into the wood and expel the waste out of holes. They often attack dead wood.

Left: powder post beetle holes in the log shown above, with galleries of the redwood bark beetle.

Right: powder post beetle waste expelled from a bay tree log. (Notice how white the bay tree's wood is.)

Below: long-horned wood boring beetle galleries and adults. (Adults feed on flowers, if at all.)

at "fallen giant"

at log near memorial

photos: Long-Horned Wood Borers from iNaturalist: left (in hand): by W Mason right: by Tony Iwane log photos by Mike Roa

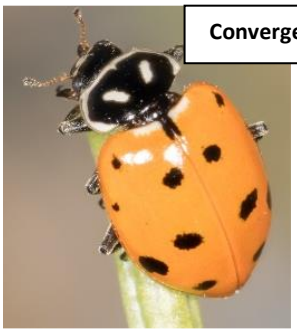
AO-A-2 **Some Insects That May Be Seen In The Redwood Forest** **ALL**

Variegated Meadowhawk Dragonfly

Dragonflies and damsel-flies have immature (nymph) stages called naiads that live in the water. Both naiads and adults are predacious.

Dragonflies hold their wings perpendicular to their bodies when at rest. Most damselflies hold their wings above and parallel to their bodies when at rest.

Pacific Forktail Damselfly



Convergent Ladybird Beetle

Both adult and larval ladybird beetles feed on **aphids.**

Fontana Grasshopper

Grasshoppers have wings.

photos: All from iNaturalist: Variegated Meadowhawk Dragonfly by royaltyler; Pacific Forktail Damselfly by suzir; Ladybird Beetles by Glmory; Fontana Grasshopper (left) by justin2; Fontana Grasshopper (right) by Scott Loarie;

Hover Fly (a.k.a. syrphid fly)

The adults may be mistaken for bees, but they don't sting or bite. Larvae are predacious on aphids. Adults feed on nectar and pollen.

Look for them hovering in sunlit patches. Unlike yellow jackets, they often hover in place and dart around.

left: Giant Western Crane Fly

Sometimes called a "mosquito hawk," adults feed on nectar or not at all. Larvae are aquatic or in damp soil and feed on decaying plant material.

Alaska Yellow Jacket

Carnivorous.

Nest in the ground.

May be confused with hover fly.

Carpenter Bee (above 3 photos)

The adult females chew round holes in wood and lay individual large eggs in chambers separated by chewed "sawdust" (right image) The left image shows a bee seeking nectar from a redwood sorrel flower. Center photo: bee looking out from a chamber

right: Box Elder Bug

True bugs, including the box elder bug, have sucking mouth parts with which they feed on plant fluids.

photos: From iNaturalist: Hover Fly by Robert Webster, Crane Fly by Kueda, Box Elder Bug by glormy, Yellow Jacket by Jdee, Carpenter Bee (left): by suzrj, Carpenter bee in hole: by adrian16 lower right photo of holes in redwood by Mike Roa

AO-A-3 Moths and Butterflies of the Redwood Forest

California Oak Moth larvae are often found on and dangling from oak trees by a thread in August. Pupa photo in May. Adult in June.

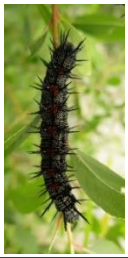
Silver-spotted tiger moth.

The **Sequoia Pitch Moth** is a clear-winged moth that infests Douglas-fir and most pines. Even though the larva infestation causes large amounts of resin to be produced, it doesn't seem to cause much harm to the tree.

