

<b>BIOLOGY 103 – LABORATORY EXERCISE</b>	
<h1>1</h1>	<b>Name:</b>
	<b>Day &amp; Time of Assigned Lab:</b>
<h2>Campus Naturewalk</h2>	

### Learning Outcomes:

After completing this laboratory, you should be able to:

1. Be familiar with different plants growth forms
2. Be able to describe important characteristics used to identify plants
3. Be able to name the important abiotic components of the ecosystem
4. Recognize important native and non native plants on campus

### Activity 1:– Campus Naturewalk

#### Stop 1. Olive (*Olea europaea*) – (Oleaceae)

**Concept – Vegetative Characteristics** - The site currently occupies by Cañada College was previously an Olive Grove. Several olive trees remain, and even still bear fruit. In the Fall semester the College hosts a Olive and Art Festival. Olive trees are native to the Eastern Mediterranean, and were one of the first plants to be domesticated 7000 years ago. They were introduced into California by the Spanish Missionaries . The olive requires a long, hot growing season to properly ripen the fruit. Late spring frosts kill the blossoms, but sufficient winter chill is required to insure fruit set.

This is the climate in their native range, but it also allows them to be grown in other



Notes

regions of the world with 'Mediterranean' climates, such as South Africa and California. Virtually all U.S. commercial olive production is concentrated in California's Central Valley. Unlike other fruits olives cannot be eaten directly from the tree. The fruit contains a bitter compound called oleuropein that has to be removed by washing. Olive fruits that are to be processed as green olives are picked while they are still green but have reached full size. They can also be picked for processing at any later stage up through full ripeness. There are several classical ways of curing olives. A common method is the lye-cure process in which green or near-ripe olives are soaked in a series of lye (Sodium Hydroxide which is alkaline) solutions for a period of time to remove the bitter oleuropein and then transferred to water and finally a mild saline solution. For California canned commercial olives, black olives are identical to green olives. The black color is obtained by exposure to air after lye extraction and has nothing to do with ripeness.

1.a. Describe the leaves of an olive. Include observations on shape, color and arrangement (position on the twig relative to other leaves)

1.b. What are the characteristics of a Mediterranean climate? Name the four other regions in the world with Mediterranean climates. .

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## Stop 2 Rosemary (*Rosmarinus officinalis*) (*Lamiaceae*)



**Concept – Plant Taxonomy**—The name *rosemary* derives from the Latin name *rosmarinus*, which is from "dew" (*ros*) and "sea" (*marinus*), or "dew of the sea" because in many locations it needs no other water than the humidity carried by the sea breeze to live. Rosemary, like many aromatic culinary herbs, is a plant of the semiarid Mediterranean biome. Mediterranean climates are typified by long dry summers and cool most winters. Evergreen shrubs are the dominant plant growth form under these conditions. Small, thick leaves, absorb less heat, and lose less soil water than trees. The aroma of Rosemary, Thyme, and Oregano is due to chemicals that serve to protect the plants from insect damage. Referred to as plant secondary compounds, they are also the basis for medicinal uses of the plants, and indeed medicine. For example betulinic acid, found in the bark of Birch trees (*Betula* species) has been found to have anti-retroviral, anti-malarial, and anti-inflammatory properties.

2.a. To which botanical family does Rosemary belong? Name three other plants (common names) in the same family.

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2.b. What purpose might the aromatic chemicals of Rosemary serve the plant?

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### Stop 3 Irises (Iridaceae)

**Concept – Floral Characteristics -.** Not all plants have flowers, and there was a time in history when no plants at all had flowers. Conifers for example have cones, which produce pollen or seeds, they function as structures for sexual reproduction but they are not flowers. About 125 million years ago, primitive flowers appeared in the fossil record. In addition to producing pollen and eggs, the sex cells of plants, they had adaptations which encouraged other species to carry pollen from the flowers of one plant to another of the same species. In addition to flowers, flowering plants, (Angiosperms) had one more trick up their sleeves; fruit. Following fertilization the ovules develop into seeds, and the ovary grows into a structure with adaptations to facilitate seed dispersal. Various contrivances have evolved, including dehiscent seed pods that rupture scattering seeds around the parent plant, feather-like plumes to catch air currents, barbs and hooks to snag passing hairy beasts, or edible, juicy, and seed packed fruit, eaten and dispersed by a variety of animals. Flowering plants are divided into two large groups based upon numerous major differences in vegetative and floral morphology, **Monocotyledons v Dicotyledons**. The Monocotyledons (Liliopsida) have parallel leaf veins, whereas Dicotyledons have a reticulate (net-like) pattern of primary and secondary veins in leaves.

