

# BIOLOGY OF PLANTS

## HOW PLANTS LIVE IN DIFFERENT PLACES Activities

### WHERE DO I BELONG?

Students classify pictures of habitats as deserts, tropical rain forests, or other areas.

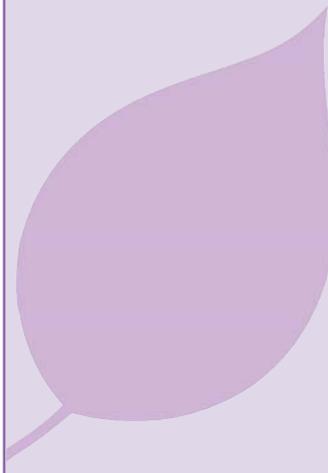
#### Materials:

1. 3 large drawings of thermometers
2. 1 very large raindrop cut-out
3. 1 very small raindrop cut-out
4. 3 large sun cut-outs (place screen or cellophane over one of them)
5. Pictures of desert scenery
6. Pictures of tropical rain forest scenery
7. Pictures or examples of desert plants
8. Pictures or examples of tropical rain forest plants

#### Procedure:

1. Discuss different habitats, especially the desert and tropical rain forest habitats\*. Help students identify desert with a hot, dry, sunny place. Help students identify tropical rain forest as a warm, wet, shady place.
2. Classify the area you live.
3. Post cut-outs and drawings for each habitat:
  - Desert: Sun, thermometer with very high temperature, small raindrop
  - Tropical Rain Forest: Sun with screen, thermometer with warm temperature, large raindrop
  - Your Habitat: Sun (screened, covered, or full), thermometer (both hot and cold, if you have seasons), raindrop of appropriate size
4. For very young children: Provide children with pictures of local, desert, and tropical rain forest habitats and plants. Ask students to separate them by the the places they come from. Create a bulletin board panel for each habitat.  
  
For older children: Ask the students to bring in or cut out pictures of the three habitat and plant types. Identify the location of each. Create a collage for one of the habitats.

\* Other habitats, such as grasslands or tundra, may also be included.



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### WATER OUT

Students will observe water loss through leaves (transpiration).

#### Materials (for each group):

1. Two living plants of the same type (using *Pothos* or *Dracaena* is best).
2. Silk/plastic plant similar to living plants (put in pot with soil)
3. Plastic bags (produce bags may work well)
4. Rubber bands or long twist ties
5. Petroleum jelly

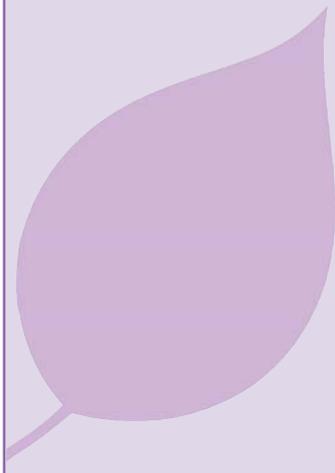
#### Procedure:

1. Discuss how plants get water. Ask if any of the students might know how plants lose water. Remind students that carbon dioxide goes into plants through holes in the leaf surface. Plants also give off oxygen through these same holes. If the idea is not suggested, ask the students if water might evaporate from the leaves through the same holes.
2. Give each group their 2 living plants and 1 silk/plastic plant.
3. Have students put petroleum jelly on the bottom of all of the leaves on one of their living plants (this will cover most of the stomates). Have the students water all three plants well—but do not make the soil sopping wet. Cover each of the plants with a plastic bag. Secure it to the base of the stem, or the pot, with rubber bands or long twist ties.
5. Observe all three plants in 2–3 days. What has happened? Ask where the water went.
6. Make a chart to show results:

	Water on bag (Y/N)	Soil (wet/dry)
Living plant without jelly		
Living plants with jelly		
Artificial plant		

The silk plant has no roots to carry water to leaves—its soil will be very damp. The plant with no jelly on its leaves should have droplets of transpired water on the inside of the bag. The plant with jelly on its leaves should have no water on bag, but soil may be drier than the artificial plant.

