

3 - 5 Life Science
Southern Nevada Regional Professional Development Program



Desert Plant Adaptations

INTRODUCTION

As desert dwellers, our students need to develop an appreciation of their environment. From this appreciation will spring a desire to protect this special place and its flora and fauna. Water conservation is a corollary lesson. This lesson is part of a cluster of lessons that can be taught alone or in conjunction with a trip to Red Rock or another natural area.

WHERE'S THE SCIENCE?

All living creatures develop ways to adapt to the unique conditions present in their ecosystems. Elementary age students should have had enough experiences with growing plants and caring for animals to be aware that water is a requirement of all living things. However, they may not fully realize that the desert environment is too hot and dry for many common household or backyard plants to exist unaided. Students should also be aware that many plants do survive in natural settings (i.e., not man-made or managed) in this climate. The most striking variable is the small amount of annual rainfall, typically about 4 inches or less in a desert. In order to survive with so little water, desert plants have developed a range of specialized structures that enable them to conserve moisture. These include a shallow root system, small leaves, and "pleats" that expand to hold moisture when it rains. This lesson introduces children to one of these water-conserving adaptations: thick skins. All plants experience *transpiration*, the loss of water through *stomata* (pores) in their leaves. The leaves of many desert plants have a thick, waxy coating that protects them and reduces the amount of water they lose through *evaporation*.



MATERIALS

- Pictures of desert plants
- Potted cacti to observe
- Hand lenses
- Sponges
- Saucers
- Petroleum jelly
- Water



PROCEDURES

1. Introduce the lesson by activating prior knowledge about the desert. A bubble or circle map would be a good way to do this. Ask the students, “How do plants survive in a hot, dry, desert?” After discussion, confirm/guide students’ predictions that desert plants are different from other plants.
2. Display several pictures of desert plants. Have available at least two potted cacti for observation: one with spines and an aloe vera-type plant that may be touched. Allow some time to explore/observe pictures and plants in small groups, cautioning students not to handle the spiny cactus. They should use the hand-lenses. Record all observations in a science notebook to be shared later. Note: the teacher may choose to make a cross-section of an aloe vera leaf so that students can observe the moist interior and thick skin.
3. Bring the students together to discuss the findings in their science notebooks. Confirm that the “skin” of a cactus can be thick and waxy and that this helps the plants keep moisture inside. Help students set up an investigation that will demonstrate how this happens. Show them the materials to be used: 2 sponges, water, 2 saucers, and petroleum jelly. Brainstorm how to use the materials to show waxy leaves keep the moisture in a plant. Distribute materials to groups.
4. Cut the sponges in half prior to the activity. Model how to place one half on each of two saucers. One sponge will be plain. Cover the top and sides of the other half with petroleum jelly and place it, uncoated side down, on a separate saucer.
5. Pour $\frac{1}{4}$ cup of water into each saucer. Pour off the excess water that the sponges don’t absorb.

6. Check the sponges periodically to keep track of how long it takes for the sponges to dry out. Students should notice that the uncoated ones dry first. Students should record their observations in a science notebook.

7. During discussion, ask the students how the coated sponge is similar to the leaves of a desert plant. How is the uncoated sponge different? During this discussion the following vocabulary should be introduced:
 - Evaporation:** The process by which liquid water changes into water vapor.
 - Transpiration:** the passage of watery vapor from a living body (as of a plant) through a membrane or pores.
 - Stomata:** the pore openings under plant leaves that open and close to release oxygen and excess water.
 - Adaptation:** a characteristic or trait that helps an organism survive in its environment.

ASSESSMENT

Teacher observation of collection procedures and ability of the students to verbalize or write about one way in which desert plants have adapted to survive in their environment.

ADDITIONAL RESOURCES

http://www.desertusa.com/du_plantsurv.html

Informational site about desert plants.

<http://www.cactusmuseum.com/survival.asp>

A website devoted to cactus survival information.

<http://www.urbanext.uiuc.edu/gpe/index.html>

The Great Plant Escape – identifies plant parts and how they grow.

NEVADA STATE SCIENCE STANDARDS

N5A1 Students know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method.

E/S

N5A5 Students know how to plan and conduct a safe and simple investigation. E/S

N5B3 Students know the benefits of working with a team and sharing findings. E/L

L5C5 Students know plants and animals have adaptations allowing them to survive in specific ecosystems. E/S

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