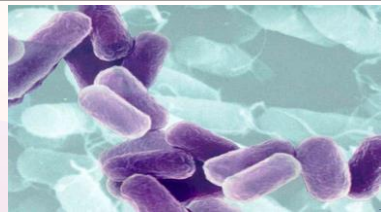


Cell Structures & Functions

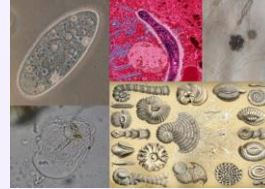
Prokaryotes



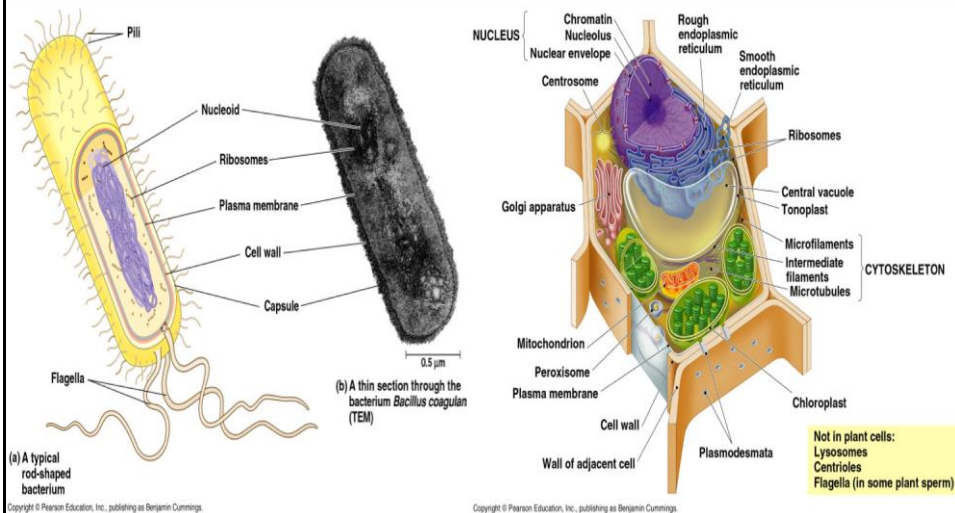
- Example: Bacteria
- Cells are all **unicellular**
 - Do ***not*** contain nuclei
 - Are smaller and simpler cells
 - Do ***not*** contain internal membrane-bound organelles
 - No mitochondria or chloroplast

Eukaryotes

- Example: plants, animals, fungi, protists
- Cells: can be unicellular or multicellular
 - Do contain nuclei
 - Are larger and more complex
 - Have many structures and internal membranes in organelles
 - Cells are highly specialized for their function



Prokaryote vs. Eukaryote Cell



Organelles

- **Organelles** (little organs) are the structures that carry out specific functions (jobs) within a cell.
- Some organelles are found in all cells, while others are only found in eukaryotes...or even specific eukaryotes.

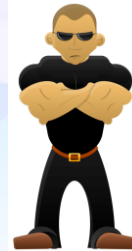
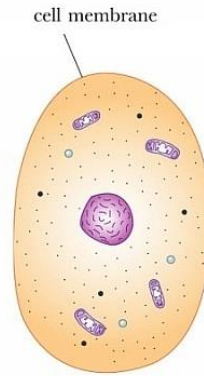
Common Organelles

4 basic parts to ALL cells:

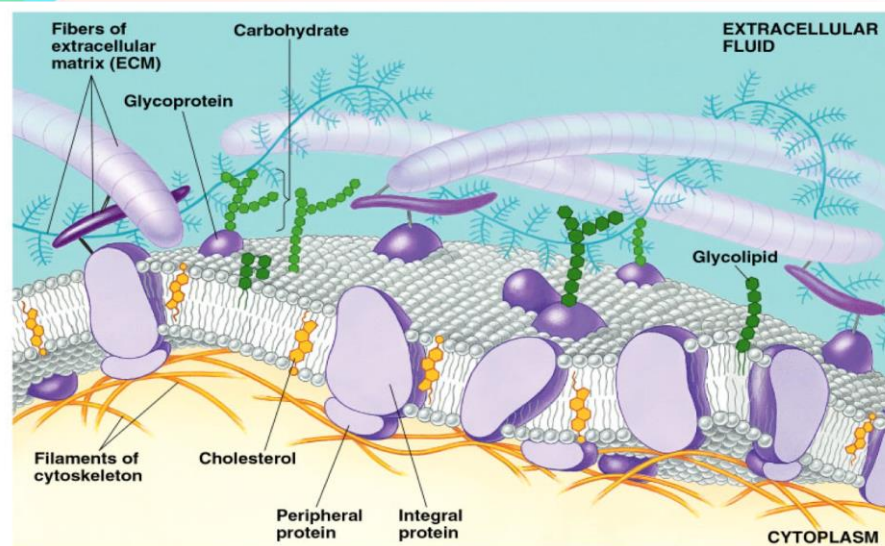
1. Cell (plasma) membrane
2. Cytoplasm
3. Ribosomes
4. Nucleic Acid (DNA)