8. Discuss with students how the water got on the bag. How did it come out of the plant? Point out that the one with jelly came out differently. What does that suggest?
9. Extension: Coat the bottom of several leaves with fingernail polish. When dry, peel this off and look at underside of leaf with a hand lens or microscope to see the holes (stomates) where water and gases are lost. Compare to a leaf that has not been coated with polish.



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## HOW PLANTS LIVE IN DIFFERENT PLACES Activities

### WATER LOSS AND LEAF STRUCTURE

Students will explore the roles of succulence and tough outer coverings in preventing water loss. Students will infer that leaves like these help plants survive in dry places.

#### Materials (for each group):

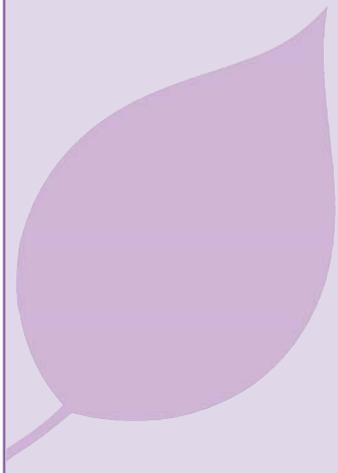
1. 3 sponges ( $4\frac{3}{4} \times 3 \times \frac{1}{16}$ )
2. 1 sponge ( $4\frac{3}{4} \times 3 \times 1\frac{1}{2}$ )
3. 1 plastic bag
4. 2 dishes large enough to hold sponges
5. 2 measuring cups or graduated cylinders
6. Water

#### Procedure for Succulence:

1. Give each group one large and one small sponge. Have them put each sponge in a dish. Have students pour equal amounts of water over each sponge. Allow the sponges to sit in the water for a minute or so.
2. Have students squeeze the thin sponge into a cup. How much did it hold? Repeat with the thicker sponge. Put the measuring cups next to each other. Which one has more water? (Older children can subtract to measure how much more the thick sponge holds.) Which sponge will dry out faster?
3. Remind the class that some plants live in places with lots of water, while others live in places with very little water. Where would thick leaves be better? Thin leaves? Why? Thick leaves like thick sponges can hold a large amount of water. In places where rain falls infrequently, plants with thick, sponge-like succulent leaves survive the droughts.

#### Procedure for Leaf Coverings:

1. Give each group two thin dry sponges. Place each in a dish. Pour 250 mL of water over each sponge. Allow the sponges to sit in the water for a minute or so.
2. Have students carefully place one sponge in a plastic bag.
3. Now squeeze each sponge over measuring cups. Compare the amount of water which comes out.
4. Which is a better way to keep water in the sponge? In this demonstration, the bag acts like a tough waxy outer coating on a leaf, keeping moisture inside. Discuss the role of leaf shape and covering in keeping plants from losing water in dry places.



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## HOW PLANTS LIVE IN DIFFERENT PLACES Activities

### WATER LOSS AND LEAF SHAPE

Students will observe that leaf shape and coating can increase runoff of extra water. Students will infer that leaves which shed water quickly keep plants healthy in very damp climates.

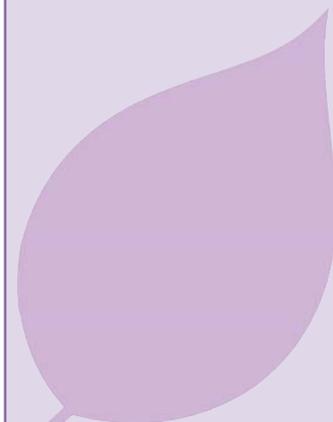
#### Materials:

1. Leaf patterns (next page)
2. Scissors
3. Construction paper
4. Wax paper
5. Water mister

#### Procedure:

1. Talk with class about the shapes of leaves they see around their school and home. (You might have them bring in samples.) Is the shape of a leaf important? Discuss reasons leaf shape may or may not be important for the survival of the plant. Suggest that they can find out by an experiment.
2. Trace the leaf patterns on the following pages so your students can use them.
3. Have each group of students cut out a set of patterns in both construction and waxed paper. (You may also have them use some large leaves found in your area as patterns.)
4. Have students work first with the construction paper leaves. Mist each with water and observe which one sheds water best. Compare results. (The heart-shaped drip-tip, pleated fan-shape, fern, and split-shaped leaves should do the best.)
5. Repeat with wax paper leaves to compare with the construction paper ones. (The waxed coating should help leaves shed water.)
6. Ask the students how leaves that shed water well might help plants in wet places survive? (Leaves which shed water and dry quickly would be less likely to mold or mildew or be settled by small plants.)

*Note: As we have seen in this activity and the previous one, waxy coatings can be beneficial for both desert and rain forest plants. In the desert, a waxy coating keeps moisture in the plant; in the rain forest, a waxy coating repels moisture which would otherwise damage the plant.*

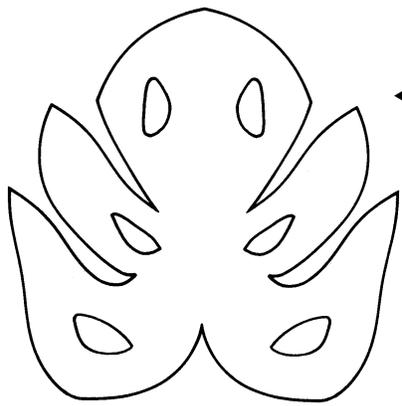


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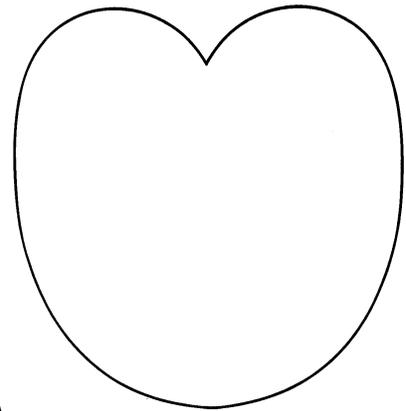
## HOW PLANTS LIVE IN DIFFERENT PLACES Activities

### WATER LOSS AND LEAF SHAPE—CONTINUED

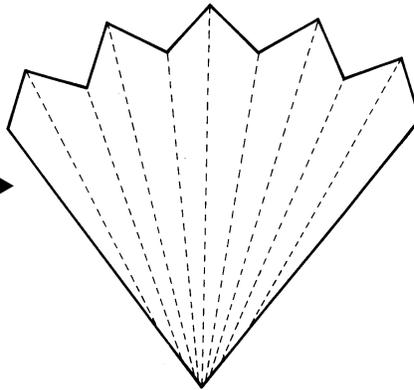
#### LEAF PATTERNS



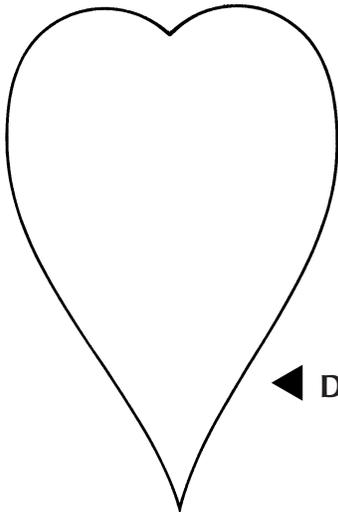
◀ **Split Leaf**  
(Cut out holes)



**Large Round Leaf** ▶



**Fan-shaped Palm** ▶  
(Cut out and pleat  
along the dotted lines)



◀ **Drip-tip Leaf**

**Fern** ▶  
(Fold paper in  
half and cut on  
the fold for a  
two-sided fern)

