

1. Botany Activity: "Plant Parts"

Key Concepts: All plants have the same basic parts.
We need to understand how the parts of plants relate to each other in order for us to propagate our plants

Lesson Objectives: Students will be able to:

- Define the terms: seed, root, stem, leaf, flower, fruit
- Understand the lifecycle of plants
- Identify plant parts

Time Required: 1-2 class periods + homework

Materials Needed: A sample potted plant, soil washed off
Various "Mystery" fruit and vegetable examples of plant parts
White paper or notebook for sketches
Worksheet
Newspaper on tables

Standards: Domain I:

- Science as Inquiry 1
- Habits of Mind 2

Domain II:

- Organisms and Development 4, 6, 9

Teacher Background:

General Information:

There are two types of seed producing plants that exist today: gymnosperms (mostly conifers, cone producing plants like the Norfolk Island Pine, for example) and angiosperms (all flowering plants). Since *Metrosideros polymorpha*, or 'Ohi'a lehua, is an angiosperm, we will focus on flowering plants. Flowering plants are the most recently evolved and diversified of the green land plants (100-150 million years old in the fossil record).

The vegetative part of the plant consists of two main systems: The Root System and The Shoot System (stems and leaves). The Roots anchor plants into the ground, absorb water, and mineral nutrients for the rest of the plant to use. Stems support leaves. They carry water and nutrients from the roots to the leaves, and they transport the food (sugar) produced in the leaves to other areas of the plant for storage or growth.

The Reproductive system includes flowers, fruits, and seeds. Flowers are modified leaves. The very "showy" or fragrant flowers are as such for the purpose of attracting pollinators. Wind pollinated flowers (like those of grasses) are less conspicuous. The fruits and seeds (formerly eggs/ovules) are produced when the

female parts of the flower have been fertilized by pollen (like sperm in human context).

Plant Parts and other Terminology:

We will expect the students to be able to be familiar with and describe the following bold basic flowering plant parts:

- a. **Seed:** a structure that contains an embryo resulting from successful sexual reproduction; capable of producing a new plant
- b. **Root:** provides anchor in substrate, and mineral, and water uptake
- c. **Stem:** major supporting structure
- d. **Leaf:** major photosynthetic (food producing) organ
- e. **Flower:** “a modified leaf” used for sexual reproduction of plants
- f. **Fruit:** attached to the flower, a ripe ovary, contains seeds
- g. **Axillary Bud:** located in the axis (angle) of each petiole, can grow out to form branches, also called “lateral bud”
- h. **Apical Bud:** located at the tip of each stem, also called “terminal bud”
- t. **Node:** the place where the leaf is attached to the stem
- j. **Internode:** the portion of the stem between two nodes
- k. **Petiole:** the stalk of the leaf
- l. **Blade:** flattened, green portion of the leaf
- m. **Veins:** vascular system of the leaf, transport system for water, minerals, and sugar
- n. **Leaf scar:** where leaves have fallen off of the plant from
- o. **Terminal bud scale scars:** mark the location of a former terminal bud from a previous year. The length between two bud scars shows the length of growth for the year. This is highly visible on *‘Ohi ‘a lehua*
- p. **Root Hairs:** very fine extensions of the root surface
- q. **Tap Root:** a large main root with several other smaller roots shooting off of it
- r. **Fibrous Root:** lots of thin roots spreading everywhere in shallow depths of soil (ex. Grass)
- s. **Meristem:** actively dividing tissue at the tips of roots and shoots
- t. **Stomata:** openings predominantly on the undersurface of leaves that allow for gas exchange (and sometimes stems) controlled by “guard cells”
- u. **Pollination:** the process of the female and male parts (pollen transferred to the stigma) of a flower meeting successfully to lead to fertilization of the plant and production of fruits.
- v. **Dispersal:** The process by which plants get around, easily remembered as “The Three “W’s”—wind, wings, water.

Lesson Notes:

- *Bring a few plants in (possibly from Walmart or pre-cultivated at home).
- *Ask students what they know about the plants, what they see, how they know what parts are what (build definitions)
- *Divide students into groups of 4 and distribute 2-3 “mystery plant parts” for them to decide what parts they are.

*Do a “jigsaw” with the students for them to share what they learned about the plant parts (i.e. in group #1 you gave each student a letter: A, B, C, D. When it is time for them to share, all “A’s” get together, all “B’s” get together, etc.)

SAMPLE MYSTERY PLANT PARTS	
Item	Plant Part (Root, Stem, or Leaf)
Potato Tuber	Stem: the “eyes” are the buds, note the leaf scar tissue under the “eyes”
Carrot	Root: there are branch root, you can see the stem at the top with leaves coming out of it
Onion	Leaf: it has no scars, the photosynthesizing (green) leaves grow out from it
Ginger Rhizome	Stem: the rings and the axillary buds are indicators
Celery “Stalk”	Leaf: it is the petiole, the axillary bud is at the base of the stalk we eat
Cactus “Pad”	Stem: the prickles are the modified leaves/buds, the stem does the photosynthesizing
Taro	Stem: it has leaf scars
Apple	Fruit: Notice the flower scar at the base and the seeds within it
Tomato	Fruit: it is a berry, notice seeds inside
Peanut	Seed: the inside of a peanut pod (fruit/legume/shell) is the part we eat, the seed
Grass	Flower: pick a grass that has “gone to seed” or shows an inflorescence. Each little part of that inflorescence is a modified flower.

*Guide them through pictorial life cycle of a plant, starting from seed, all the way to pollination, fruit production, and back to seeds. Have them do the jigsaw puzzle and let them color it in once completed.

*Let students do the *kalo* worksheet in which they match plant parts and Hawaiian plant part names with English names.

*Have students go outside and observe a plant of choice. Give them 5-7 minutes to draw and label all the parts (like they did with the worksheet)

*Share what they observed back in class

***As Homework:** Ask the students to make similar observations (3-5) that they did on campus around their homes. Look in the yard, in the refrigerator, or anywhere they find plant parts. If they are super eager, suggest that they try to bring a new “mystery” plant part in for the class to figure out. Show and tell in class: describe the item (plant or plant part) that the student brings in. They should explain what it is and why they know what the plant or plant part of choice is.

Created by the GK-12 Program; Ecology, Evolution and Conservation Biology Program, University of Hawaii. On the web at: <http://www.hawaii.edu/gk-12/evolution>