

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, such as amoebas, all of the functions required by 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 shape and size of a cell, as well as the structures found inside it, are determined by the functions of the cell. In this investigation, you will observe several different types of cells. You will compare and contrast the structures you see in the cells, and relate the structures to the functions the different cells perform.

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 types of cells have a cell membrane, cytoplasm, and a nucleus? Where would you expect to find the cytoplasm in a cell?

2. In what types of cells would you expect to see a cell wall?

3. Saclike structures called vacuoles are found in many cells. What is the function of vacuoles?

4. An organelle is a cell structure with a specialized function. Plastids are plant organelles. Which plastid traps the energy of sunlight and converts it into chemical energy?

5. The outer layer of cells of a leaf is called the epidermis. These cells protect the tissues inside the leaf by slowing down the loss of water through evaporation. Predict what these cells will look like.

6. Some functions are exclusive to plants, while others are performed only by animals. Which specialized cells or tissues would you expect to find only in plants? Only in animals?



Materials *(per group)*

compound light microscope
lens paper
lettuce leaf
water plant leaf
dropper pipette
2 microscope slides
2 coverslips
forceps
dissecting probe
prepared slides of 3 types of human tissues

Safety

Put on a laboratory apron. Handle all glassware and sharp tools carefully. Always handle the microscope with extreme care. If you are using a microscope with a lamp, follow all safety rules related to electrical equipment. 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 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 centimeters 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.

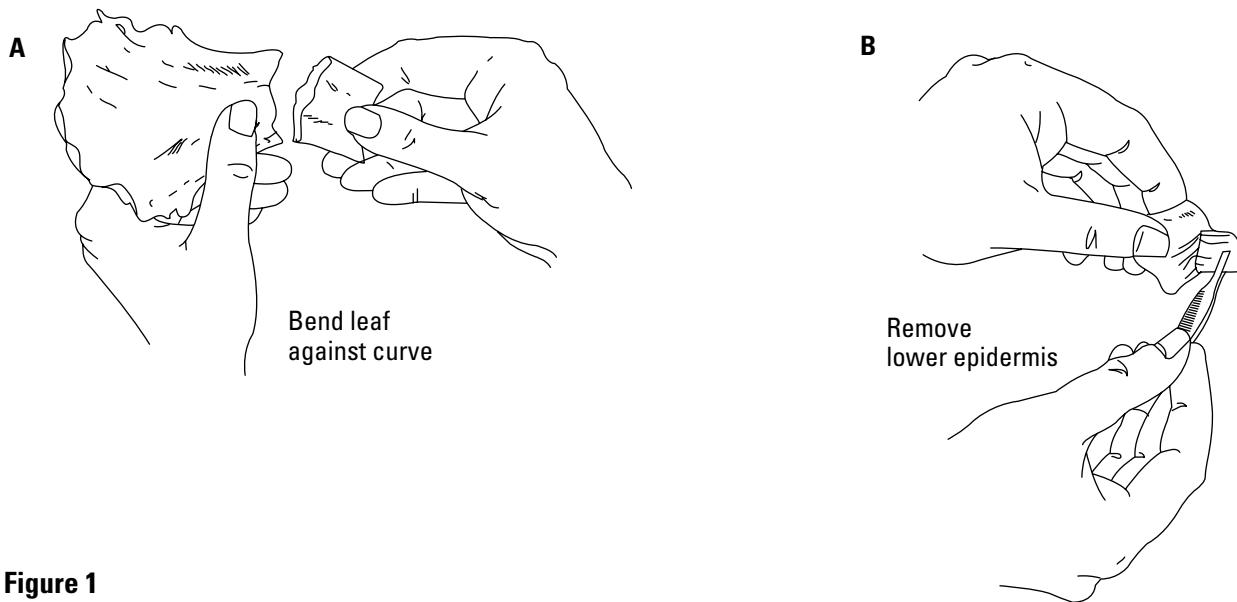


Figure 1

4. With the forceps, carefully remove the thin layer of 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.* **CAUTION:** *Microscope slides can break easily.*
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 as shown in Figure 2. **CAUTION:** *Be careful when handling sharp instruments.*

