Cellular Structures and Organelles

Organelles - specialized structures that carry out specific cell functions

- We already know that the plasma membrane is the barrier between the inside and outside of the cell. It is made of phospholipids and controls what enters and leaves the cell.

Cytoplasm - the semifluid material that makes up the environment inside the plasma membrane

- Organelles float in this
- Cytosol

Cytoskeleton

Cytoskeleton - a supporting network of long protein fibers that provide an anchor for the organelles inside the cell

made up of...

- microfilaments: thin protein threads that help give the cell shape and enable the entire cell or parts of the cell to move
- microtubules: hollow protein cylinders that form a rigid skeleton for the cell

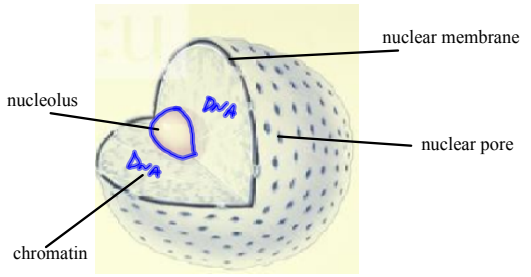
- microtubules and microfilaments rapidly slide past one another allowing organelles to move

The Nucleus

- the organelle that directs cellular processes (manager of factory)
- contains most of the cell's DNA
- Surrounded by a double membrane called the nuclear envelope
  - equipped with nuclear pores that allow things to enter and leave the nucleus

* Chromatin - a complex DNA attached to a protein is found throughout the nucleus

Nucleolus - the area in the nucleus that is responsible for making ribosomes



Ribosomes

- one of the functions of the cell is to make proteins
- the ribosomes are the organelles that help manufacture proteins
  - make proteins
- ribosomes are made of RNA and protein

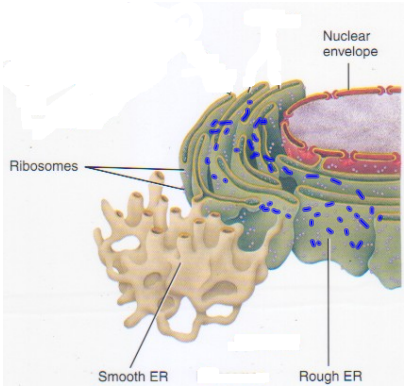
* some ribosomes float freely in the cytoplasm, while others are attached to another organelle called the endoplasmic reticulum

Endoplasmic Reticulum (ER)

- a system of folded sacs and interconnected channels that serve as the site for protein and lipid synthesis

Rough Endoplasmic Reticulum - the area of the ER where ribosomes are attached.
- It appears as if there is bumps on the ER.
- These ribosomes produce protein that will be exported to other cells

Smooth Endoplasmic Reticulum - the area of the ER where no ribosomes are attached
- provides area where carbohydrates and lipids are produced

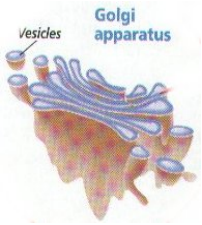


- after the endoplasmic reticulum makes proteins, some of that protein might be transferred to the Golgi Apparatus

Golgi Apparatus

- a flattened stack of membranes that modifies, sorts, and packages proteins into sacs called vesicles

fuse with plasma membrane to release proteins to environment outside of cell

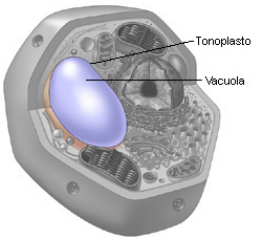


Vacuole

- a sac used to store food, enzymes, and other materials needed by the cell. Some vacuoles store wastes

- Animal cells usually DO NOT contain vacuoles

- Plant cells have large vacuoles (store water)



Lysosomes

- vesicles that contain substances that digest excess or worn-out organelles and food particles

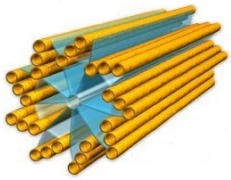
- lysosomes also digest bacteria and viruses that enter the cell

- animal cells only

Centrioles

- organelles made of microtubules that function during cell division

- located in the cytoplasm of animal cells usually near the nucleus



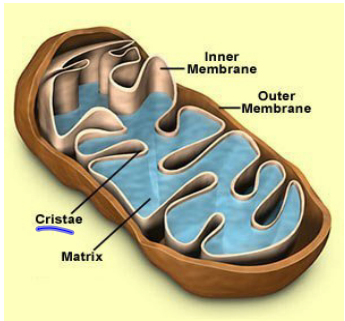
Mitochondria

- the powerhouse of the cell

- an organelle that converts fuel particles (mainly sugar), into usable energy.

