

Name _____

Period _____

Cells have many different shapes and functions

Objective: Students will learn that, even though we draw cells with a generic picture with all of the organelles, cells actually have a very exact structure that helps it perform many exact functions. Students will also learn that cells can become sick and infected and that they can also help to fight these infections and sicknesses.

Lab Station 1) Muscle cells

1- Sketch and LABEL a picture of the muscle cells.

2- Make a Claim!! Based on the STRUCTURE and FUNCTION of the muscle cell, argue any group of organelles this cell type might have in high supply.

3- Make an INFERENCE! Explain how your body might respond if you started to do a lot more exercise and you needed more and more energy in your muscle cells every time you exercise.

Lab Station 2) Simple Columnar Epithelial Cells

4- Sketch and label a picture of the Simple Columnar Epithelial cell below (draw a couple of cells one after another like the first picture

5- Explain how the cilia of the lung cells work to remove crap from your lungs.

6- Epithelial cells are found lining the entire digestive and respiratory tracts. Why would it be important that these cells produce proteins that they use to form connections with each other that “glue” them together to form “tight Junctions”.

Lab station 3) Viruses on a Body Cell

7- Sketch and label a picture of a virus

8- Knowing what a virus is made of, List and explain the main organelles the Virus would overtake to make copies of itself.

9- Since viruses infect body cells, how must your body rid your body of viruses?

Lab station 4) Cell becoming DINNER for another Cell

10- Sketch and Label the cell eating the paramecium.

11- After the Cell “eats” the paramecium it must DIGEST the cell for food. Cells have gene switches that it can turn on and off. Write a claim: give me a specific GENE that must be turned on in this predatory cell and how the cell will produce a product from the stimulus of eating this meal. The claim can be written as a paragraph, series of pictures, animations etc.

12- What did I mean when I said that both of these cells were EUKARYOTES??

13- EXPAND!!! What specific genes does your body turn on when YOU eat a meal? Where are the cells probably located that turn these genes on? (we are thinking digestion here)

Lab Station 5) NERVE CELLS ARE FUNKY

14- Sketch and Label the artist drawing of a nerve cell

15- Explain what is located in the cell body of a nerve cell.

16- Look at the synapse, write an argumentative statement here. You must argue the following problem. The nerve cell and synapse pictures do not show any Endoplasmic Reticulum or Ribosomes. Give an argument from the information on the picture as to why there should be ER and Ribosomes in the nerve cell.

Lab Station 6) The EUGLENA has it ALL

17- Sketch and label all organelles of the euglena

18- Pretend your lab partner found a Euglena under a microscope and then classified it as a plant. Give a claim as to why your lab partner might be correct.

19- Scientists actually do not classify the Euglena as a plant so now give a counterclaim as to why it is not classified as a plant.

Lab Station 7) BLOOD CELLS LOOK LIKE HARD CANDY

20- Sketch and label a few Red Blood Cells

21- RBC's have no nucleus. Write an argument that would support the function of the RBC even though it has no nucleus

22- Many cells can fix themselves if something goes a little wrong, for example if a cell has a bad mitochondrion, it can digest it down and just make a new one.

Scenario: something happens to a RBC and it ruins all of its hemoglobin proteins! Make a claim that convinces me WHY the RBC can no longer perform its function.

Lab station 8) Bacteria Help More than You Think

23- Draw a cartoon picture of the Lactobacillus bacteria helping you break down food in your intestine