Cell Boundaries: Cell (Plasma Membrane)

- Cell Membrane / Plasma Membrane / Phospholipid bi-layer
 - Is selectively or semi-permeable
 - Controls materials entering & leaving cell- acts like a "bouncer"
 - Supports cell
 - Made of phospholipids



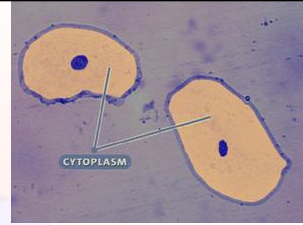
Phospholipid Bi-layer



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Cytoplasm

- A jellylike fluid within the cell that helps to cushion the cell and other organelles.
- Part between cell membrane and nucleus
- Contains the other organelles

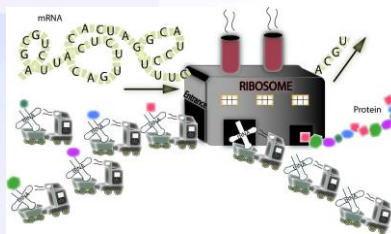
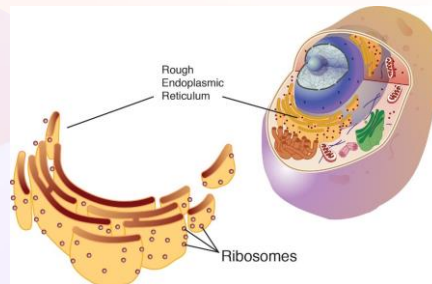


Ribosomes

- These are the most numerous of the cells organelles

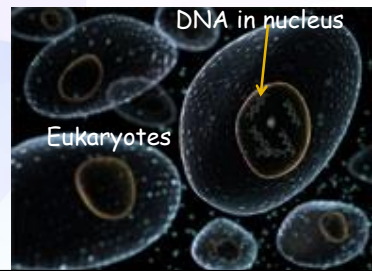
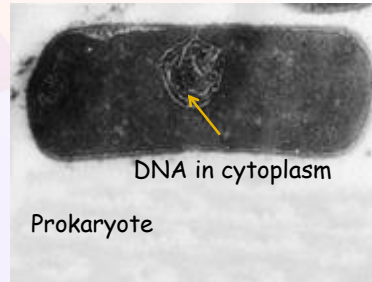
Protein Factory

- Proteins are assembled (synthesized) here
- Located in the cytoplasm and on the Rough ER



Nucleic Acids (DNA and RNA)

- In prokaryotes, the nucleic acid (DNA or RNA) is found in the cytoplasm
 - Remember, prokaryotes DO NOT HAVE A NUCLEUS
- In eukaryotes, the DNA is wound into chromosomes in the nucleus
 - RNA is found both in the nucleus and in the cytoplasm in eukaryotes

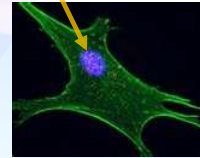
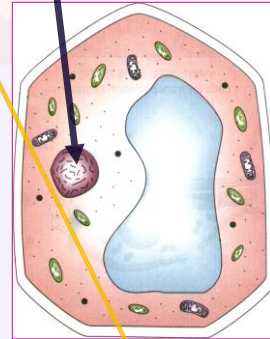


Organelles found in Eukaryotes only...

- Eukaryotes have several organelles that prokaryotes do not.
- Some, like chloroplasts, are only found in certain eukaryotes...
- Others, like mitochondria, are found in all eukaryotes.