Its mimicry of yellow jackets gives it some protection.

photos: From iNaturalist. **Ca. oak moth** adult: by photon-hog. larvae (both) by euproserpinus, pupa by calloohcally.
Silver spotted tiger moth adult by sarka.
Pitch moth from iNaturalist: adult by snifflin. Larva in sap **from Flikr**, by orangepet,
Damaged tree by susan K. Hagle, **from USDA Forest Service**, Bugwood.com Silver-spotted tiger moth larva by Mike Roa

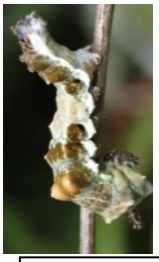
Oct. **Western Tiger Swallowtail** May



June **Mourning Cloak** September

August **Cabbage** September

June **Common Buckeye** October



May **Lorquin's Admiral** July

April **CA Tortoiseshell** July

photos: from iNaturalist: **W. Swallowtail**: larva by niallclandy, adult by jmaley.
Mourning Cloak: larva by reuvenm, adult by jmaley. **Common Buckeye** larva by gcwarbler, adult by Andy Wilson.
Lorquin's Admiral larva by psyllidhipster, adult by larsonek **Cabbage** larva by allan7 , adult by tomasp
CA Tortoiseshell: larva by eukproserpinus **CA Tortoiseshell** adult by Rachel Hallaway

AO-A-4 **AMPHIBIANS** **ALL**

Amphibians need water in which they lay their eggs. They need to keep their skin moist because, as adults, they generally "breathe" through their skin. So they are generally found in or near water or in other damp areas such as under rotting logs.

Slender Salamander (3"-4")

May be found under logs or rocks in shady areas. Unlike most amphibians, does not lay eggs or live in streams. They lay eggs and live in damp soil under logs or rocks in shady areas. About 20 species of slender salamanders live in California.

Rough-skinned Newt (5"-7")

May be found near streams in winter or spring. Males become smooth-skinned during mating season. They produce toxins that may irritate the skin and may even be fatal if the newt is swallowed!

California Giant Salamander (to 12" or more)

The California Giant Salamander lives in Fife Creek. It is a voracious eater, with banana slugs among its favorite foods. They have even been known to eat mice! Note the gills on the immature or "larval" form at the right.

photos:
Slender Salamander: by Mike Roa
Rough-skinned Newt: from California Herps, by Gary Nafis
California Giant Salamander adult: from iNaturalist, by b_on_maui
California Giant Salamander larva: from iNaturalist, by Oscar Johnson

AO-A-5 **REPTILES** **ALL**

This is a juvenilerattlesnake, with only one "rattle", which Is called a button. Since there is only one, it can't make a rattling noise. (Nor can a snake that has lost its rattles.)

Pacific Rattlesnake

The **pacific rattlesnake** is sometimes found in warmer, drier openings in the redwood forest. (The grassy openings are called prairies). They are sometimes seen near the picnic area or in the vicinity of the volunteer office and the Discovery, East Ridge, Pool Ridge, and Waterfall trails.

Adults often grow to over three feet in length, with the largest recorded being over five feet.

photos: The rattlesnake mage is from the web site of California Herps.
The photographer, Gary Nafis, gives permission for our use of them. sign by Mike Roa

Western Fence Lizard

The Western Fence Lizard (a.k.a. “Bluebelly”) ranges in color from light brown to charcoal black. They can grow to almost 8 inches in length, bur are usually shorter.

Like many lizards, their tail breaks off easily. If a predator pounces on the tail, it may break off and wiggle for a while, distracting the predator while the lizard escapes. Note the different texture (smaller scales) on the larger picture, and the re-growing stub of a lost tail in the photo in the upper right photo.

Fence lizard **photos:** Upper left: by Mike Roa
Upper right: from iNaturalist, by Jesse Rorabaugh
Lower right (belly): from iNaturalist, by Andrew J. Crawford

AO-A-6 **WILD PIG or WILD BOAR** **ALL**

The animal is generally called a “Wild Boar”, even though female pigs are called sows and males are called boars.

Pigs were introduced to North America from Europe, and have spread throughout the country. They do great damage to ecosystems as they tear up the ground rooting for food. They can also be quite dangerous.

Note the damage done to the grassland around this sow and her piglets.

They can get to be over 200 pounds!

photos: from iNaturalist, photo by Eric Graham.