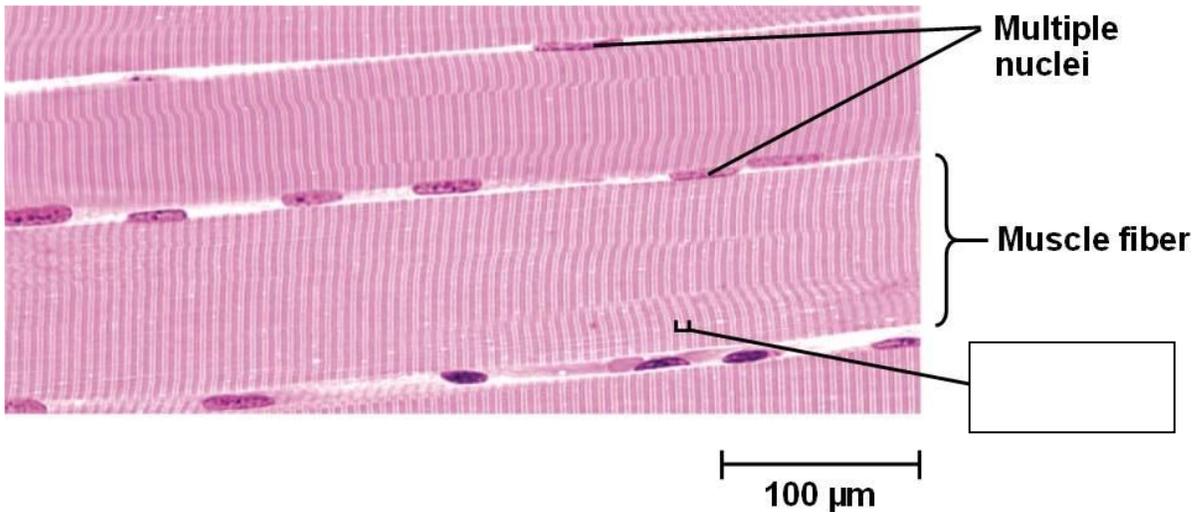
24- Explain what is meant by the term Symbiosis.

25- Explain what type of Symbiosis the Lactobacillus bacteria are sharing with you. (who is benefiting)

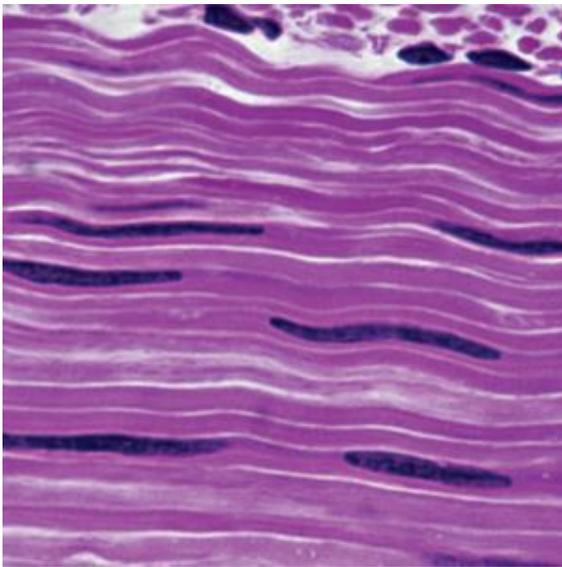
26- Explain the following: Liver cells are constantly DIGESTING (breaking down with ENZYMES) waste and toxins in the liver. Name and explain 3 organelles that the Liver cells would have a very high concentration of.

27- Explain the following: Some plant cells make a lot of sugar. They then ship the sugar to other parts of the Plant. When the sugars are shipped elsewhere they enter other cells to be STORED. What organelle would the STORAGE cells have a lot of.