Nucleus-Control Center of Cell

- Regulates cell function.
 - The "brain" of the cell
- The nuclear membrane/envelope surrounds the nucleus
 - Allows materials to enter & leave nucleus
- Chromatin: DNA wrapped around proteins
 - Chromatin becomes chromosomes during cell division



Nucleolus & Nuclear Envelope

The Nucleolus:

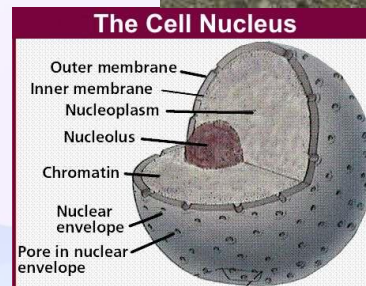
Stores genetic material such as **RNA**...

Site where ribosomes are synthesized (made).

Dense region in nucleus.

The Nuclear Envelope:

Double membrane around the nucleus used to protect it and allow **RNA** to enter and leave the nucleus.

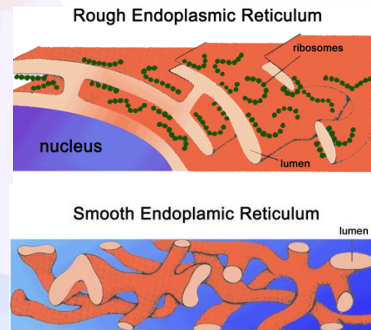


Endoplasmic Reticulum (ER)

➤ The ER directs the traffic of the many molecules by creating a series of channels that act as a "highway system" through the cytoplasm.

1. **Rough ER** - contains ribosomes on its surface & it makes proteins

2. **Smooth ER** - location of *lipid* synthesis (making lipids) & ships out parts of cell membrane (phospholipids)

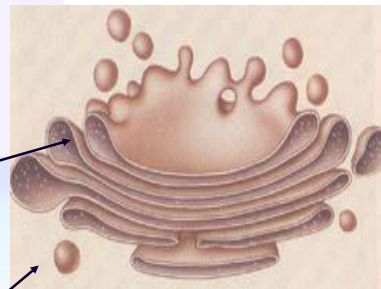


Golgi apparatus aka Golgi bodies or Golgi complex

- "Warehouse of the Cell"
- Modifies, sorts, & packages proteins & materials to be "shipped out" (secreted by vesicle)

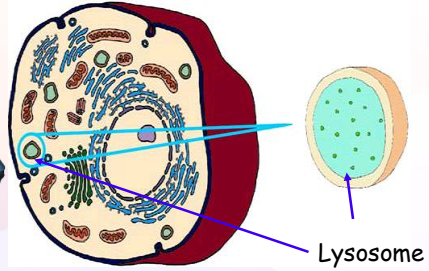


Golgi Apparatus



Transport Vesicle

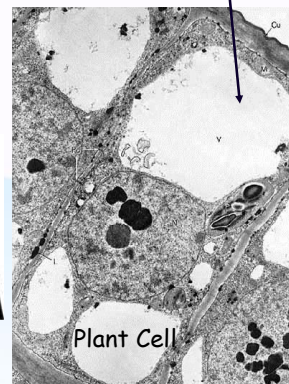
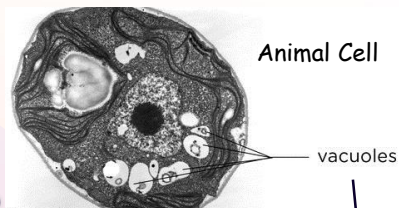
Lysosomes



- "Clean up crew/janitor"
- Special vacuoles that contain digestive enzymes to break down wastes, food particles, and disease-causing bacteria that enter the cell
- The recycling centers of the cell
- Only in ANIMAL cells!

Vacuoles

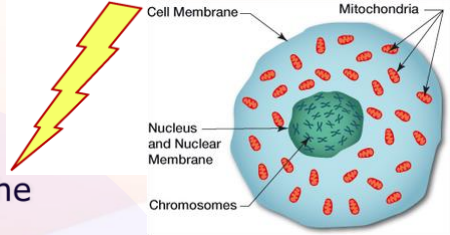
- Fluid filled spaces that aid in digestion, storage, support, and help maintain water balance.
- Store food, water, proteins- enzymes, and waste products
- Plant cells often contain a LARGE central vacuole...animals cells usually only contain smaller food and waste vacuoles
 - An exception is adipose (fat) cells in animals, which have a large vacuole to hold a droplet of oil (fat)



Mitochondria

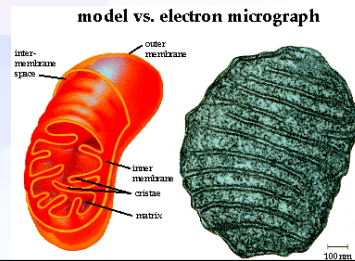
found in ALL eukaryotes

- Produce the energy for the cell.
- Also known as the "powerhouse of the cell".
- Double membrane organelle (inner and outer)
- Has a highly folded inner membrane (cristae).
- Converts food into ENERGY the cell can use!
- Contains its own DNA- you inherit your mom's!

