

Natural History of UCSC Fall 2017

Plants of UCSC Lesson Plan

By Sheyna Haisman-Holmes

Learning outcomes: Students will learn about plant communities and how to identify species within evergreen forest and chaparral communities. They will learn to identify by leaves, branches, fruits, smell, color, and location. They will also learn how early humans used these plants for medicine, food, and materials. Lastly, they will learn about dangerous plants to touch and consume.

Background Information: This lesson aims to introduce mostly shrubs and trees that are common on campus. Make sure you feel confident in the identification of *Pseudotsuga menziesii*, *Lithocarpus densiflorus*, *Arctostaphylos spp.*, *Eriodictyon californicum*, *Baccharis pilularis*, *Arbutus menziesii*, and *Pinus attenuata*. Calflora.org or cnps.org are great resources that illustrates these species with pictures and life history information. Reading the chapter titled “Plants” by Dashe & Hayes from *The Natural History of the UC Santa Cruz Campus* is very helpful. Pages 99-141 illustrate many species and where on campus they can be found. Learning to identify these plants will give students the skills to be familiar with most trees and shrubs found on campus and hopefully get them interested and noticing other plants. We will have yerba buena tea in the woods to ground the group together while we have a class discussion- something very unique to outdoor education!

Materials:

Plant anatomy handout illustrated by Lucy Conklin

Braiding Sweetgrass by Robin Wall Kimmerer

1 cup for each student

2-3 Thermos of hot water and yerba buena collected that morning and already steeping!

Plan for the day:

Opening- Meet at the classroom! Pass out a cup for each student (or ask them ahead of time to bring their own cup) to carry and start walking to upper campus north remote parking lot trailhead

Duration: 25 minutes

Regroup at trailhead and short plant introduction/inspiration

Duration: 15 minutes

Have the class check their triads and stand together. Hand out the plant anatomy handout and show students how to use it. Explain that it looks intimidating with all the fancy leaf shape names, but that we can easily classify leaves and arrangements and ensure them we will practice this a lot today and in the coming classes. Briefly give a talk on plant basics. “We are going to point out trees and shrubs on our hike today. So what’s the difference between a tree and a shrub? A tree is a woody perennial plant, typically having a single stem or trunk that has branches at some distance from the ground. A shrub is a woody plant that is smaller than a tree and has several main stems arising at or near the ground. It is fall right now so we aren't going to see too many flowering plants at all. The springtime is when most flowers bloom. In fall, plants and trees that are deciduous lose their leaves and are usually bare until the end of winter at the start of spring. Evergreen means that a plant retains its leaves year round. It will be cool for you all to learn how to identify things when they aren’t flowering so you can identify it in all seasons”. Then introduce the concept of plant communities. “The vegetation communities on campus include: grassland, coastal prairie, maritime chaparral, chaparral, knobcone pine forest, mixed evergreen forest, redwood forest, and riparian woodland. There are many places where these communities overlap as the geology, elevation, aspect, and soil type changes. Today we are exploring a lot of chaparral and mixed evergreen forest. As we hike try to observe these transitions. We are going to start out in an evergreen forest and then emerge in chaparral which is very different- notice this and ask questions about your observations. As we hike, mostly stay on the trail and when we divert to look at plants, look out for poison oak. Right now it may be turning a reddish color, but has leaves of 3 and can look like a blackberry plant”. Break into 3 groups and stagger yourselves starting the hike so each group has space. Make sure any questions are answered and everyone is ready to go.

if spotted, gather yerba buena leaves and add to thermos on the way up!

Look at plants while hiking

Duration: 1 hour 40 mins

Start walking up the trail and find an opportunity to be close enough to a Douglas Fir (*Pseudotsuga menziesii*) to feel it. Let the students look at its needles and smell them. Explain how it's the "classic christmas tree" and how it differs from a redwood. Find a redwood needle and compare the two. Redwood needles are flat and only grow on the sides of the branch whereas Doug Fir needles grow all around the branches and aren't as thick or sharp at the tip. Have them observe the difference in bark color and texture. Tell the native american story of the Doug Fir pinecone- there was a big flood and all the mice ran and jumped into crevices to hide- that's why the cones have little brown tails coming out of their grooves. Mention that these needles were used for lung illnesses in tea- add some fresh growth tips to your thermos if you want.

Keep walking up the trail and stop to look at the Tanoaks (*Lithocarpus densiflorus*). Ask students to look around and observe how common they are in a redwood forest. It is very common- what does that tell you about these trees? They can withstand a lot of shade. Let them look at the leaves up close and show how it's easy to identify these leaves by picturing a birds eye view of parking spaces on the leaf surface. Does anyone know what tanoaks were mainly used for? They are really high in tannins and were extracted for their constituents for tanning hides.

