

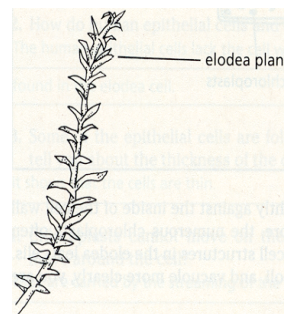
Name _____ Period _____ Date _____

This lab has been adapted for students who cannot be in the laboratory. You should be able to understand all concepts in the lab by following the directions and paying particular attention to the “**Alt-Go to:**” prompts. E-mail me if you have any questions.

Lab: Characteristics of Plant and Animal Cells

Introduction:

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 study, the Cell Theory was developed. The Cell Theory states that the cell is the structural and functional unit of living things. Eukaryotic cells contain structures called organelles that carry out life processes. Cells are classified by the types of organelles they contain. In plant and animal cells, similarities and difference exist because of varied life functions.



Objectives:

- 1) Demonstrate the use of stains to enhance observations of cellular organelles.
- 2) Compare and contrast plant and animal cells using a microscope, and try to identify organelles that give clues to life processes.
- 3) Estimate size of cells in microns (μm).

****Alternate-Go to:** <http://www.youtube.com/watch?v=GHnndVuaync> for an explanation of how the onion and cheek epithelial cells are obtained. The Elodea cells are described below.

Directions:

Part A. Plant Cells: Elodea or Anacharis cells

- 1) Obtain a small Elodea leaf and prepare a wet mount. Place the leaf in the center of a slide with a drop of water and cover with a coverslip.

****Alternate-Go to:**

<http://www.thetropicaltank.co.uk/Plantdir/egeriad.htm> and observe the information about Elodea.

- 2) Start by viewing the leaf under **low power**. Focus on an area of the leaf where you can clearly see many cells. HINT – if you aren’t seeing GREEN you aren’t in the right place!

****Alt-Go to:**

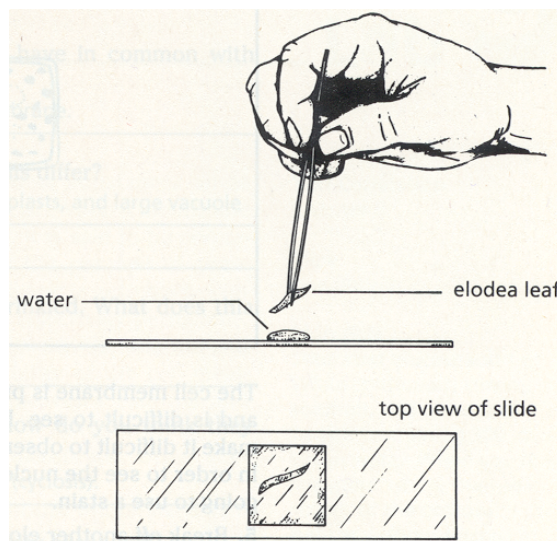
http://www.xtec.es/~imartin6/1/hotpot/essesr_vius/imatges/elodea_cells.jpg

The dark purple area are darkly pigmented cells. Don’t be distracted by them. The other green rectangular cells are what you want to observe.

- 3) **Switch to high power.** Use the fine adjustment knob to focus on the cells in the center of the field of view.

****Alt-Go to:**

<http://iws.ccccd.edu/biopage/BioLab/Unit%207/Elodea%20closeup.jpg>



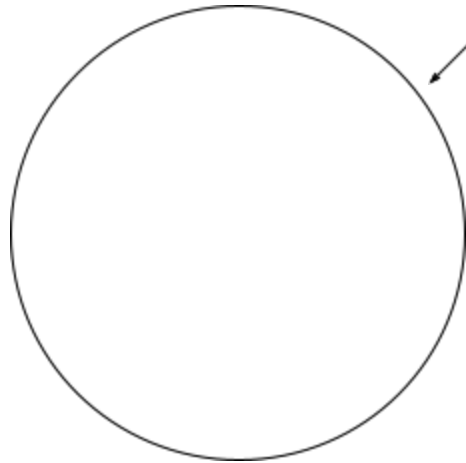
This is a spectacular view of the Elodea cells. Use them for the drawing on the next page.

- 4) Draw several **ELODEA CELLS** on HIGH power in the field of view below. Label the cell wall, chloroplasts and cytoplasm.

What is the total magnification of your microscope?

 400 X

High / Low Power
(circle one above)



Length of cell (μm):

Show all calculations:

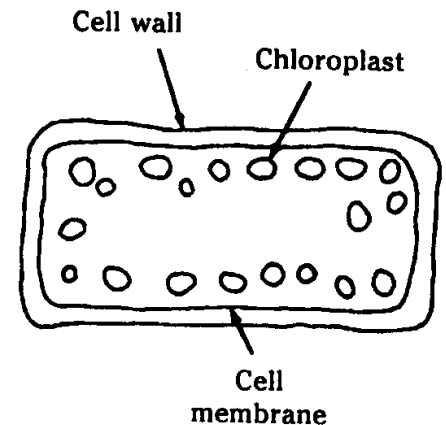
- 5) Assume the diameter of the field of view in low power is 1500 μm and the diameter in high power is 350 μm. Estimate the length (use the longest dimension) of one cell. Show your work in the box above.

