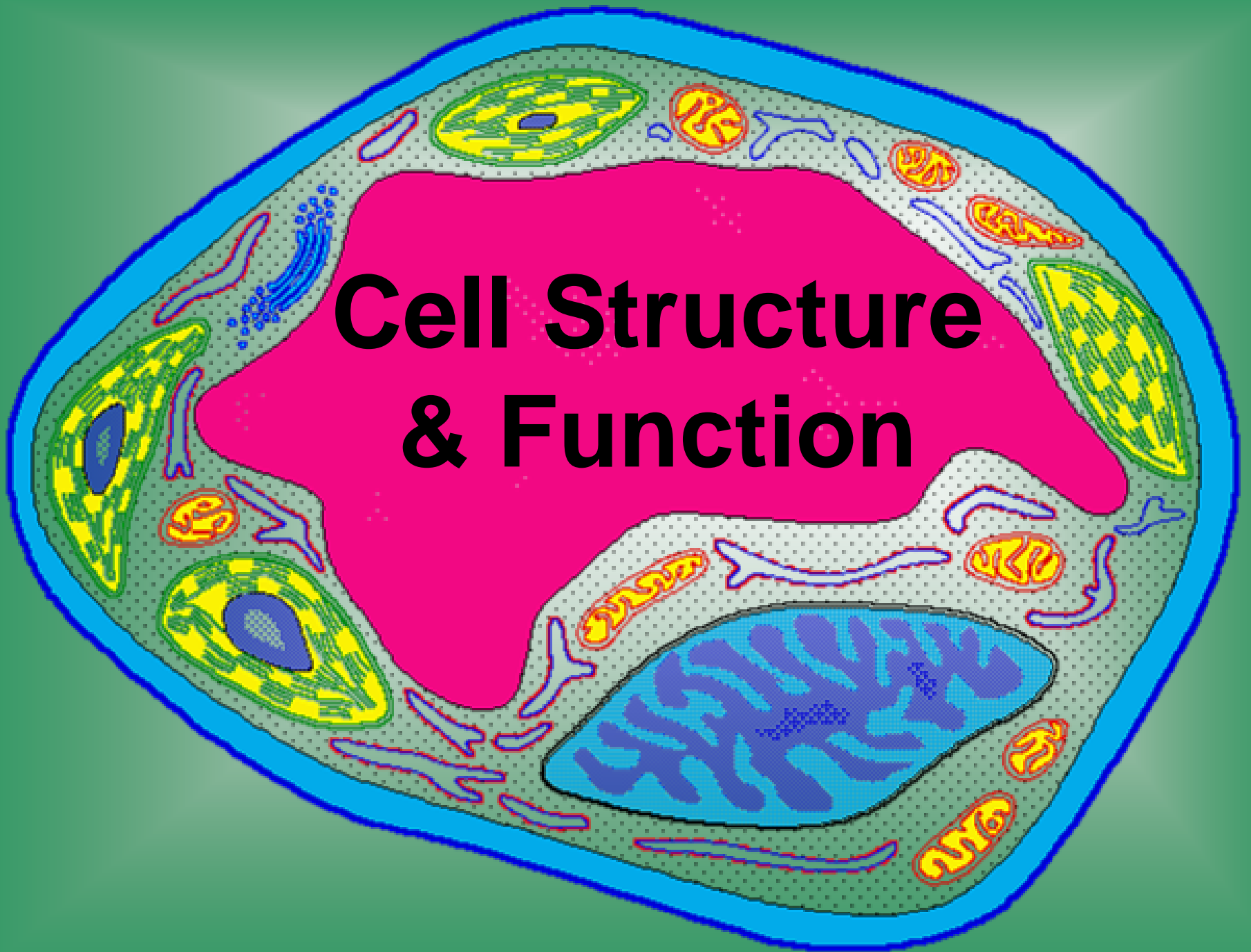


Cell Structure & Function

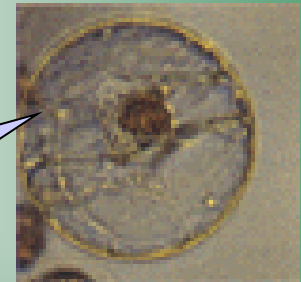


The Cell

- A cell is the smallest unit that is capable of performing life functions.

