

Chapter 10 Cell Growth and Division

Observing Specialized Cells

Introduction

The cell is the basic unit of structure and function in all living things. All of the processes necessary for life occur in cells. In single-celled organisms, all of the life functions of the organism take place within one cell. Multicellular organisms, such as humans and plants, are made up of many cells with different structures and functions. The cells of multicellular organisms take on special functions.

In this investigation, you will observe several types of cells and relate their structural differences to their functions.

Problem

How are the structures of specialized cells adapted to fit their particular functions?

Pre-Lab Discussion

Read the entire investigation. Then, work with a partner to answer the following questions.

1. What kinds of cells will you observe in this investigation? Which of these cells belong to plants? Which belong to animals?

2. In this investigation, you will prepare two wet mounts of specimens and examine three prepared slides. Why is it not practical for you to examine all of your specimens as wet mounts?

3. Why is an oak leaf probably not a good specimen for this investigation?

4. What structures do you expect to find in all five cell samples?

5. In what ways do the cells you will observe in this investigation differ from one another in function? Based on the differences in function, predict how the cells are likely to differ in structure.

Materials *(per group)*

microscope
lettuce leaf
water plant leaf
dropper pipette
3 microscope slides

3 coverslips
forceps
dissecting probe
prepared slides of 3 types of human tissues

Safety



Put on a laboratory apron. Plant parts and their juices can irritate your eyes and skin. Use forceps or wear gloves when handling plants. Handle all glassware carefully. Always handle the microscope with extreme care. You are responsible for its proper care and use. Use caution when handling microscope slides as they can break easily and cut you. Note all safety alert symbols in the Procedure and review the meaning of each symbol by referring to Safety Symbols on page 8.

Procedure

1. Obtain a microscope and place it about 10 cm from the edge of the laboratory table.
2. Carefully clean the eyepiece and the objective lenses with lens paper.
3. Locate a rib in the lettuce leaf. As shown in Figure 1, bend the lettuce leaf against the curve until it snaps.

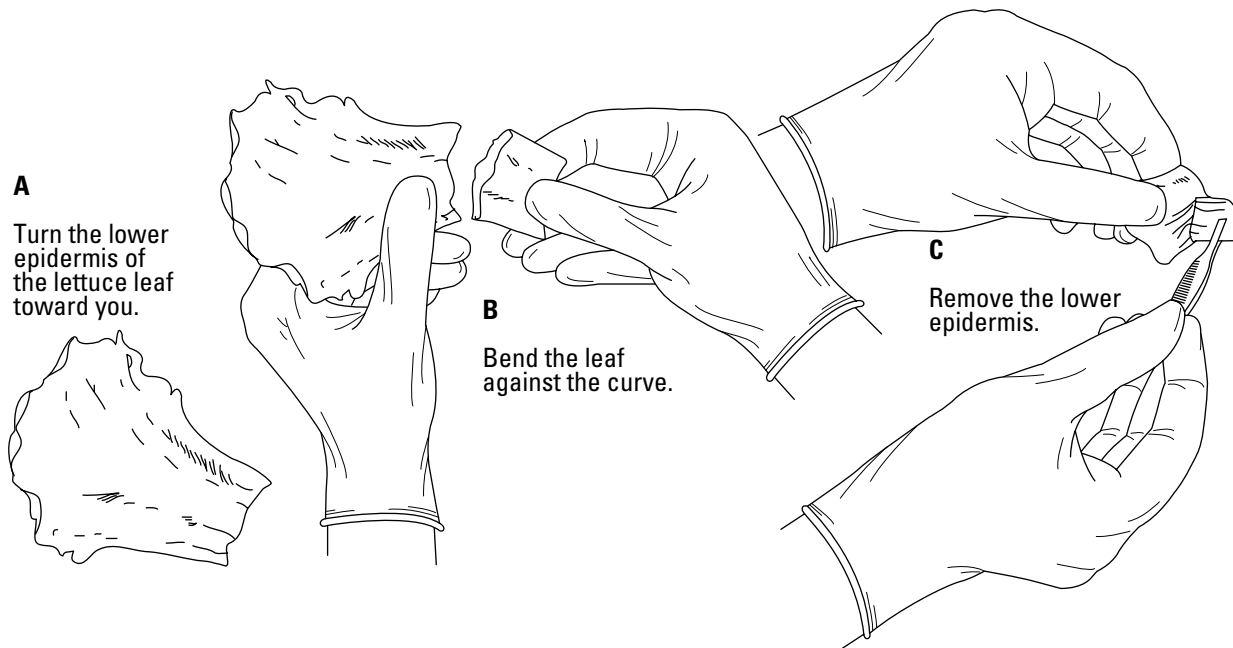
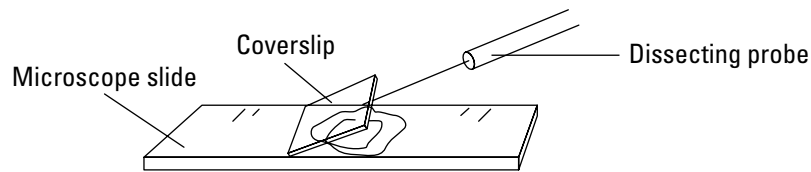


Figure 1



4. **CAUTION:** Be careful when handling sharp instruments. Handle all glassware carefully. Use forceps or wear gloves when collecting plant specimens. With the forceps, carefully remove the thin layer of surface tissue called the epidermis from the piece of lettuce. Spread out the epidermis as smoothly as possible on a microscope slide. **Note:** If the epidermis becomes folded on the slide, use a dissecting probe to gently unfold and flatten it.
5. To prepare a wet-mount slide, place a drop of water in the center of the slide. Using the dissecting probe, gently lower the coverslip onto the lettuce epidermis as shown in Figure 2.