****Alt-Go to:** Answer the following questions based on the video: http://www.youtube.com/watch?v=PFtzs_cUddI

- 6) Observe the small, oval, green bodies that appear in the cells. These are **chloroplasts**. Watch the chloroplasts carefully for any movement.

Movement within a cell is called **cytoplasmic streaming**. The contents of the cytoplasm are moved along by the action of the **cytoskeleton**, protein tubes which form an internal structure for the cell.

Are they all moving in the same direction? At the same speed?

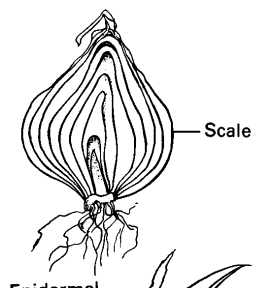


Finish this sentence: "The movement of the chloroplasts reminds me of...."

- 7) What is the name of the **PIGMENT** found in the chloroplasts which gives them their green color?

Part B. Plant Cells: Onion (Allium) Epidermis Cells

- 1) Remove one of the fleshy leaves from a piece of onion, bend the piece against the curve until it snaps as shown in the diagram.



- 2) Using your forceps, spread the epidermis on a slide as smoothly as possible.
- 3) Many cell organelles are difficult to see without the use of a chemical stain to color the organelle. **Iodine** is a **chemical stain** that will color the nucleus nucleoli and cell wall of onion cells. Unfortunately, stains will **KILL** the cell. Place a drop of iodine solution on the onion tissue. **CAUTION:** Use care when working with iodine to avoid staining hands and clothing. Add a coverslip to spread the iodine over the onion tissue.

- 4) Focus the slide under **low power**.

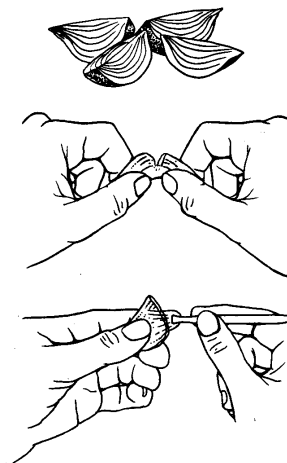
****Alt-Go to:**

<http://www.microscopy-uk.org.uk/mag/imgapr06/08-Eosine.jpg>

- 5) **Switch to high power.** Use the fine adjustment knob to focus on the cells. Note that the **nucleus** of the onion cell is stained amber or yellow/brown in color. Observe several nuclei. Notice the small, circular dots inside the nuclei.

****Alt-Go to:** <http://www.microscopy-uk.org.uk/mag/imgapr06/09-Eosine.jpg>

What are these small structures? _____



- 6) Compare the Elodea cells with the onion cells. What organelle, which WAS present in the Elodea cell, was NOT observed in the onion cells? _____

Why wasn't this organelle present? _____

Is it present in any other part of the onion plant other than the bulb? _____



****Hint: Go to:** http://wiki.answers.com/Q/Why_dont_onion_cells_have_chloroplasts

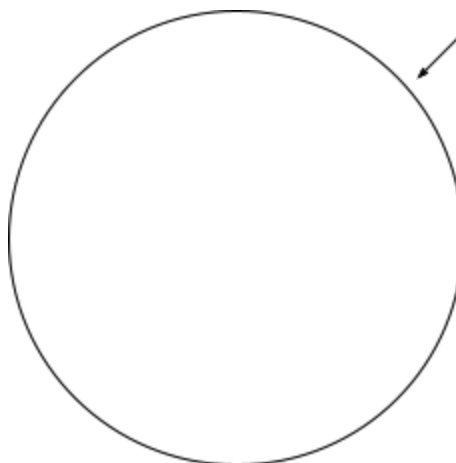
- 7) Draw several **ONION CELLS** on HIGH power in the field of view below. Label the cell wall, nucleus, vacuole, nucleolus (if seen) and cytoplasm.

****Alt-Go to and draw:** <http://www.microscopy-uk.org.uk/mag/imgapr06/08-Eosine.jpg>

What is the total magnification of your microscope?

