

**Background**

Ever since the first microscope was used, biologists have been interested in studying the cellular organization of all living things. After hundreds of years of observations by many biologists, the cell theory was developed. The cell theory states that the cell is the structural and functional unit of living things. Cells contain structures called organelles that carry out life processes. Cells can be classified by the types of organelles they contain. In plant and animal cells, similarities and differences exist because of varied life functions.

Although all cells are basically similar in having cytoplasm bordered by a cell membrane, they vary considerably in structure, depending on the function they serve and the organism in which they are found.

**Procedure**

1. You are to make several wet mount slides showing a variety of cells and some of the more easily observed **organelles** found within them. When instructed, make a detailed drawing using a pencil, not a pen. Show as much of the detail as you possibly can while carefully observing the cells at low power and then high power. Do not look at any slides under the oil immersion objective.
2. Onion bulb cells can be used to observe the cellular structures called the **nucleus** and **nucleoli**. Remove the almost transparent layer of cells from the inside of an onion bulb scale by digging lightly into the scale with your fingernail. Place this layer onto a microscope slide. Be sure to place the slide on a paper towel as you build the wet mount slide. Once the slide is built and the water and stain have been added, dry the bottom of the slide with the paper towel. Add a drop of water to the slide. Uncurl or unfold any overlapped portion of the cell layer. Make sure the layer is perfectly flat. Add a drop of iodine to stain the cells. Add a cover slip. You are now ready to view some epidermal cells of a plant.
  - Observe the cells under low and high power magnification. Note the brick wall appearance created by the **cell walls**.
  - With high power (400X) observe the onion epidermal cells.
  - Draw a single cell at high power. Label the following parts: cell wall, cytosol, cell membrane, nucleus, and nucleoli.

**Onion Cell at High Power Magnification      400 X**

3. Cells of the *Elodea* (pronounced ih - low - DEE -uh) Leaf - a Common Aquarium Plant

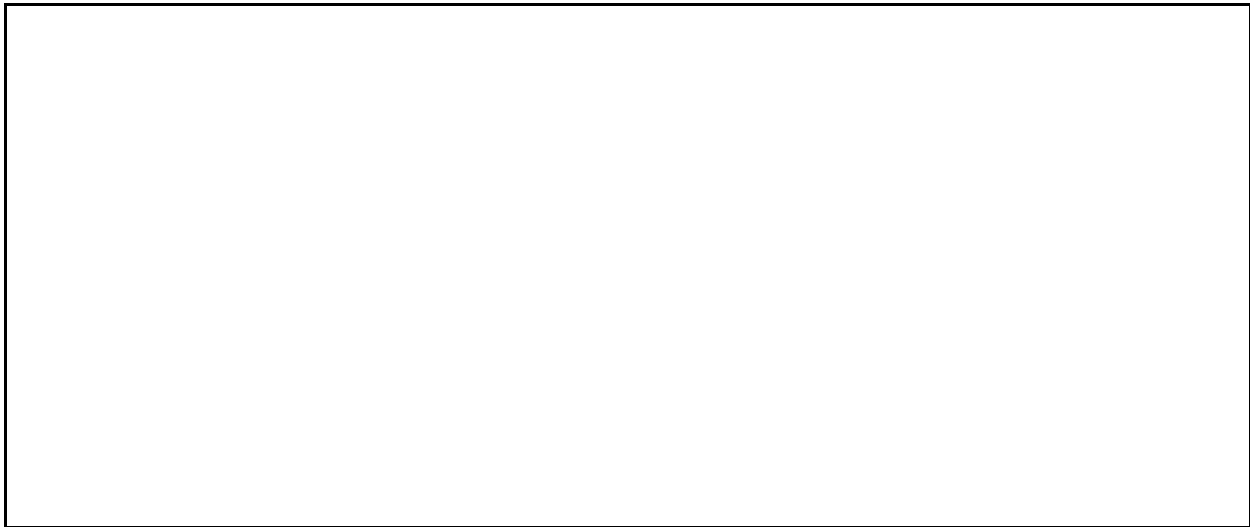
Since plants lead a stationary existence, it is appropriate that their cells should have an outer rigid **cell wall** for support. Animals, on the other hand, have to move around and need more flexible cells. Animal cells lack the support of a cell wall.

Remove a fresh, green leaf from an *Elodea* plant. Mount the whole leaf in a drop of water. Do not add any stain to these cells. Add a cover slip. Examine all areas of the leaf with the low power of your microscope. Then select a portion where the cells are clearly visible, center it in the field of view, and bring it into focus under high power magnification.

The oval, green bodies in the cytosol are **chloroplasts**. They may or may not be moving through the cell's cytosol. In the appropriate drawing space, draw two or three *Elodea* cells. If they are moving, indicate the direction with an arrow along the cell wall. Using a green pencil to shade the chloroplasts. Label the following structures: cell wall, chloroplasts, cytosol, and nucleus, if its visible.