Keep walking until the plant community changes to chaparral. Ask students if they noticed the emergence that just occurred. Ask what they feel and see and notice about where they are standing now compared to where they just were. Stop to look at the Brittle Leaf manzanitas (*Arctostaphylos ssp.*) on the left of the trail. Encourage students to step off the trail to come feel the leaves and berries. Try to fold a leaf in half and notice how brittle it is- helpful way to remember the name! Does anyone know what manzanita means? Little apple! Their berries look just like little apples and were used a lot by native people. They were eaten and used medicinally. Mention that manzanitas can resprout from a burl after a fire-- then look around for a burl.

There are lots of Yerba Santa (*Eriodictyon californicum*) plants around, so stop and point out that this is a classic chaparral plant. Have everyone feel a leaf and how thick and leathery it

is. This type of adaptation is for this environment to protect the plant from losing too much water through its leaves. Encourage everyone to take a little nibble out of a leaf to taste-- notice how it tastes kind of minty and coats your teeth with a funny residue. This plant is very medicinal and is used for coughs, lung issues, and colds.

There are also many examples of Coyote Brush (*Baccharis pilularis*) alongside the trail. Have the students look at all the different leaf shapes that can occur on the same bush or neighboring bushes. Some may be flowering and they can be examined even though they are super tiny. Students can just observe what they notice about the plant and ask them to share. Which plant community would you expect this plant to grow in? This bush is native to the area and there are some issues with it encroaching on meadows. Why do you think this has become a problem? What is different now that is causing this?

There are a few examples of Madrone (*Arbutus menziesii*) along the trail, so choose one that is large so everyone in the group can make more observations. What are the differences between this tree and a manzanita? What are the similarities? What are the main characteristics we can use to tell them apart? Madrones can grow burls after fire like manzanita and have similar cinnamon colored bark and bright green leaves. Madrones are usually a lot bigger than manzanita and have much bigger leaves. Madrones have been used for stomach aches, leaves and bark used topically for wounds, berries for food, wood for structures, and charcoal for gunpowder. These trees can also be seen in redwood forests whereas manzanita is more rare to see in that plant community.

There are Knobcone pines (*Pinus attenuata*) around and a few with fallen branches where cones and needles can be observed and touched. Pass around some needles and ask them to notice how many needles are in each group (3 needles) on what is called a fascicle. Point to the cones and how they are symmetrical from each other on the branches and are hugging the branches tightly. They look like handles or knobs attached to the trees. Explain how the cones need extreme heat to open their sap-sealed cones and that fire is the main source for that. Does it look like this tree has been recently burned? No? Then how do you think it could reproduce? We will talk about fire again later, so let this question linger unanswered.

At the top of the trail, there is a fork and on the left hand side there is some Yerba Buena (*Satureja douglasii*) growing. You can pick some of this to put in the thermos to steep. Keep going down the trail and there is a little clearing within a redwood grove where the class can all

meet up. If you are there early, have your group look at some leaves on the ground and use the handout to practice identifying them.

Meet together in the redwood grove, tea time and talk!

Duration: 40 mins

Sit in a big circle and pour everyone some yerba buena tea. While everyone takes a break, an instructor can read a story or poem that's inspiring and peaceful for the moment. A great story is a reading from *Braiding Sweetgrass* by Robin Wall Kimmerer, about how the Sky Woman that brings all the plants to Earth. Then start a discussion about geology and fire. On the hike up here, did anyone notice a sign of fire or recent fire? No? Why do you think that is? How does that change the environment we are in right now? Fire and absence of fire has a lot to do with plant communities here. Fire may seem like a disturbance, but the absence of fire is actually the disturbance that the plants here are dealing with. Without fire, the soil becomes nutrient poor and many seeds need fire to open and therefore can't germinate. Does anyone know why the plant community changed from evergreen to chaparral? What drives these different types of vegetation? Plant communities differentiate due to soil types! In some grasslands, there is a layer of clay in the soil that is impermeable to plants with deep roots which allows the grass and only the grass and shallowly rooting plants to thrive. Chaparral has sandier soils and forests have schist and loam. Soil types change due to different rocks that have been deposited from geologic processes and break down over time. These geologic processes are mostly earthquakes and plate tectonics.

Name Game!

Duration: 20 mins

This game is 'steal the bacon' but with plant specimens and their latin and common names. TA's will have collected plants along the way for this game. Form two groups and line up facing each other. Each pair facing each other is a number going down the line. So there a 1, 2, 3, etc. in each line. Lay out the plant specimens on the ground between the groups. Call out the name of a specimen and then the number of a group, and their task is to identify and retrieve the specimen. Change up the names from latin to common and ask basic ID questions like this plant has three needles or this trees bark can grow to be 1 foot thick.

