19-1 What Do the Inside Parts of Leaves Look Like?

A leaf is one of the organs of a plant. The main function of a leaf is to make food for the rest of the plant. The food is carried to other plant parts. What parts of a leaf make and carry food?

Since leaves are organs, they are made of many different kinds of tissues. In leaves these tissues appear as layers of cells. Each tissue has a specific function and the shape of the cells in the tissue is related to its function. Some cells look like small boxes stacked side by side, while others are long and balloon-shaped. Certain cells are round and loosely packed while others look like small tubes stacked together.

EXPLORATION

OBJECTIVES
In this exercise, you will:
a. build a model of the structure of a leaf.
b. compare the model with the cells of a leaf as seen through the microscope.

KEYWORDS
Define the following keywords:
epidermis
palisade layer
spongy layer
stoma

MATERIALS
scissors
1 sheet white paper
prepared slide of leaf
colored pencils: red, blue, purple, yellow,
microscope tan, light green, dark green
transparent tape

PROCEDURE
Part A. Making a Model of a Leaf
1. Figure 1 shows the different cell layers of a leaf. Your teacher will provide you with a copy to color as follows:
a. waxy layer—purple
b. upper epidermis layer—yellow
c. lower epidermis layer—tan
d. spongy layer—light green
e. palisade layer—dark green
f. xylem—red
g. phloem—blue
h. guard cells—dark green
2. Cut out the six layers of your colored copy of Figure 1. Cut along the dotted lines or follow the outlines of the cell layers.
3. Assemble your model of a leaf using Figure 19-5 on page 401 in your text.
4. Starting with the upper epidermis, tape each layer onto the blank sheet of paper. (HINT: The xylem and phloem fit together like parts of a puzzle.)
5. Label your leaf model by using the key in step 1.

Part B. Examining the Tissues of a Leaf
1. Examine the prepared slide of a leaf cross section on the low power of a microscope.
2. Locate and identify the six cell layers in the leaf section.
3. Draw a small section of the leaf that you see through the microscope on low power in the space provided. Label the parts of this leaf drawing by using the key in step 1.

FIGURE 2. Parts of a leaf

QUESTIONS
1. List the job of each of the following leaf parts:
   a. waxy layer
   b. upper and lower epidermis layers
   c. guard cell
   d. spongy layer
e. palisade layer

f. xylem

g. phloem

h. stoma

2. How many cell layers thick are the upper and lower epidermis?

3. Is the waxy layer thicker or thinner than the epidermis?

4. How is the waxy layer similar to a plastic bag?

5. Describe the differences in the shapes of the kinds of leaf cells that make food.

6. Where does the phloem get the food that it carries to the stem and roots?

7. Tell which cells in leaves
   a. are box-shaped.
   b. are shaped like balloons.
   c. have many air spaces around them.
   d. are covered with wax.

3. What would happen to the gases and water in a leaf if the guard cells were closer together, that is, if the stoma were smaller than it is?

3. Many houseplants have very thick, waxy leaves. They do not wilt as quickly as houseplants with thinner leaves. Explain why.

0. The celery stalks that you eat are leaf stalks. What kind of cells are the “strings” inside the celery?
FIGURE 1. Tissue layers of a leaf

- Waxy layer
- Upper epidermis
- Epidermis layers
- Lower epidermis
  - Guard cells
- Waxy layer
- Palisade layer
- Spongy layer
- Phloem
- Xylem