

Student Laboratory Packet

How Plant and Animal Cells Differ

A Laboratory Activity for the Living Environment

Background

Although plant and animal cells have many structures in common, they also have basic differences. Plant cells have a rigid cell wall, and if they are green, they also have *chloroplasts*. Animal cells lack both a cell wall and chloroplasts. They also lack the *central vacuole* common to plant cells.

You will observe and compare animal cells and plant cells. You will first examine epithelial cells from the inside of your cheek. Epithelium is a type of tissue that covers the surfaces of many organs and cavities of the body.

You will then examine cells from a leaf of a plant. The cells of this plant are green because they contain the pigment, *chlorophyll*. Chlorophyll, which is found in chloroplasts within each cell, enables plants to manufacture their own food.

Objectives

In this activity you will:

- Observe human epithelial cells and plant cells

Describe the differences between animal cells and plant cells.

Procedures and Observations

PART I. HUMAN EPITHELIAL CELLS _____

1. Place a drop of water on a clean slide. Obtain epithelial cells by gently scraping the inside of your cheek with a clean toothpick as shown in Figure 1. **CAUTION:** *Never reuse a toothpick or put anything in your mouth which may not be clean.* Stir the material from the toothpick in the drop of water on the slide. Then immediately break the toothpick in half and throw it away.

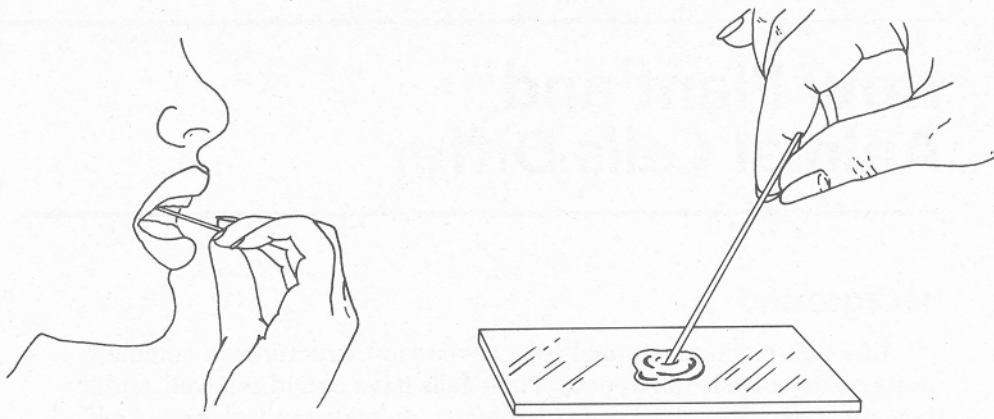
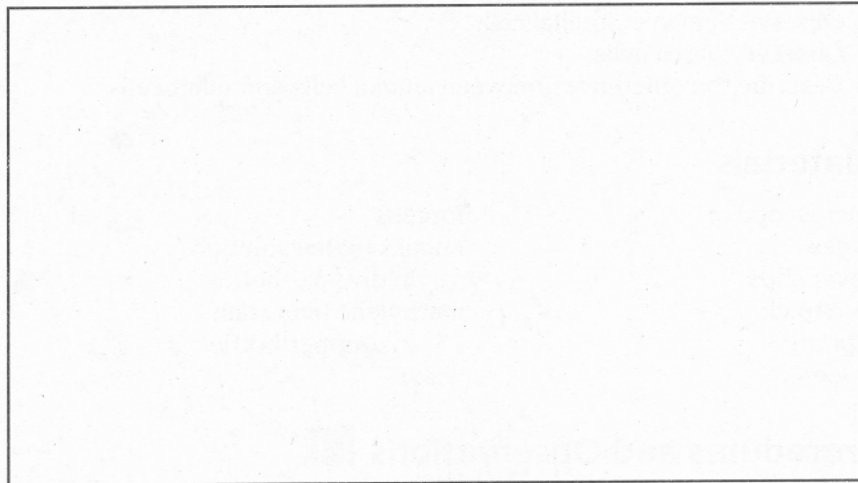


Figure 1

2. Add a small drop of methylene blue stain to the slide. **CAUTION:** *Stain can damage clothing and discolor skin.* Use a clean toothpick to stir the cells on the slide, then immediately break the toothpick and throw it away. Carefully place a cover slip on the slide. Examine the slide under low power. When you find some cells that are separate from each other, examine them under high power. Recall that you may have to adjust the diaphragm to reduce the intensity of the light.
 - a. *Make a drawing of two or three cells as they appear under high power. Label the nucleus, cytoplasm, and cell membrane of one of the cells.*



b. *What is the shape of the cells?*

c. *Describe the appearance of the cytoplasm.*

PART II. PLANT LEAF CELLS

1. Break off a small leaf near the tip of an elodea plant. With a forceps place the entire leaf in a drop of water on a clean slide. Add a cover slip. See Figure 2.

