

Comparing Plant, Animal and Bacteria Cells

Pre-Lab Discussion:

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. In this investigation, you will compare the structures of a typical plant cell (onion) and a typical animal cell (human and a bacteria cell).

Problem:

- How are plant and animal cells alike?
- How are they different?
- How are bacteria cells the same and different?

Answer the following questions WITHOUT looking anything up!

1. How would you know if a cell is a prokaryote or a eukaryote?

2. What type would you classify the following as (prokaryote or eukaryote):
 - a. Animal Cell: _____
 - b. Plant Cell: _____
 - c. Bacteria: _____

Materials:

- | | | |
|-----------------|------------------------|--------------------|
| • Forceps | • Toothpicks | • Microscope |
| • Medicine drop | • Methylene blue stain | • Microscope slide |
| • Onion skin | • Paper towel | • Coverslip |
| • Water | • Lens paper | • Iodine |

Procedure:

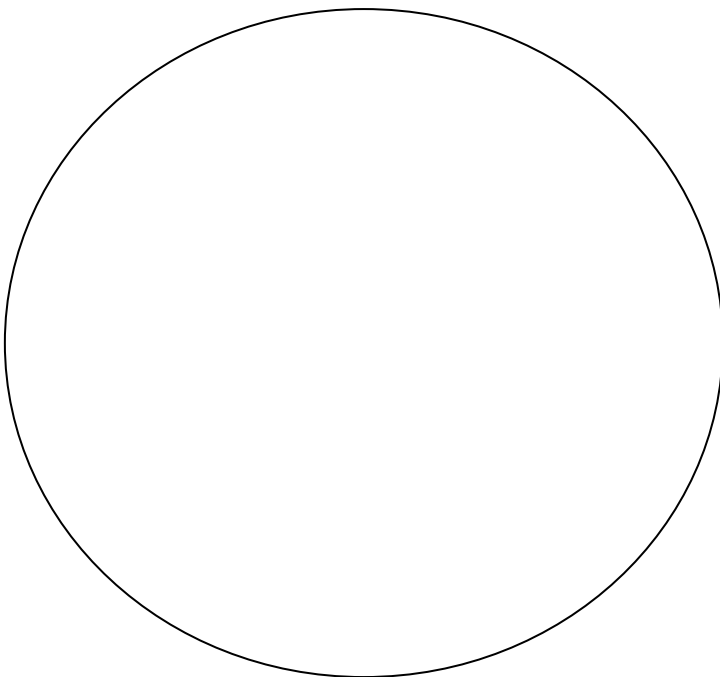
Part A: Onion Skin Cell

1. Place a drop of water in the center of a clean glass slide
2. With the forceps, remove the skin from a piece of onion and place it on the drop of water on the slide.
3. Place a drop of iodine over the onion skin.
4. Carefully place a coverslip over the drop of water, iodine and the onion skin so there are no bubbles.
5. Remove any excess water by holding a paper towel to the edge of the cover slip and letting it soak up any liquid.
6. Place the slide on the stage of the microscope with the onion skin directly over the opening in the stage.
7. Using the low-power objective lens, locate the leaf under the microscope. Turn the coarse adjustment knob until the leaf comes into focus.
8. Switch to the high-power objective lens. **CAUTION:** *When turning to the high-power objective lens, 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.*
9. Observe the cells of the onion skin. Draw and label what you see in the appropriate place in the Observations. (The entire circle should be taken up by your drawing)
10. Record the magnification of the microscope.
11. Carefully clean and dry your slide and coverslip with water and paper towel. Place it back on the microscope stage. Your group will be marked down if your area is not clean.

Observations:

Onion Skin: (Plant Cell)

Total Magnification (_____ x _____): _____



Label and Color:

1. Nucleus
2. Nuclear Membrane
3. Cytoplasm
4. Cell Membrane
5. Cell Wall

Part B: Animal Cell

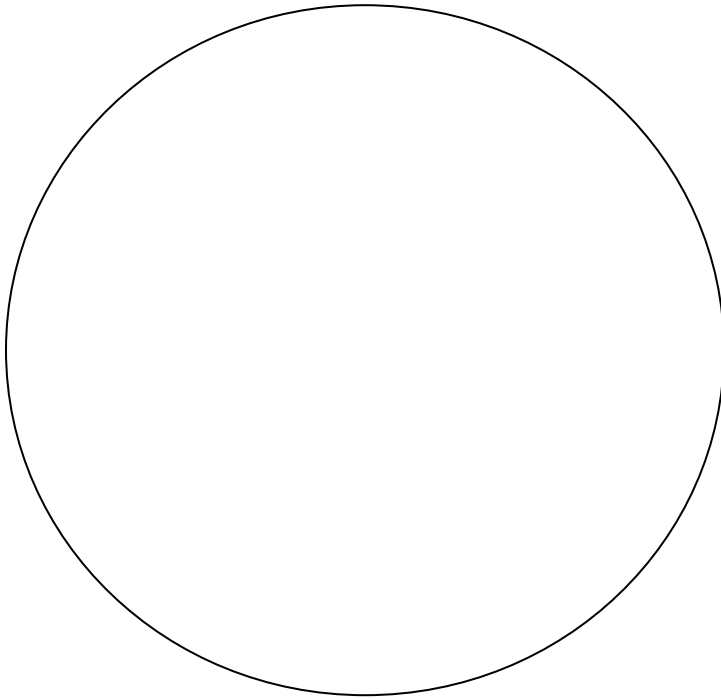
1. Place a drop of water in the center of a clean glass slide.
2. Using the flat end of a toothpick, gently scrape the inside of your cheek. **CAUTION:** *do not use force when scraping the inside of your cheek. Only a few cells are needed.* The end of the toothpick will have several cheek cells stuck to it even though you may see nothing but a drop of saliva.
3. Stir the water on the slide with the end of the toothpick to mix the cheek cells with the water. **DISPOSE OF THE TOOTHPICK.**
4. Put one drop of methylene blue stain on top of the drop of water containing the cheek cells.
5. **CAUTION:** *Use care when working with methylene blue to avoid staining hands and clothing.*
6. **Wait one minute**, and then carefully place a coverslip over the stained cheek cells.
7. To remove the stain from under the coverslip and replace it with clear water, place a piece of paper towel at the edge of one side of the coverslip. Then place a drop of water at the edge of the coverslip on the opposite side. The stained water under the coverslip will be absorbed by the paper towel. As the stain is removed, the clear water next to the coverslip on the opposite side will be drawn under the coverslip. Discard the paper towel after it has absorbed the stained water.
8. Place the slide on the stage of the microscope with the center of the coverslip directly over the opening in the stage.
9. Using the low-power objective lens, locate a few cheek cells under the microscope. **Note:** *you will need to reduce the amount of light coming through the slide in order to see the cells more clearly. Adjust the diaphragm as necessary.*
10. Switch to the high-power objective lens. **CAUTION:** *When turning to the high-power objective lens, 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.*
11. Observe some cheek cells. Draw and label what you see in the appropriate place in the Observations.
12. Record the magnification of the microscope.
13. Carefully clean and dry your slide and coverslip with water and paper towel. Place it back on the microscope stage. Your group will be marked down if your area is not clean.

Name: _____

Date: _____ Hour: _____

Cheek Cells: (Animal Cell)

Total Magnification (_____ x _____): _____



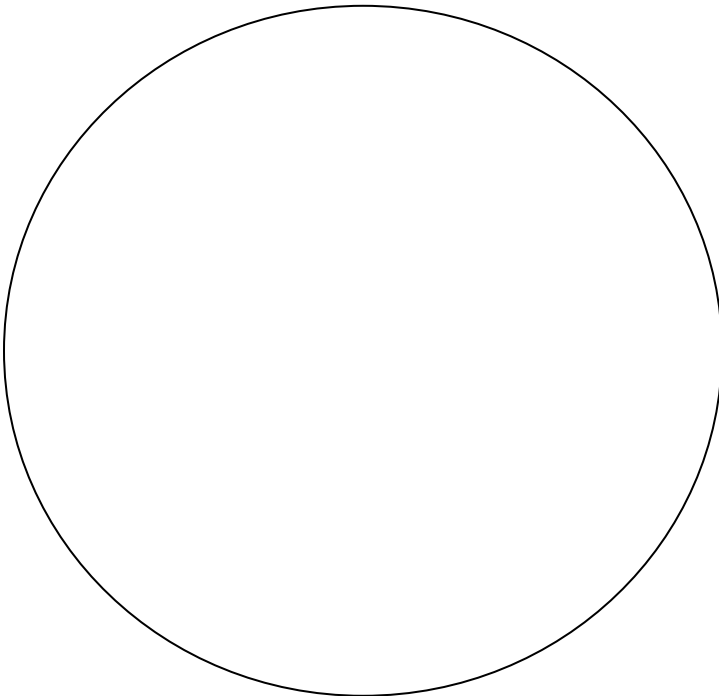
Label and Color:

- 6. Nucleus
- 6. Nuclear Membrane
- 7. Cytoplasm
- 8. Cell Membrane

Part C: Bacteria Slide

Name of Bacteria: _____

1. Obtain a pre-made bacteria slide
2. Using the lowest magnification try to find a bacteria
3. Move to the next highest magnification and re-focus
4. Move the objective lens to the **highest** magnification - draw what you see below



Analysis and Conclusion:

1. What is the shape of an onion cell?
2. What is the shape of a cheek cell?
3. What is the shape of a bacteria cell?
4. What are some differences you noticed between the plant, animal and bacteria cell?
5. How are plant and animal cells similar in structure?
6. How are plant and animal cells different in structure?
7. Why are stains such as methylene blue used when observing cells under the microscope?
8. How are plant and animal cells alike? How are they different?
9. Were you able to label anything in the bacteria cell? Why do you think that is?

10. Answer the following questions:

a. What does eukaryote mean? What does prokaryote mean?

b. What type would you classify the following as (prokaryote or eukaryote) – GIVE AN EXPLANATION AS TO ***WHY*** you classified them this way. Did your answers change from the beginning of class? If so, how?

- i. Animal Cell: _____
- ii. Plant Cell: _____
- iii. Bacteria: _____