**Two or Three *Elodea* Cells at High Power**

**400 X**



4. Potato Cells

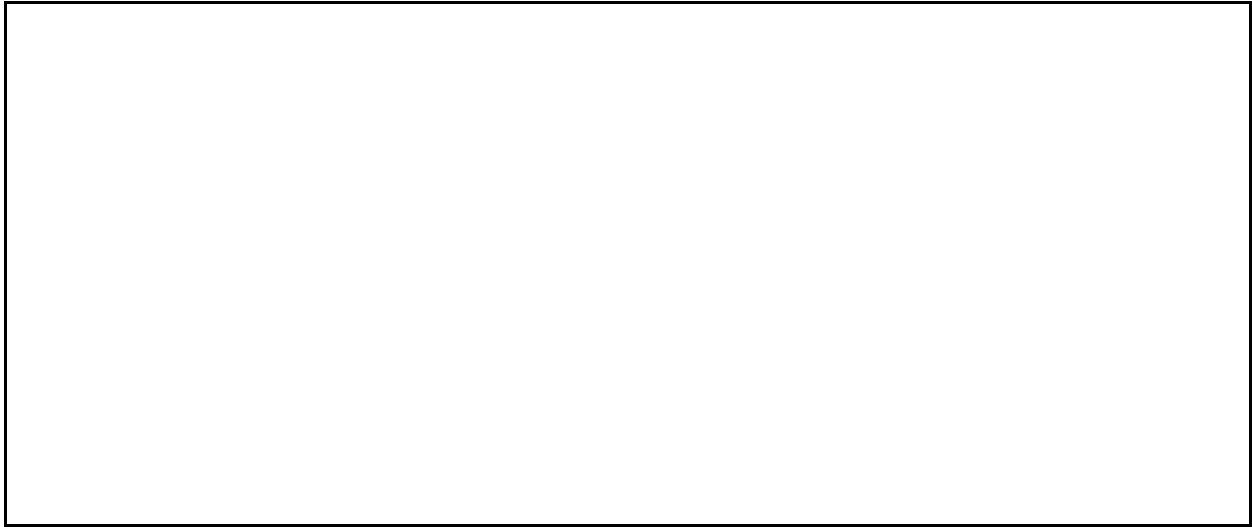
In examining potato cells, you will see cells which perform a storage function in plants. Starch, or starch grains, will make the potato cells appear white. The starch will be located inside an organelle called a plastid. These organelles are named for their white appearance. They are known as **leucoplasts**.

Cut a piece of potato using a microtome or a razor blade. Make it as thin as possible. Prepare a wet mount slide of the thin piece of potato. Add a drop of iodine at the edge of your sample. Put a cover slip over the sample and dry the bottom of the slide before you place it on the stage of the microscope for viewing. Observe the cells as iodine stains the starch grains a blue-black color.

Find a cell whose cell walls are visible and in which you can find numerous starch grains. Change to high power. Draw a cell, or a small group of cells, in the appropriate area on the following page. Each cell should be about two to three centimeters in diameter. Using a blue pencil, color the starch grains. The starch grains are actually located inside a colorless organelle called a leucoplast. Label the following structures: cell wall, starch grain, leucoplast, and cytosol.

**Drawing of Two or Three Potato Cells**

**400 X**



5. **Human Epithelial Cells (Cheek Cells)**

You will study a type of animal cell which clearly exhibits one of the major differences between plant and animal cells. The absence of a cell wall is characteristic of animal cells.

Gently scrape the inside of your cheek with a clean toothpick. Smear the material on a slide. Mount in water and add a drop of iodine or methylene blue stain. Add a cover slip. Remember to dry the bottom of the slide before you place it on the stage of the microscope. Examine under low power, noting the clumps of cells. Move the slide around until you find an area with single cells clearly visible.

Draw a single cell under high power. Label the following structures: cell membrane, cytosol, and nucleus.

**Drawing of an Epithelial Cell at High Power**

**400 X**



**Analysis and Conclusions:**

1. Complete the table below by stating the function of each.

Organelle or Structure	Function
Nucleus	
Nucleolus	
Cell membrane	
Cell wall	
Cytosol	
Cytoplasm	
Plastid	
Chloroplast	
Leucoplast	

2. Of the types of cells that you observed in this lab, which type was the smallest? the largest?
3. Were these cells from a prokaryote or eukaryote? Explain your decision.
4. Name three characteristics of a plant cell.
- a)
  - b)
  - c)
5. How would animals be affected if they had cell walls on the outside of their cells?
6. Explain the difference between a cell membrane and a cell wall. Which of these must all cells have?