3.a. Describe the leaves of Irises. Include observations on shape and venation.

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3.b. Describe the fruit of irises. What is the purpose of fruit?

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**Stop 4 – Cork Oak – *Quercus suber* (Fagaceae)**

**Concept – Vegetative Characteristics** As the common name suggests the Cork Oak is the source of most of the world's commercial corks. The species name refers to the high concentration of the hydrophobic rubbery suberin that prevents water loss from the stems. Native to Southwest Europe and North Africa, the thick bark protects the living cambium from fire. Cork Oaks are grown commercially in Spain, Portugal, Algeria, Morocco, France and Italy. The

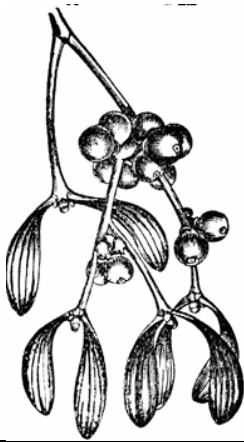
outerbark layer can be harvested every 9-12 years without damaging the tree. Cork is thus a sustainable resource.

4.a. How is it possible to harvest cork from oaks without killing the trees?

4.b. What characteristics distinguish trees from other plants?

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**Stop 5 – Parasitic Plants – Mistletoe *Phoradendron villosum* (Viscaceae)**



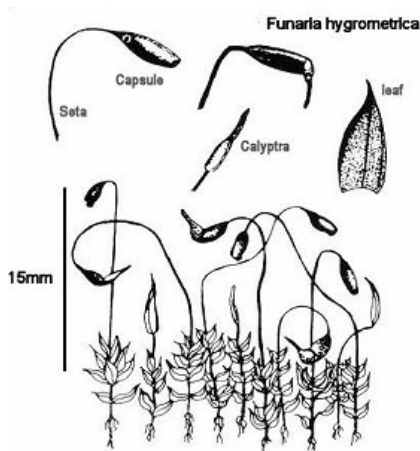
**Concept – Ecological Interactions** - Mistletoes are hemi-parasites. Their roots penetrate the bark of their host tree, which they rely upon for their water and nutrients, but they photosynthesize to produce their own sugars. Mistletoe is evergreen, and is often most apparent in winter when it's host tree's branches are bare. Along with evergreen holly, and evergreen conifers these plants were used to celebrate Christmas, and even pre-christian mid-winter festivals in Europe. The green appearance of these plants symbolized that Spring would return and winter would end.

5.a. What resources does mistletoe gain from the host plant?

5.b. In addition to mistletoe name two more species of parasitic plant that grow in California (common names AND scientific names).

Notes

**Stop 6 – Non-vascular plants – Bryophytes - Mosses**



**Concept – Plant Diversity** - Mosses are primitive plants that have no vascular tissue to conduct water internally. The lack of vascular tissue restricts the height to which mosses can grow. They also lack true leaves, true roots, flowers, or seeds. However, mosses are abundant and successful plants.

They reproduce via sperm that leaves male reproductive structures, antheridia and swims through a film of water to fertilize ova in female reproductive structures, archegonia.

6.a. Describe the type of locations where mosses tend to grow, why are they restricted to only certain locations?

6.b. Mosses are described as Poikilohydric plants, what does this mean, and describe why this is a useful adaptation.

Notes

**Stop 7 – Shrubs - Manzanita *Arctostaphylos* sp (Ericaceae)**



**Concept – Plant Adaptations** - Both trees and shrubs are growth forms of perennial plants. They have woody tissue that provides support to branches and leaves are spread out on twigs to capture light. However, trees generally have a single main stem (or trunk), that branches above the ground level, whereas shrubs have several stems all branching from the ground.