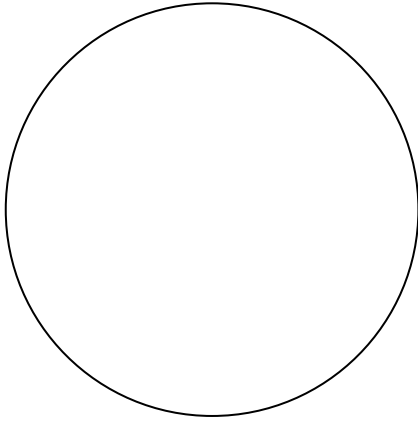
**Figure 2**

6. **CAUTION:** Always handle the microscope with extreme care and do not use it around water or with wet hands. Never use direct sunlight as the light source for the microscope. Observe the lettuce epidermis under the low-power objective of the microscope. **Note:** It may be necessary to adjust the diaphragm so there is sufficient light passing through the cells. Notice the shapes of the epidermal cells.
7. Switch to the high-power objective. **CAUTION:** When turning to the high-power objective, look at the objective from the side of your microscope so that the objective lens does not hit or damage the slide.
8. In the Data Table, write the type of cell that you examined. Describe its general shape and place a check mark in the columns below the structures that you are able to observe under the high-power objective.
9. In the space provided on the next page, draw and label what you see under the high-power objective. Record the magnification of the microscope.
10. Repeat steps 5 to 9 using the water plant leaf.
11. Repeat steps 6 to 9 using the 3 prepared slides of human cells and/or tissues.
12. Wash your hands with soap and warm water before leaving the lab.

Data Table

Cell Type	Shape	Cell Structures						
		Cell wall	Cell membrane	Nucleus	Nuclear envelope	Cytoplasm	Vacuoles	Plastids

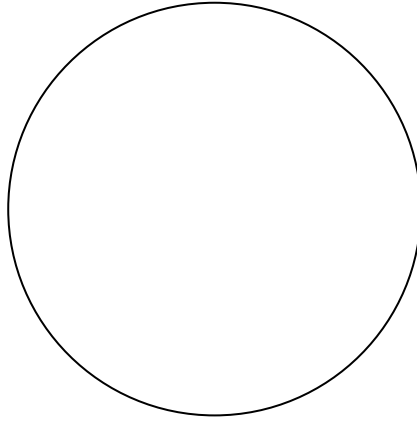
Magnification _____



Lettuce epidermis

Prepared Slide 1

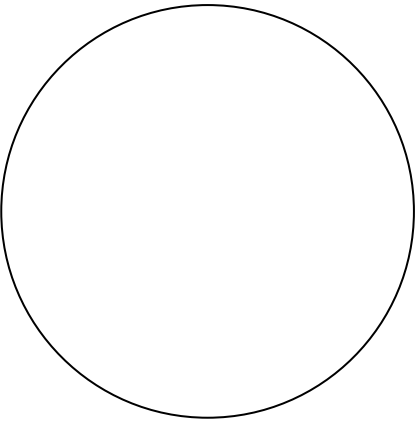
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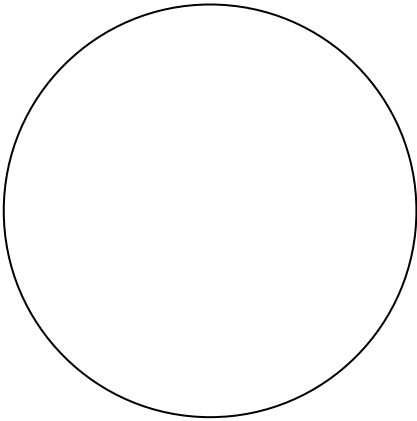
Water plant leaf

Prepared Slide 2

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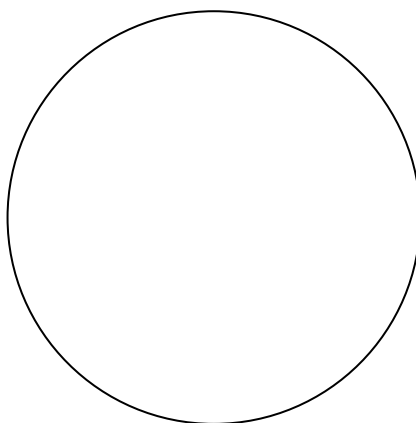


Magnification _____



Prepared Slide 3

Magnification _____



Analysis and Conclusions

- 1. Evaluating and Revising** Did your observations support your initial prediction about the structures common to all the cells? List the structures all the cells you observed have in common.

- 2. Comparing and Contrasting** Compare and contrast the shapes of the different cells you observed. Describe any similarities or differences.

- 3. Analyzing Data** For each type of human tissue you observed, describe one feature that is not found in any of the other tissues you observed.

- 4. Drawing Conclusions** How is each tissue you observed adapted to perform its function?

Going Further

Write a short report on the types of tissues found in humans and plants. Include the general characteristics and functions of each type.