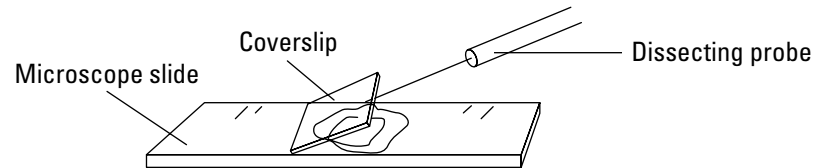


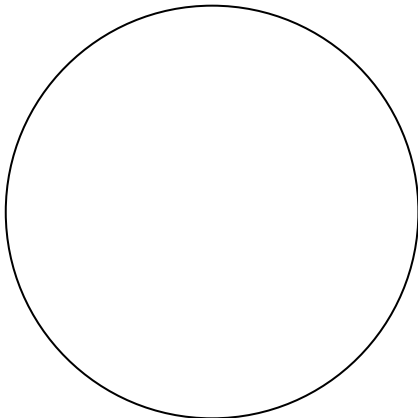
Figure 2

6. 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 irregular shapes of the epidermal cells.
7. Switch to the high-power objective. **CAUTION:** *When turning to the high-power objective, you should always 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 on page 98, write the name of the 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 appropriate place on page 98, 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. Draw and label what you see in the appropriate place on pages 98 and 99.

Data Table

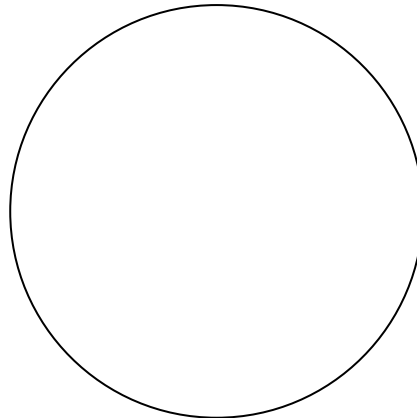
| Cell Type | Shape | Cell Structures | | | | | | |
|-----------|-------|-----------------|---------------|---------|------------------|-----------|----------|----------|
| | | Cell wall | Cell membrane | Nucleus | Nuclear envelope | Cytoplasm | Vacuoles | Plastids |
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Magnification _____



Lettuce epidermis

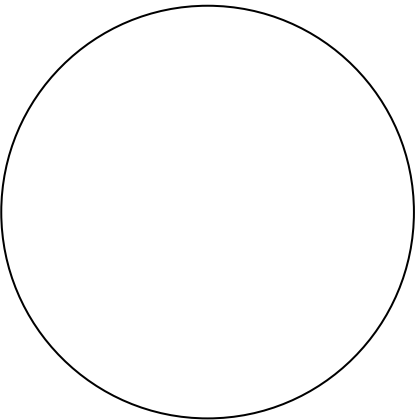
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Water plant epidermis

Prepared Slide 1

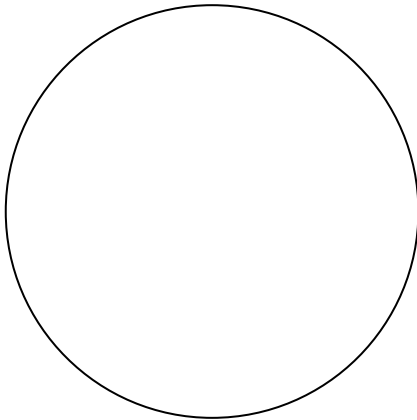
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Tissue _____

Prepared Slide 2

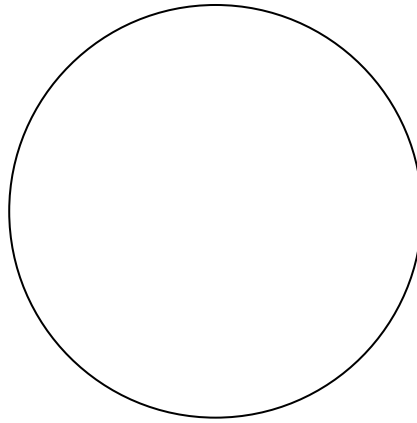
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Tissue _____

Prepared Slide 3

Magnification _____



Tissue _____

Analysis and Conclusions

1. Observing Do all the cells share any common structures? Explain your answer.

2. Comparing and Contrasting Compare the shapes of the different cells. Describe any similarities or differences.

3. Inferring What factors might affect the size and shape of a cell?

4. Comparing and Contrasting For each type of tissue that you observed, describe one feature that is not found in any of the others.

5. Analyzing Data How is each tissue you observed adapted to perform its special function?

6. Drawing Conclusions Why do the cells that make up the different tissues have different shapes and sizes?

Going Further

Obtain additional prepared slides of specialized cells and tissue from your teacher. Prepare labeled sketches of each of these slides.