LABORATORY #1 -- BIOL 111
Characteristics of cells

The basic unit of life is the cell. Some organisms are composed of a single cell (e.g., a bacterium like *E. coli*) whereas others are multicellular (e.g., us). Regardless of what type of organism one considers, all are composed of cells and these cells are remarkably similar, from algae to anteaters and from *Hirudo* to *Homo*. This means that examining a single cell can give you a picture of the cell anatomy of almost any living thing.

There are two classes of cells: prokaryotic ("before nucleus") and eukaryotic ("true nucleus"). Organisms that have prokaryotic cells are called "prokaryotes"; if organisms have eukaryotic cells, they are called "eukaryotes." No organism has both kinds. Prokaryotes are the bacteria; eukaryotes are everything else (algae, protozoa, fungi, plants, and animals). Prokaryotes are very small and difficult to see easily.

We will be examining eukaryotic cells (from plants and animals). Eukaryotic cells differ from prokaryotic cells in that there is compartmentalization. All the functions that were accomplished by prokaryotes in the mishmosh of cytoplasm are now separated into their own chambers. The result is a much higher level or organization. This organization appears to be necessary in order to achieve higher levels of complexity seen in eukaryotes (all of you would agree that a cottonwood appears to be a more organized and specialized form of life than a bacterium). The compartments are called organelles.

When you examine the cells, you will see two types of organelles: implicit and explicit. Explicit organelles are those which are plainly visible (e.g., the nucleus will be clearly seen); implicit organelles are those that we cannot truly observe but must exist (i.e., if there is a nucleus to see, then there must be a nuclear membrane around it). If we include implicit organelles, then you will observe many different aspects of cells today.

We will examine plant (from onions and an aquatic plant called *Elodea*) and animal cells (your own inner cheek cells of your mouth). We examine both plants and animals because plant cells have three structures not seen in animal cells, and these three structures are responsible for the obvious differences between these two kinds of life that you have always known about: plants make their own food (via chloroplasts), don't move much and may grow very tall (via cell walls), and plants can store stuff in their cells much longer than animals (via the vacuole).

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Cell structures that we can observe

Using the directions provided to you by your instructor, prepare three slides:
one with onion skin (epidermis), one with an *Elodea* leaf, and one with human cheek cells.

1) Using a drop of IKI prepare a wet mount slide of onion skin from the inner side of a bulb leaf. Observe the cells at low, medium and high magnification.

2) Using a drop of water, prepare a wet mount of an *Elodea* leaf. View the leaf under low power and determine whether higher magnification is needed to determine the size of the individual cells and chloroplasts. Switch to higher powers if necessary. Calculate the approximate size of the cells and chloroplasts in micrometers. (This is #2 on your "Requirements" page.)

3) Prepare a slide of cheek cells stained with methylene blue.

	Seen in (indicate with a check):		
organelle	onion cells	*Elodea* cells	cheek cells
cell membrane			
nucleus			
nuclear membrane			
cytoplasm			
chloroplast			
cell wall			
vacuole			

Name_____

Requirements

1. For each organelle you observed, list its function.

2. Prepare a diagram of each of the cell types and label the organelles that you were able to see.

3. Of the Elodea, onion skin, and human cheek cells, which cells were longest, intermediate, and shortest? Describe how you figured this out.

4. What was the idea to using the iodine (or methylene blue) solution? Was it even necessary?