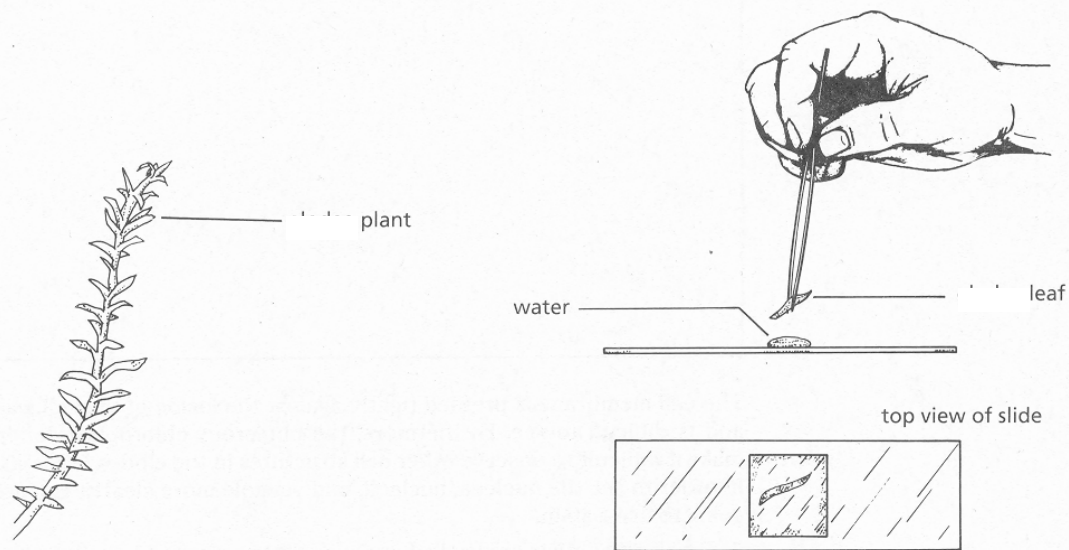


Figure 2

2. Examine the leaf under low power.

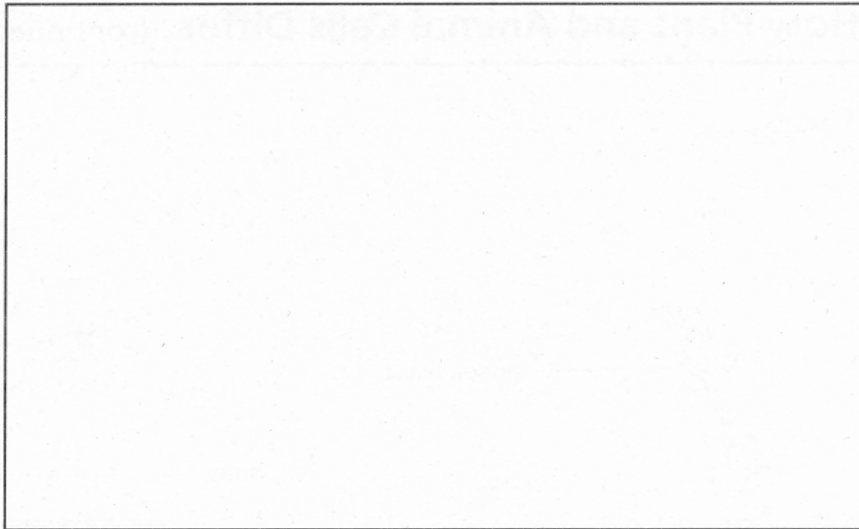
a. *What is the shape of the cells?*

The boundary that you see around each cell is the cell wall. The numerous small, green bodies in the cells are the *chloroplasts*.

3. Look for an area in the leaf where you can see the cells most clearly. Examine these cells under high power, carefully focusing up and down with the fine adjustment.

b. *Describe the shape and location of the chloroplasts.*

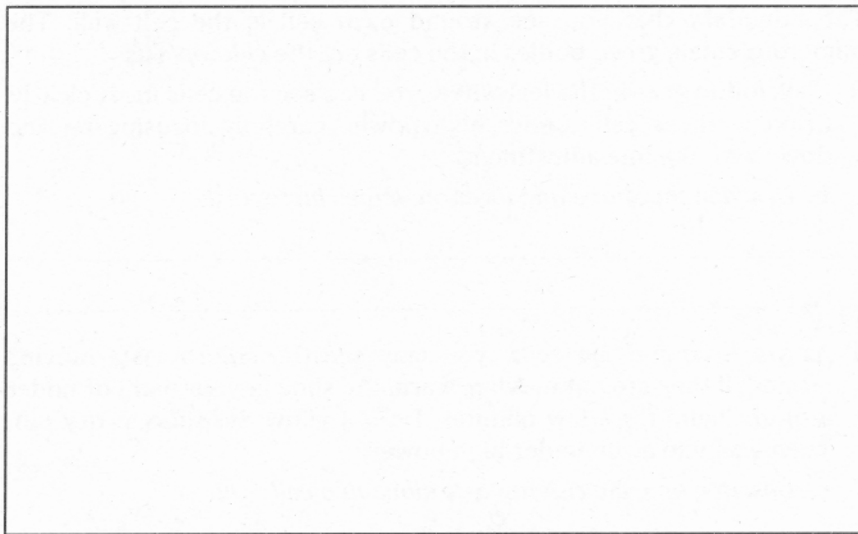
d. *Make a drawing of a Plant cell. Label the cell wall, chloroplasts, and any other structures you see.*



The cell membrane is pressed tightly against the inside of the cell wall and is difficult to see. Furthermore, the numerous chloroplasts often make it difficult to observe other cell structures in the elodea leaf cells. In order to see the nucleus, nucleoli, and vacuole more clearly, you are going to use a stain.

5. Break off another elodea leaf and place it in a drop of Lugol's iodine solution on a clean slide. Add a cover slip. Wait a minute or so for the stain to penetrate into the cells. Then examine the stained elodea cells under low and high power.

e. *Make a drawing of a stained cell. Label the cell wall, cell membrane (if visible), chloroplasts, nucleus, nucleoli, and vacuole.*



- f. What structures can you see more clearly after staining?

Analysis and Interpretations

1. What structures do human epithelial cells have in common with elodea cells?

2. How do human epithelial cells and plant cells differ?

3. Some of the epithelial cells are folded or wrinkled. What does this tell you about the thickness of the cells?

4. Chloroplasts cannot move on their own. How do you think they move around the cell?

5. What does Lugol's iodine stain do to the activity of the cell?