- has an outer membrane and a highly folded inner membrane

provides large surface area to break down sugar molecules

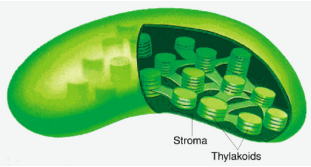


Chloroplasts

- found in PLANT cells only
- organelles that capture light energy and convert it to chemical energy through a process called photosynthesis
- inside the inner membrane of the chloroplasts there are many small disk-shaped compartments called thylakoids

energy from the sunlight is trapped here by a pigment called chlorophyll

gives leaves and stems their green color



Cell Wall

- PLANT cells only

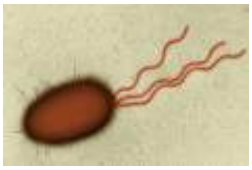
- a thick rigid mesh of fibers that surround the plasma membrane protecting the cell and giving it support
- allow plants to stand various weights
- cell walls are made of a carbohydrate called cellulose

Cilia and Flagella

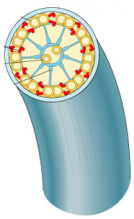
Help the cell move → locomotion

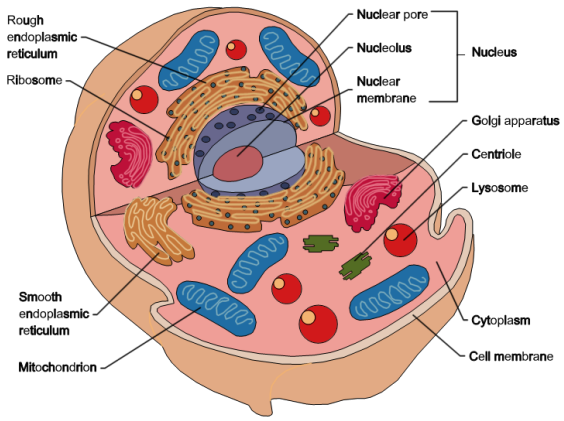
- short numerous projections that look like hairs
- the motion of the cilia is similar to the oars of a rowboat

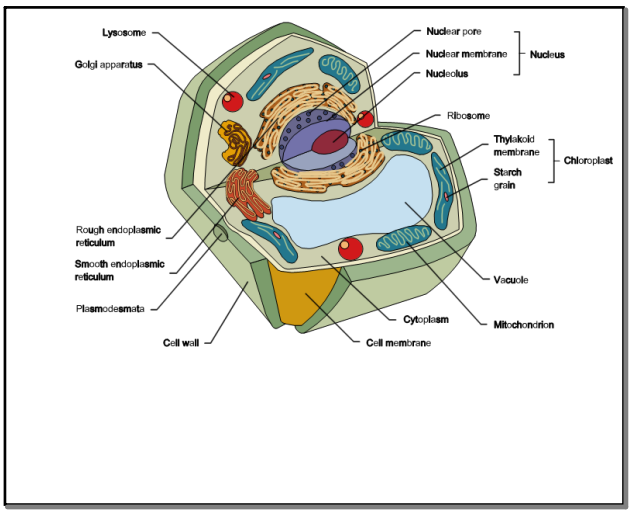
- longer and less numerous than cilia
- move in a whip-like motion
- a cell usually only has one or two flagella



- cilia and flagella arranged in a 9+2 fashion. This means that 9 pairs of microtubules surround 2 single microtubules






Lysosome
Golgi apparatus
Nuclear pore
Nuclear membrane
Nucleolus
Nucleus
Ribosome
Thylakoid membrane
Starch grain
Chloroplast
Rough endoplasmic reticulum
Smooth endoplasmic reticulum
Plasmodesmata
Cell wall
Vacuole
Cytoplasm
Mitochondrion
Cell membrane