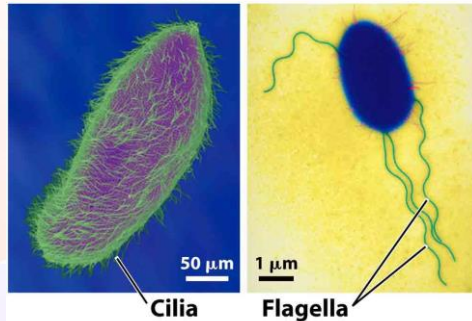


Mitochondria-(plural)

Mitochondrion- (singular)



Cilia & Flagella



- Used for movement in unicellular organisms.
- Used for movement of materials or absorption in multicellular organisms.
- Cilia are hair-like projections
- Flagella are whip-like projections

Cytoskeleton

- Supports cell
- Also involved in cell movement
- Cyto = cell,
 - so skeleton of the cell!

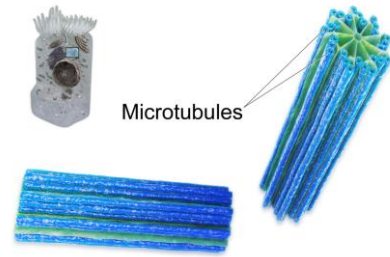
Special Eukaryotic Organelles

- Some eukaryotic organelles are only found in certain groups of eukaryotes, such as:
- Centrioles
- Chloroplasts
- Cell walls
- Central (LARGE) vacuole*

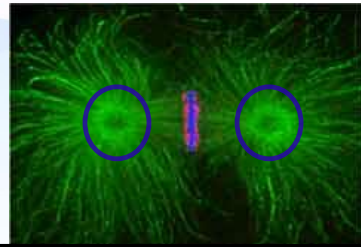
Remember the "C's"

Centrioles

- Found only in animal cells in the nucleus
- Help with cell division (mitosis)

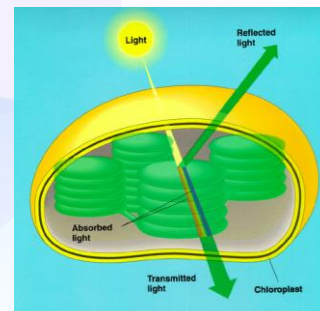
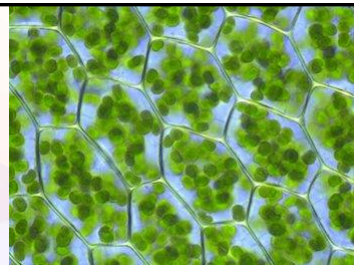


Centrioles



Chloroplasts

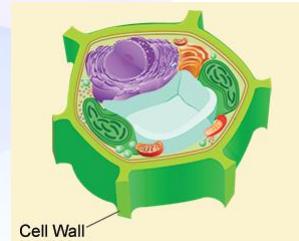
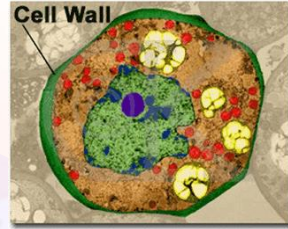
- Found only in photosynthetic organisms, such as PLANTS and some protists.
- This is the site of photosynthesis:
 - Conversion of light energy to chemical energy (sugar)
 - Contains chlorophyll (green pigment)
 - Contain DNA!



Cell Walls

also found in prokaryotes

- Found in some protists, all fungi, and all plants.
- Provides protection and support for the cells.
- Chemical make-up is different for the different organisms
 - Plant cell walls are made of cellulose
 - Fungi cell walls are made of chitin



Plant vs. Animal Cells

1. Animal cells have lysosomes, plants do not.
2. Animal cells have centrioles, plants do not.
3. Plants have cell walls, animals do not.
4. Plants have chloroplasts, animals do not.
5. Plants have central vacuoles, animals do not.