28- Explain what you learned about STRUCTURE and FUNCTION of different types of cells

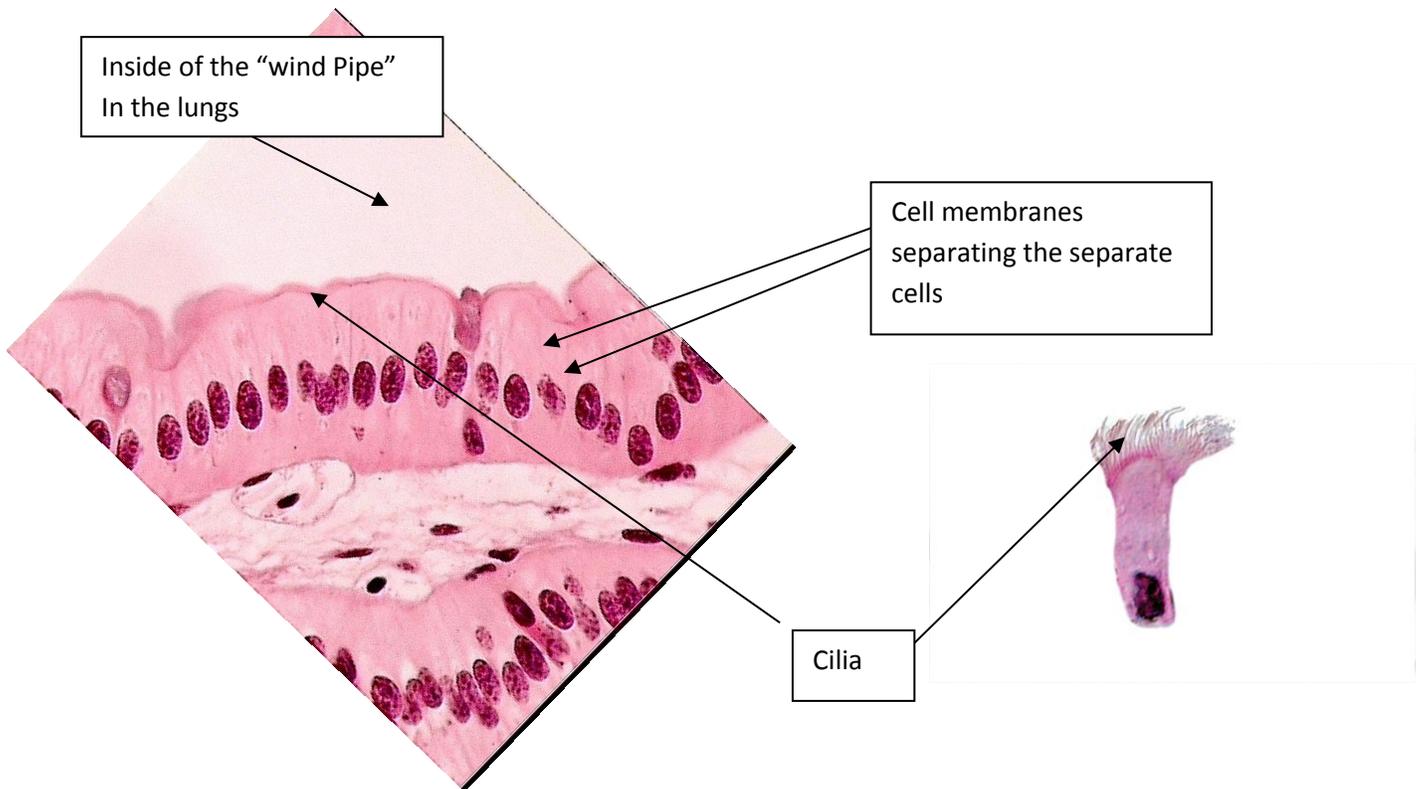


Skeletal Muscle Cells showing multiple Nuclei (nucleus). These are single muscle cells and they are very long. They are made mostly of protein fibers and of course the proteins are made from the instructions from the muscle cells DNA. The nucleus and other organelles are forced to the outside of the cell to make room for all of the muscle protein fibers. These muscle cells need constant energy and they need even more energy if a person exercises and requires more.