Arctostaphylos is a large genus in the Heather family Ericaceae. All members of this family have hanging bell-shaped flowers, followed by seedy berry-like fruit. Blueberries, Cranberries, and Huckleberries are in the same families. There are many different species found across the

state in different communities. Several species grow in chaparral communities and have evolved adaptations to cope with the long dry summers, heat, and frequent fires that characterize this ecosystem.

7.a. What is the distinction between a tree and a shrub? Which California Vegetation type is dominated by drought adapted shrubs?

7.b. Describe the orientation of Manzanita leaves relative to the sun. Discuss how this can benefit the plant.

Notes

**Stop 8 - Abiotic Factors –**

**Concept – The Abiotic Environment** - All ecosystems have two components; the living or biotic factors- other species, and the non-living or abiotic factors. Both exert strong influences on organisms living in that particular ecosystem. Climate, including temperature and precipitation , soil chemistry, and even wind are abiotic factors.

8.a. Name and describe four abiotic factors of the environment.

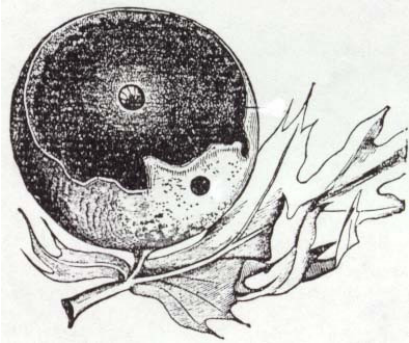
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8.b. Describe how the properties of soil can differ from location to location. How does soil properties affect plant growth?

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**Stop 9 – Parasitic Relationships- Plant Galls**



**Concept – Ecological Interactions** The buff colored growths on Valley oak are made by the oak in response to the activities of a parasitic wasp known as the California Oak Apple Gall Wasp. The female wasp lays eggs inside the twigs. Chemicals secreted by the larvae (or mother) act to stimulate cell growth (much like a tumor). Each gall wasp causes the development of a gall unique to that one species. In fact the different species of wasp all look much the same. Galls can

occur on a wide range of plants, on both stems and leaves. They can be caused by a variety of different insects including, moths, aphids, sawfly, mites and midges, Although encased inside the plant tissues gall larvae are protected from many predators, they themselves can be parasitized themselves by hyperparasitoid wasps that lay eggs inside the gall-forming larvae. You will also observe red leaf galls on some of the Manzanitas. They are caused by an aphid.

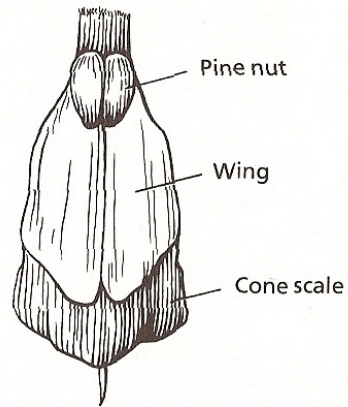
9.a. What is a gall?

9.b. Describe the nature of the relationship between plants and gall forming insects.

Notes

**Stop 10 Non-flowering plants – Gymnosperms - Coniferous Trees–**

**Concept – Plant Diversity** Gymnosperms literally means “naked seeds” Seeds are borne on bracts, rather than being enclosed inside a fruit as in Flowering plants, the Angiosperms. Conifers are trees whose sex cells are housed in cones rather than flowers. Most coniferous trees bear male, or pollen cones and female, or seed, cones. They tend to have linear or needle-shaped leaves, most of which are evergreen. In Pines seed cones take 2 years to develop, being green the first year, then brown and dry when mature. There are many different species of pines in California. Some species have their needles organized in bundles of 3 or 5, and the size, and structure of the cones vary. Coulter Pine has needles in threes, with both needles and cones measuring 25 cm long .



10.a. What does ‘conifer’ mean, and what are the functions of the different types of cones they produce?

10.b. In addition to Pines, name 4 other types of coniferous trees.

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