___ 400 X ___

High / Low Power
(circle one above)

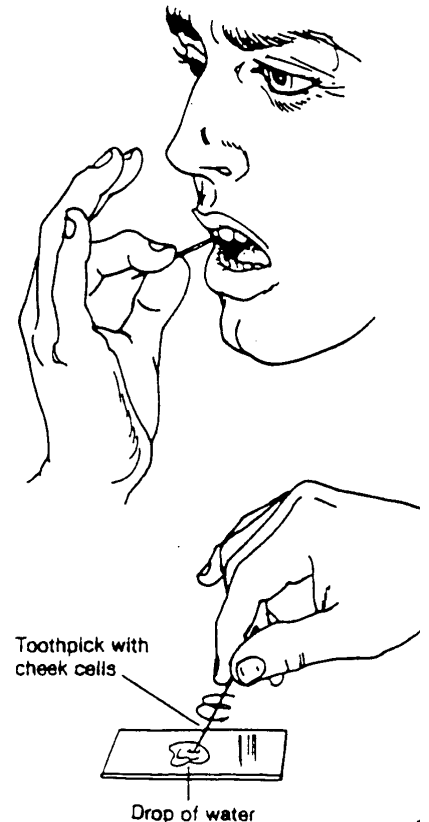
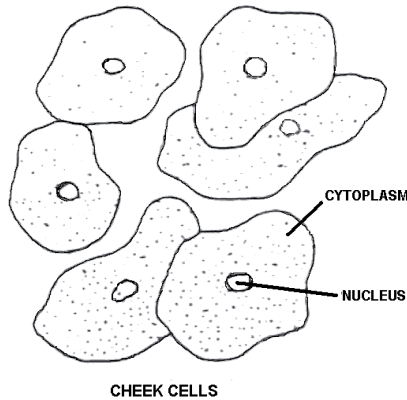


Length of cell:

Show all calculations:

Part C. Animal Cells: Human (Homo sapiens) Cheek Epithelial Cells

- 1) Gently scrape the inside of your cheek with a clean toothpick.
Prepare a wet mount of the material that you have scraped. Add a drop of another type of chemical stain, **methylene blue**, to the slide. Cover with a coverslip.
- 2) Examine the cells under low power. Look for groups of several blue colored cells. Center them in the field of view and switch to high power. Use the fine adjustment knob to focus on the cells.



****Alt-Go to:**

http://faculty.clintoncc.suny.edu/faculty/michael.gregory/files/Bio%20101/Bio%20101%20Lectures/Cells/cheek_cells.jpg

And <http://www.biologycorner.com/resources/CheekCellHuman.JPG> These latter cells are stained red. The cells that we observed in class looked like this:

http://washington.uwc.edu/about/faculty/schaefer_w/TISSUES/cheek_cells1.jpg

Use any of the above to draw the cheek cells in the field of view on the next page.

- 3) Observe the cheek cells. What is the major structural difference between the outer edge of the cheek cells and the outer edges of the plant cells?

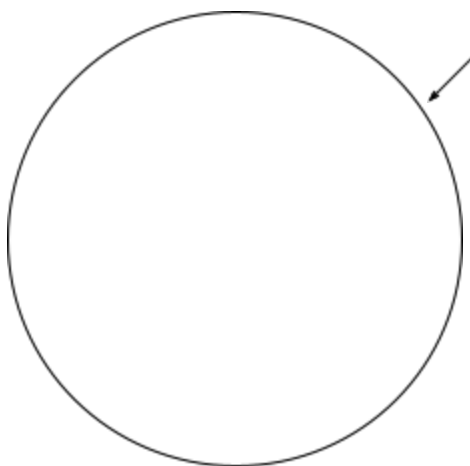
- 4) Describe the difference between the general shape of the cheek cells and the shape of the plant cells.

- 5) Draw several **CHEEK CELLS** on HIGH power in the field of view below. Label the nucleus, cell membrane nucleolus (if seen) and cytoplasm. Because the cells are irregularly shaped, estimate the diameter of one cell. Show your work in the box below.

What is the total magnification of your microscope?

_____X

High / Low Power
(circle one above)



Length of cell:

Show all calculations:

- 1) Fill in the table below using the following key:

√ = the cell part *should* be there but it's not visible in my slide

√√ = I can SEE this cell part in my slide

N/A = I do not see this cell part in my slide (and I shouldn't!)

Cell Type	Nucleus	Cell Wall	Cytoplasm	Nuclear Membrane	Nucleolus	Chloroplasts	Central Vacuole	Cell Membrane
Elodea								
Onion Epidermis								
Cheek								

2) Were you able to see the nucleus in the Elodea cell? What did you in the preparation of your slide in order to be able to see the nucleus in the onion and cheek cells? _____

3) Were any of the cells you observed alive? What **effect** might the chemical stain have on the functioning of the cell? Keep in mind that most stains are colored pigment molecules that stick to and completely cover the proteins in cell membranes.

4) Name three structures generally found in plant cells that animal cells do not have.

5) Name three structures generally common to **all** cells.

6) Plant cells are distinct due to the presence of a cell wall and a large, central, water vacuole. What is function of these parts and why don't animal cells have them?

7) Identify each type of cell below as either plant or animal cells by placing a check (✓) mark in the correct column.

<u>Cell Example</u>	<u>Animal Cell</u>	<u>Plant Cell</u>
Elodea cell		
Cheek cell		
Onion cell		

- 8) Think of two reasons why you might not have been able to see structures such as Endoplasmic Reticulum and Ribosomes, even though the cells definitely had these structures.

- 9) What structure is responsible for the box-like shape of most plant cells? _____