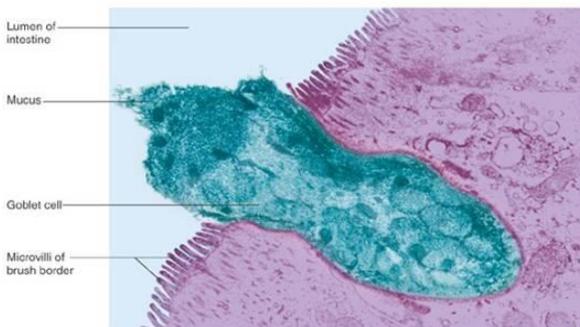


This is cardiac (heart) smooth muscle. It is stacked on top of each other with the darker visible nuclei smashed kind of flat. This muscle works ALL THE TIME and must have a constant energy supply!

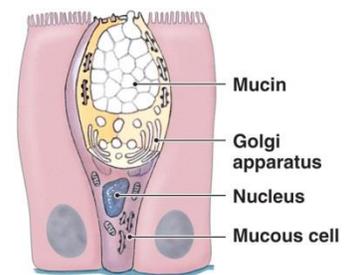
SIMPLE COLUMNAR EPITHELIAL CELLS of the LUNG



These are cells that line the trachea (wind pipe) in the lungs and out to the mouth. To the left you see a single cell with Cilia lining the top. Above you see the cells as they are found stuck together to form a barrier for protection of the wind pipe. The cilia move to get junk out of the lungs. You can see the dark black nucleus in the cells

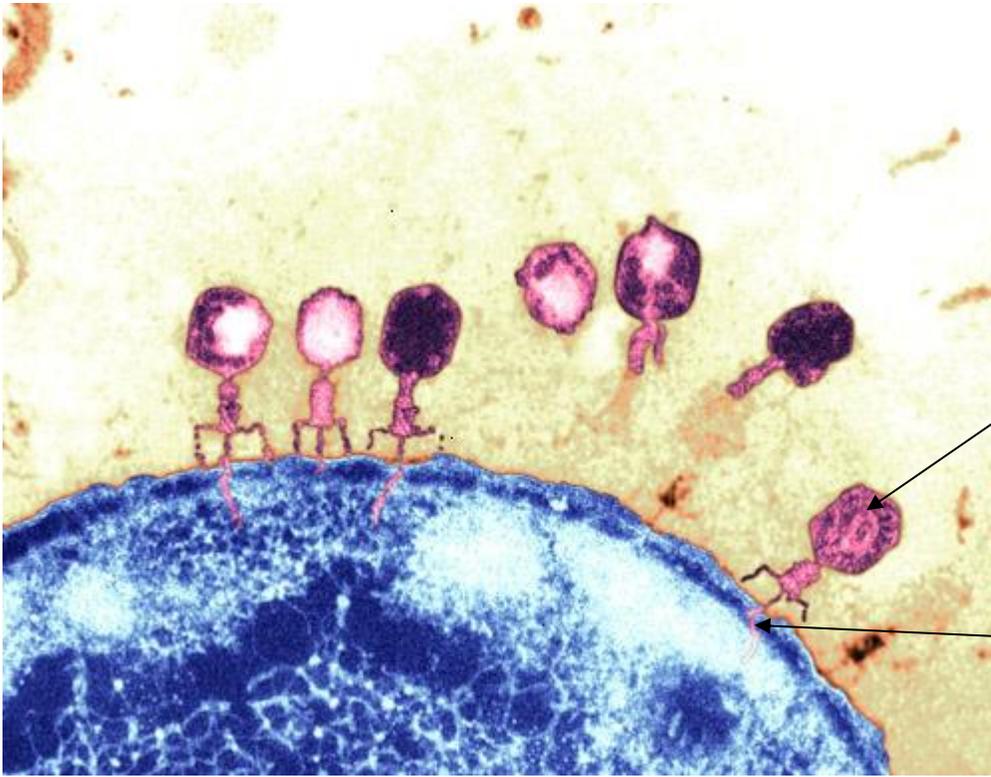


A mucous cell in a ciliated columnar epithelium



Above is a Goblet Cell. A Goblet Cell is a SPECIFIED epithelium cell. Its specific function is to secrete mucin (mucus) which is a PROTEIN encased in a lipid membrane (vesicle). If you look in the top picture on the page you can see that the lung cells also have goblet cells.