Bonnet Mushroom

Golden Ear Fungus

Sulfur Tuft mushroom
Toxic
Has been used experimentally to treat some harmful coniferous fungi because it can out-compete them for limited resources.

photos: Sulfur Tuft: Darvin Deshazer others by Mike Roa

Scarlet Scarlet Wax Cap:
photo: left:from iNaturalist, by moranat
right ; by Mike Roa

Yellow Wax Cap:
photo: from flikr, by James Manghi

Witch's Hat (Conical Wax Cap)
Looks similar to wax cap, but more pointed. **Probably toxic.**
photo: Alan Rockefeller (Sonoma Mycological Assoc.)

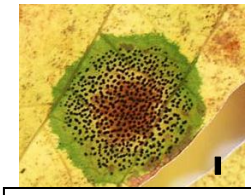
Cowboy's Handkerchief (Ivory Wax Cap)
"Cowboy's Handkerchief" common name comes from the mushroom's sliminess. Edible, but unappealing due to sliminess.
photo: from iNaturalist by mycowalt

Bird's Nest Fungus
"Nests" are about 6 mm (1/4 inch) in diameter. The "eggs" are called "peridioles" and contain spores. **photo:** by Mike Roa

Artist's Conk (Bracket Fungus)
This fungus has a white porous surface underneath. If a drawing is scratched into it, the drawing will remain when the conk is dried. It is edible.
photos: lower: from Flikr, by Joyce
upper: from iNaturalist, by laceypantalones

Red Coral Fungus
Considered edible, but may cause upset stomach.

photo: CalPhotos # 1342 3162 2660 0076 by Gerald and Buff Corsi



Green Island Fungus
see Big Leaf Maple

Dog Vomit (Scrambled Eggs) Slime Mold
(This photo was taken on a cloudy day in the shade. It was a much brighter yellow.)

Slime molds are interesting organisms formed by an aggregate of cells. Formerly classified as a type of fungus, they are now considered protists. They may move in amoeba-like fashion.

This type is highly tolerant of metals and may accumulate high concentrations of them, especially of zinc. It may have antibiotic properties.
It may trigger asthma and rhinitis in some people.

photo: by Mike Roa

AO-F&L-3 **CRUSTOSE LICHENS** **7+**

As the name implies, crustose lichens form a low mass or crust, often on rocks and sometimes on trees.

Crab Eye Lichen Photo by Mike Roa

AO-F&L-4 **FRUTICOSE LICHENS** **7+**

Lace Lichen
(California state lichen)
(not in Armstrong)

Lichens are made up of fungi and algae (and sometimes certain bacteria). The fungus provides shelter for the alga and the alga provides nutrients for the fungus.

Fruticose lichens grown in stringy masses.

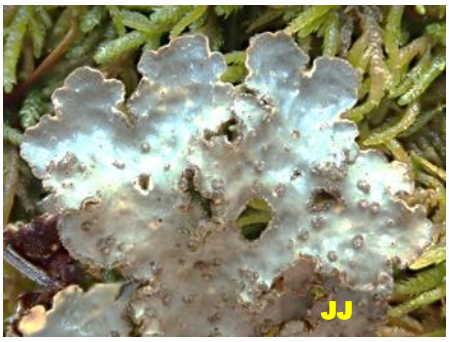
The lace lichen looks like more robust "old man's beard." It is California's State Lichen. It is not found in Armstrong Woods, but is found in Annadel State Park and near Spring Lake. (It is included here just because it is the State Lichen.

photo by Mike Roa

AO-F&L-5 **FOLIOSE LICHENS** **7+**

Textured lung Lichens

Lung Lichen



Common Greenshield Lichen

Lichens are made up of fungi and algae (and sometimes certain bacteria).
The fungus provides shelter for the alga and the alga provides nutrients for the fungus.

Foliose lichens have broader, less stringy forms than Fruticose lichens. (Think "foliage"… leaves.)

Tube lichens form tubes.

Lung lichens look a little like lung tissue.

The Greenshield lichen is broad (shield-like).

Photo Credits

Common Greenshield: from iNaturalist, by suzrj
All others: from iNaturalist, by Julene (JJ) Johnson