Walk back down the trail

Duration: 20 Mins

During this time, reintroduce plants to your group. Review the names of plants and how we can identify them. Involve students by asking if they have any stories about some of these plants or if they have ever seen a giant redwood.

Regroup and Departure

Duration: 5 minutes

Make sure everyone made it to the North Remote Parking Lot. Ask if anyone has questions about the day and talk about next week. Then say farewell and allow them time to walk back towards the classroom before the class is officially over incase they have a class following this one.

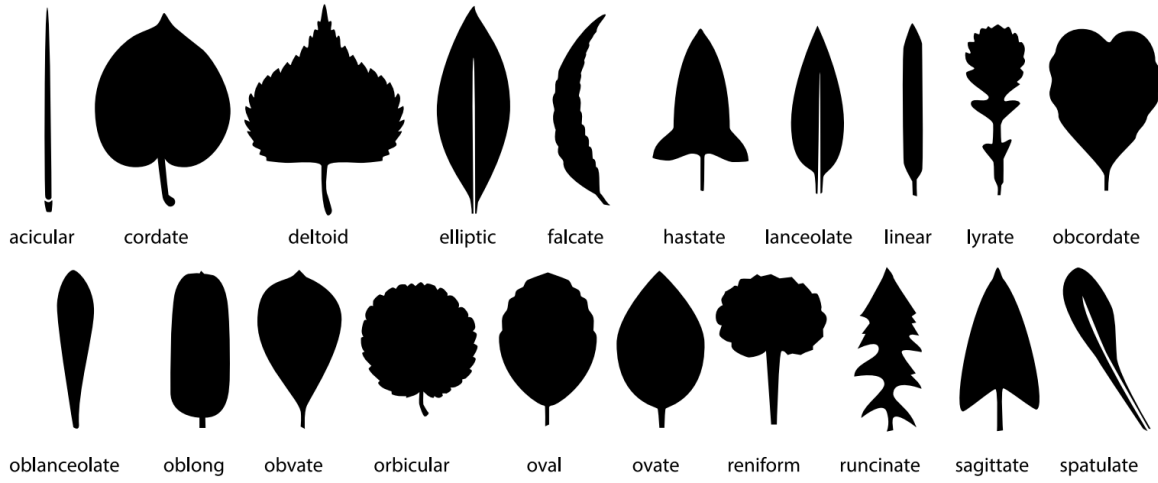
Bibliography:

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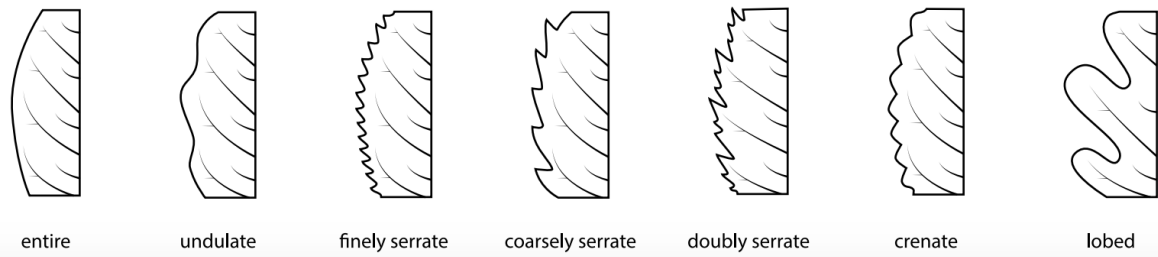
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Kimmerer, R.W. (2013). *Braiding Sweetgrass*. Skywoman Falling (pp. 3-5). Canada: Milkweed Editions.