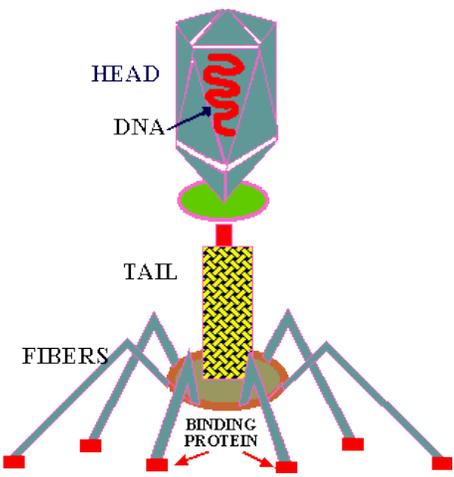
VIRUSES on a Bacterial CELL



Viruses infecting a body cell.

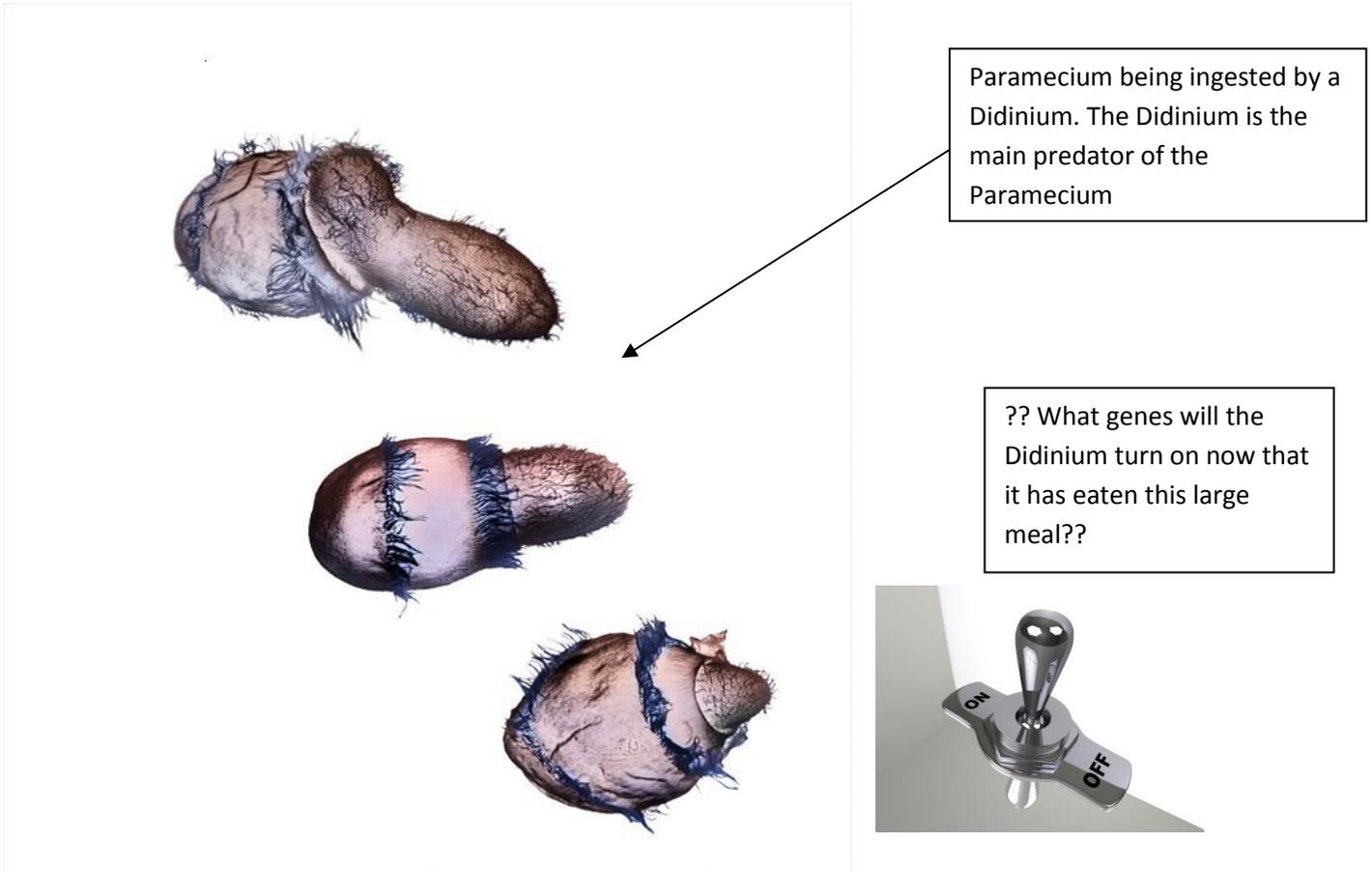
Viral DNA being injected

The virus will insert its own DNA and it will take over the organelles of the cell to make more viruses. This makes you sick when you get overtaken by too many viruses. They literally take over your cells “machinery” for making proteins for their use and make more virus parts. They then destroy your cells when they break out to infect other cells. Many people don’t realize than many times when you get sick it is because your cells are actually the ones getting sick. Your white blood cells will be called in to kill your cells that are infected and this gets rid of the viruses.



