AP Biology—Chapter 6 Lecture Notes

Cells—the Basic Unit of Life

Be sure to read about the discovery of aquaporin on p. 92-93!

Cell Importance

--cells are the basic unit of structure and function; they are the smallest part of an organism that is considered alive

--microscopes are a key to observing cells; there are two factors that must be considered:

1. Magnification—how much the object's image can be increased in size
2. Resolution—minimum distance two points can be separated; it is a measure of image clarity

--there are two main types of microscopes:

1. Light microscopes—use visible light to produce an image of the object; they can magnify about 1000 times and still produce good resolution
   --can be used to observe living specimens
2. Electron microscopes—use a beam of electrons to pass through the object or bounce off the outer surface of an object; they can magnify over 100,000 times and still produce good resolution
   --specimens must be killed to observe them under an electron microscope since they must be coated in metal such as gold or platinum before observation
   --there are two types of electron microscopes:
   a. Transmission Electron Microscope (TEM)—passes a beam of electrons through the specimen
      --shows intricate internal detail but image is two-dimensional
      --has highest magnification power of any microscopes
   b. Scanning Electron Microscope (SEM)—scans a beam of electron over the surface of the specimen
      --shows three-dimensional image of the surface detail of specimens
      --magnification power is lower than TEMs
   --the higher magnification and resolution of SEMs and TEMs allows for scientists to view the **ultrastructure** of cells

Cell Fractionation

--separates cells into "fractions" by their densities

--what is being fractioned is cellular **organelles**, cellular structures that have specific roles within the cell

--**centrifuges** and **ultracentrifuges** are used to separate organelles by their densities; fractions can be observed after this has been done (see figure 6.5)

--cell fractionation allowed scientists to determine the roles of different organelles as well as the frequency of these organelles in particular cells

Prokaryotic and Eukaryotic Cells

--all cells contain the following components: plasma membrane (cell membrane), cytosol (cytoplasm), ribosomes, enzymes, chromosomes (which contain DNA), and RNA

--Prokaryotic cells contain unique cell walls surrounding their membranes; some have sticky capsules; their DNA is arranged in a large, circular chromosome and in smaller circular plasmids
--Prokaryotic cells lack a nucleus and membrane-bound organelles; Eukaryotic cells do not lack these
--Eukaryotic cells tend to have a greater size than Prokaryotic cells; in general, they are considered more complex
Please read p. 100-118 on your own; you will be doing a research project about organelles and I don't want to give anything away!

Extracellular Components
--refers to what is *outside* the cell
--the **plant cell wall** protects the cell, maintains shape, and prevents excess uptake of water
--animal cells have an **Extracellular Matrix (ECM)**; the ECM is connected to the plasma membrane; the ECM helps regulate cell behavior (see p. 120)
--cells can connect to each other through **Intercellular (between cell) Junctions**
--plant cell intercellular junctions are called **plasmodesmata**; they allow for connection of cytoplasm between cells; this is very important when one considers that plants must get the food they made in their leaves to the roots and that the way this happens is through living cell tubes called **phloem**
--animal cells have **tight junctions**, **desmosomes**, and **gap junctions** (similar to plasmodesmata); they are most common in epithelial tissue (layers of cells found on the outside and inside lining or organisms)