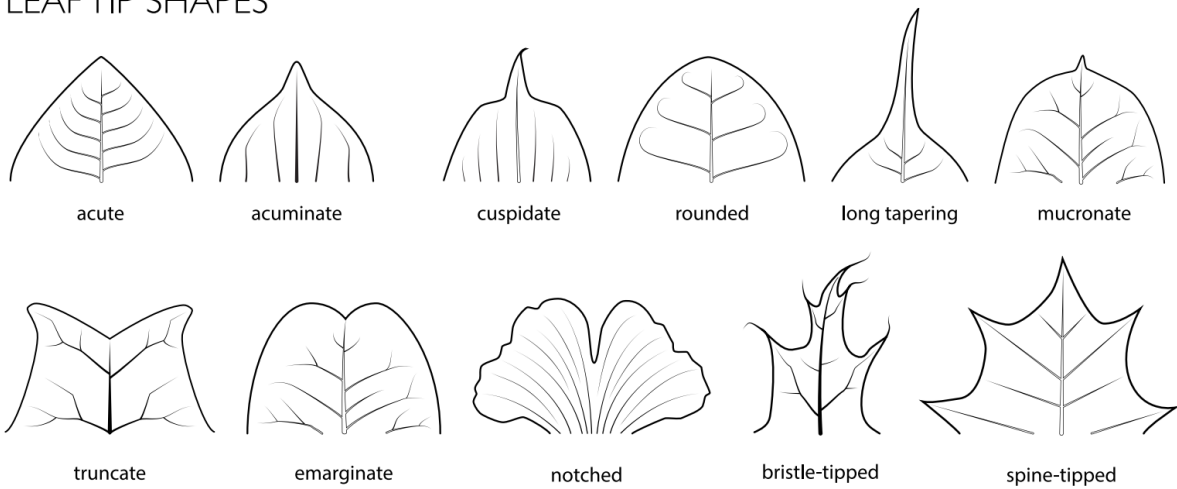
LEAF SHAPES



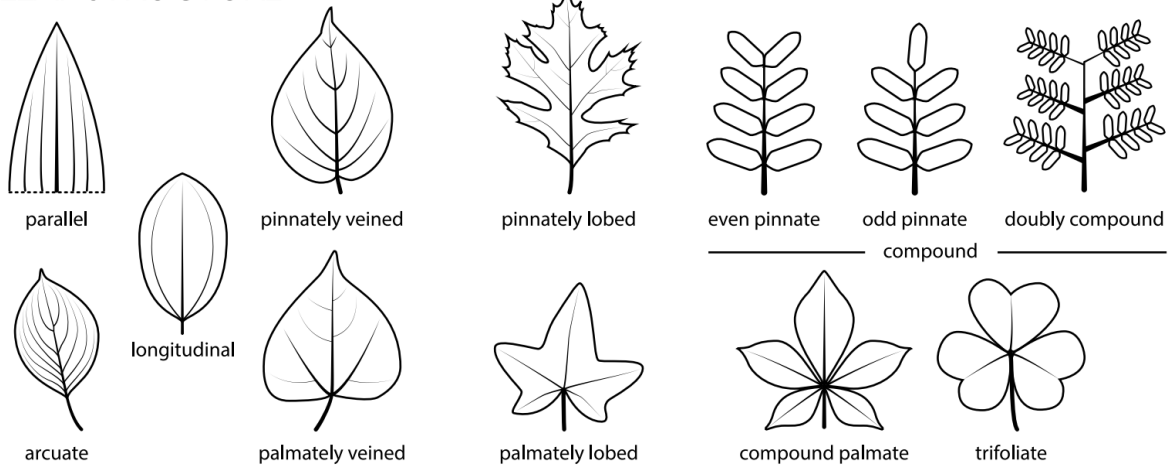
LEAF MARGINS



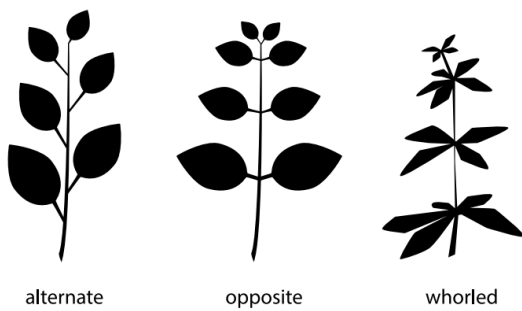
LEAF TIP SHAPES



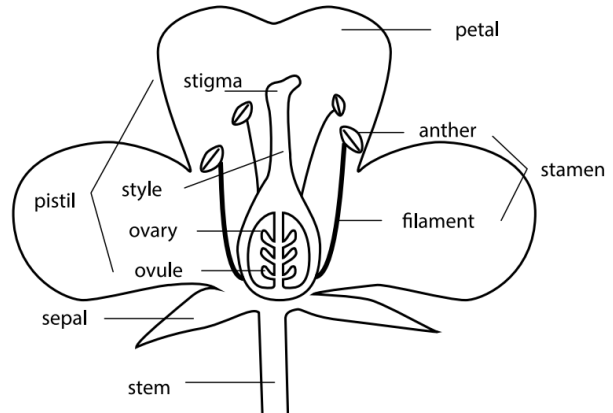
LEAF STRUCTURE



LEAF ARRANGEMENT



FLOWER ANATOMY



FLOWER ARRANGEMENTS