This animation of a bacteriophage virus is made of three main components: the head or capsule which contains the genetic material (DNA or RNA), the body of the virus and the tail in this virus are made of protein and some lipid.

Cell becoming DINNER for another Cell



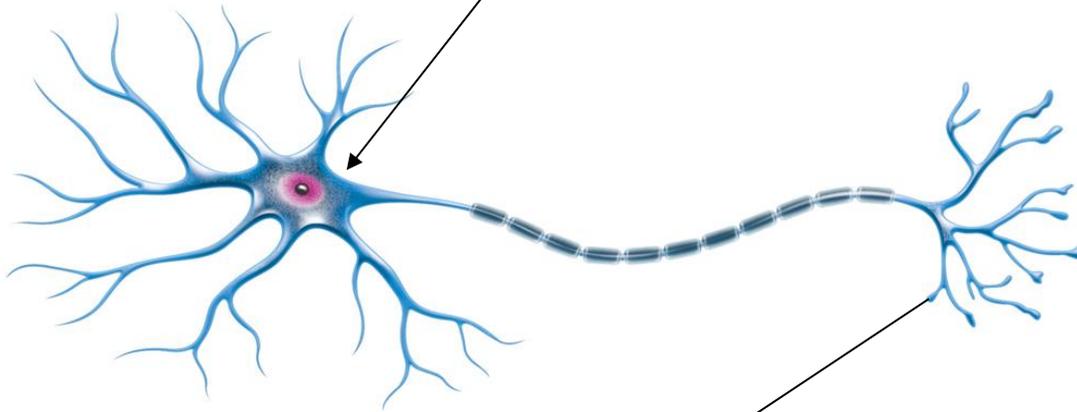
ABOVE: Here it is predator/prey at the cellular (microscopic) level. The paramecium is a prey to many single celled organisms. These are both single celled EUKARYOTES. You can see the cilia on both cells. This is how they move around in the fluid they live in.



