

Leafing through the Garden

Grade 3-6

Supplies

- Sketch pad
- Colored pencils or crayons
- Pencil
- Leafing Through Activity sheet

Background information

The California flora is incredibly diverse and includes over 5,000 species of native plants. California is one of the world's biodiversity 'hot spots' due, in great part, to the variety of habitats formed as a result of our tremendous geographic diversity. California ranges in elevation from 282 ft below sea level in Death Valley to 14,505 ft above sea level at the top of Mount Whitney. Our mountain ranges vary in age and type parent rock material, and as these rocks break down, many different types of soil are formed. Other factors such as orientation of the range (east-west or north-south axis) and slope aspect (north or south facing), the presence or absence of fog, and the amount of salt in the air are important in determining which plant species can survive in a particular area. In California, evolutionary processes in the resulting habitats have led to incredible diversification within familiar genera such as the oaks, manzanitas, ceanothus, lupines, and sages. Within the oak genus, for example, there are species that grow near the coast, in inland valleys, in desert areas, on the islands, and in the high mountains. Each of California's different oak species is well adapted to the particular combination of environmental factors that prevail in its habitat. Some native California oaks are evergreen while others are deciduous; some have prickly leaves and others have lobed leaves; some are large, and others are smaller multi-trunked shrubs.

At the Santa Barbara Botanic Garden

Ask students to take a moment to look around at the different kinds of leaves they see. Leaves give us clues as to how a plant is adapted to its environment. The variety of leaves also illustrates the incredible diversity of the California flora. What is the adaptive significance of the leaf features that students observe? How does the plants' form and function relate to its habitat? How does this compare to other plants students have seen at home or school? If they haven't noticed leaves in these places, ask them to make some observations in the next few days, and then ask them to compare what they see to the native plants in the Garden.

Examples of leaves found in the Garden that demonstrate diversity are:

- Chaparral yucca
- Coast live oak
- Valley oak
- White sage
- Yerba Buena
- Lemonade berry
- Cattail
- Pine
- Spice bush

Ask students to work in groups of two or three and find leaves that exemplify as many of the descriptive terms on the activity sheet as possible. In each box they should make a leaf rubbing or sketch of a leaf. On the line above their rubbing or sketch they should write one or two of the descriptive words from the following list. At the end of the activity students will gather to discuss the range of leaf forms and adaptations they have observed, and have a group discussion about the possible advantages to each leaf form.

Descriptive leaf features

- Deciduous / Evergreen
- Thick / Thin
- Tough / Delicate
- Small / Large
- Fibrous / Not fibrous
- Succulent / Not succulent
- Prickly edges / Smooth edges
- Hairy surface / Hairless surface
- Shiny surface / Dull surface
- Dark green / Gray / Other
- Aromatic / Odorless

Following are a few challenges to plant survival that exist in different parts of California. What adaptations might leaves have to compete successfully?

- Grazing animals
- Very high temperatures
- Very low temperatures
- Scarce moisture (seasonal drought)
- Salty soil and air
- Insect herbivores

Tips for discussion:

- Transparent hairs reflect light.
- Hairs slow the flow of air around the stomata. A more humid layer of air may thus remain next to the leaf and this will reduce loss of water vapor from the leaf.
- Sharp hairs can impede herbivorous insects.
- Prickles on leaf edges may deter grazing animals such as grasshoppers or deer.
- Tough waxy cuticle layers on leaves help them to retain moisture and reflect light.
- Leaf fragrance, associated with strong chemicals in leaves, may deter herbivores.

After your visit

Ask students to identify some characteristics of the plants at your school based on their leaves and other features. Are these plants well adapted to California's climate? Assign the different species to your students for a research report. Include horticultural and botanical information and distribution maps in the report.