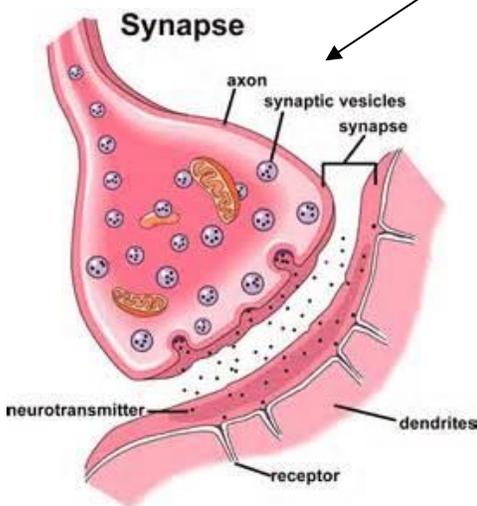
Side: This is basically the same thing except that here are your white blood cells (macrophages) eating very small rod shaped bacteria that could make you sick. Your body will call in the macrophages when it finds a cell that it doesn't recognize like the bacteria below

NERVE CELLS ARE REALLY FUNKY!

This part of the nerve cell is the cell body. This is where the nucleus and other organelles like the mitochondria etc. are located. The fibers are extensions of the cells where impulses are sent.

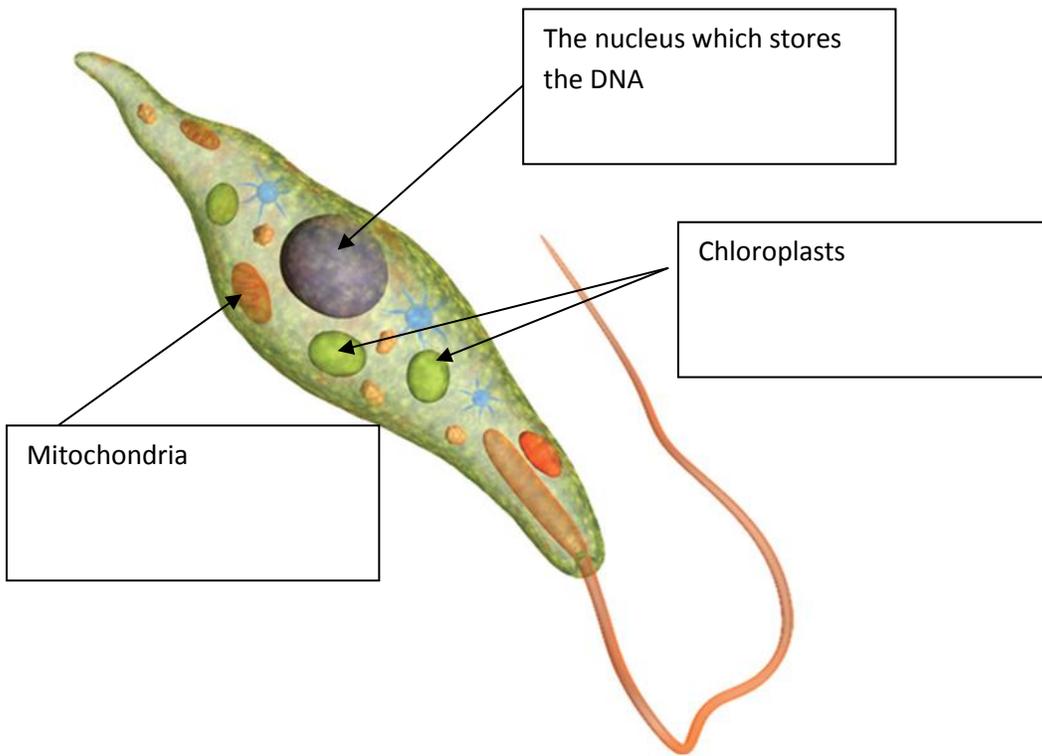


Left: here you see nerve cells that are basically connected to other nerve cells. This is how they communicate to send nerve impulses from body to your brain and then back to your body so that you feel things like pain.



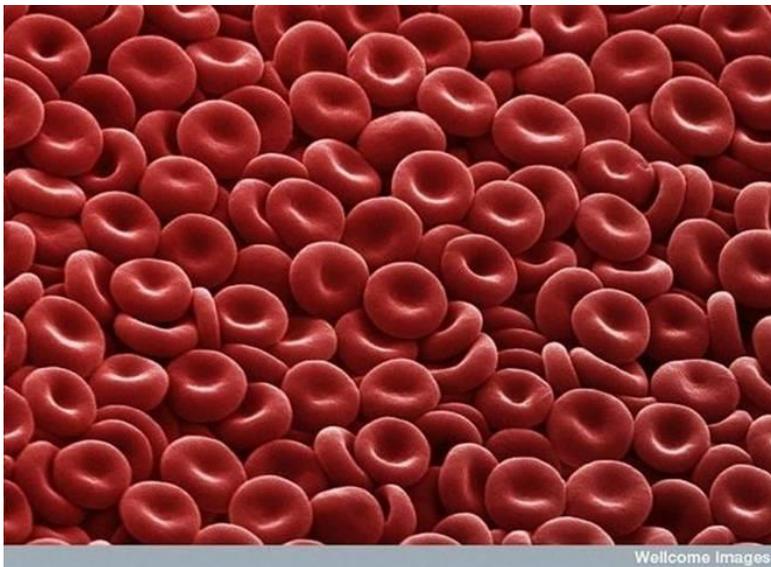
Here is an illustration that shows the end of a nerve cell. The neurotransmitter is a protein. The other side has receptors that are also protein channels with receptors for specific neurotransmitters. Unless the receptors receive the specific neurotransmitter protein, they will not relay the message from the nerve cell.

The EUGLENA has it ALL!!

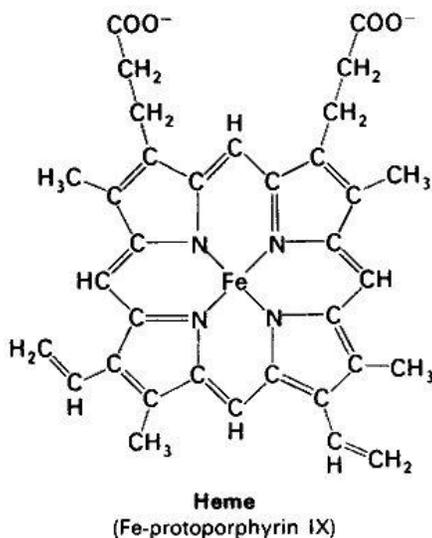


This is a euglena, single celled organism, with a very long flagella that it uses for movement. This euglena has visible mitochondria and it also has visible chloroplasts. You can see the nucleus and other organelles as well.

BLOOD CELLS LOOK LIKE HARD CANDY I LIKE TO EAT



Here we see a whole bunch of Red Blood Cells. These cells have once again been made to serve a distinct function. They have no nucleus as they lose the nucleus after maturity, thus they have no DNA during the functional part of their life. So you may ask, “how do they perform the functions without the DNA?” I mean we did learn that the nucleus is the **BRAIN** of the cell!! Let’s talk about the **function** of a red blood cell.



The picture to the left is a picture of the structure of the atoms that make up the **PROTEIN** HEMOGLOBIN.

The core of the protein is an iron atom (Fe). The function of the protein comes from active sites that are super attracted to oxygen molecules. The protein enzyme function is to attach to oxygen at the lung and carry the O₂ to the body where it releases the O₂. RBC’s are basically a bag of Hemoglobin proteins and not much else.

THESE BACTERIA HELP YOU MORE THAN YOU THINK



These are Lactobacillus bacteria that live symbiotically in your intestines. You better know what is meant by the term “symbiotically” (symbiosis). These bacteria help to break down food in your intestine so you can absorb the food. They also produce many B vitamins that you use for other functions in your body. The bacteria in return are given a nice, moist, and warm place to live. You have many symbiotic bacteria that live in your body.