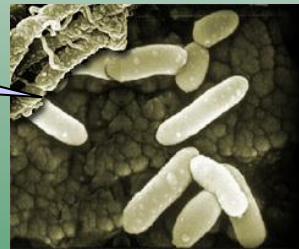


Amoeba
Proteus

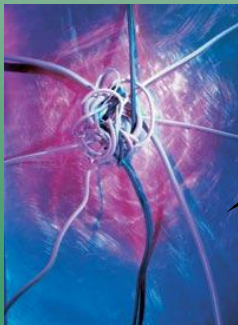


Plant
Stem

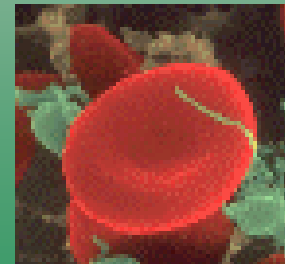
Bacteria



Red
Blood
Cell



Nerve
Cell



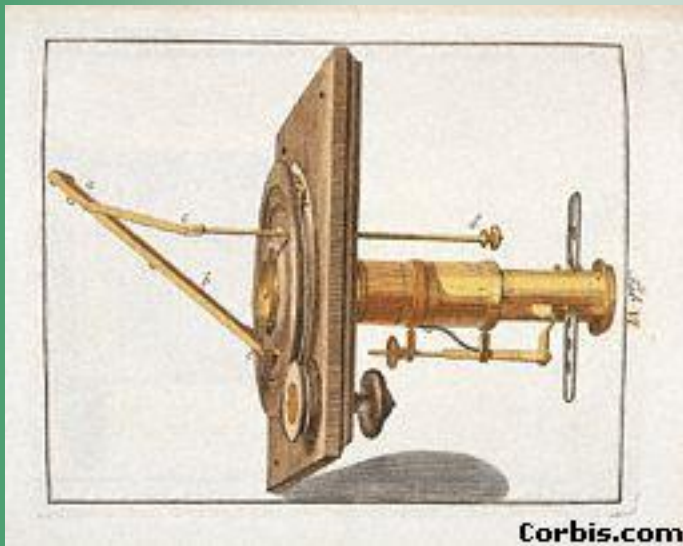
Microscopes and Cells

- 1600's.
 - Anton van Leeuwenhoek first described living cells as seen through a simple microscope.



Microscopes and Cells

– Robert Hooke first used a compound microscope to view thinly sliced cork cells.



- Compound scopes use a series of lenses to magnify in steps.
- Hooke was the first to use the term “cell”.

Microscopes and Cells

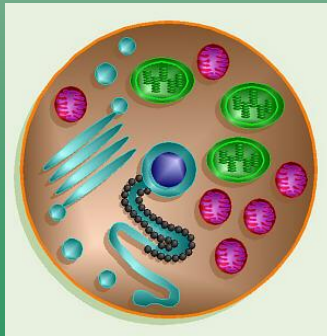
- 1830's.
 - Mathias Schleiden identified the first plant cells and concluded that all plants are made of cells.

- Thomas Schwann made the same conclusion about animal cells.




Cell Theory

1. All living things are made up of 1 or more cells.
2. Cells are the smallest working units of all living things.
3. All cells come from pre-existing cells through cell division.




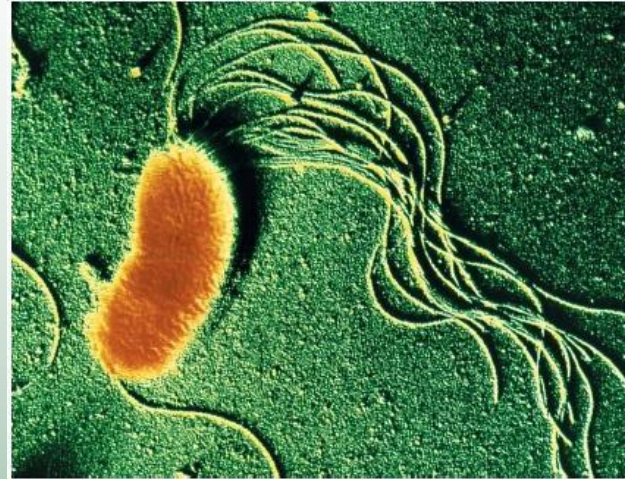
Number of Cells

Organisms may be:

- Unicellular-  *composed of 1 cell*

OR

- Multicellular-  *made of many cells*

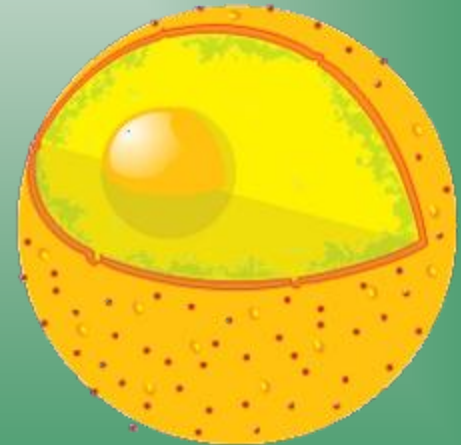
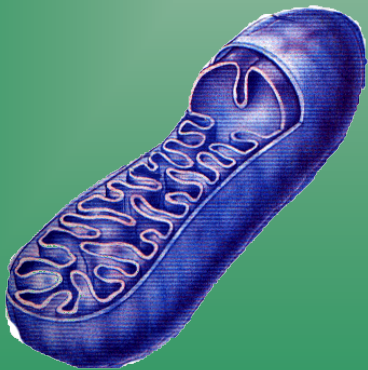


Cells can be Eukaryotic or Prokaryotic

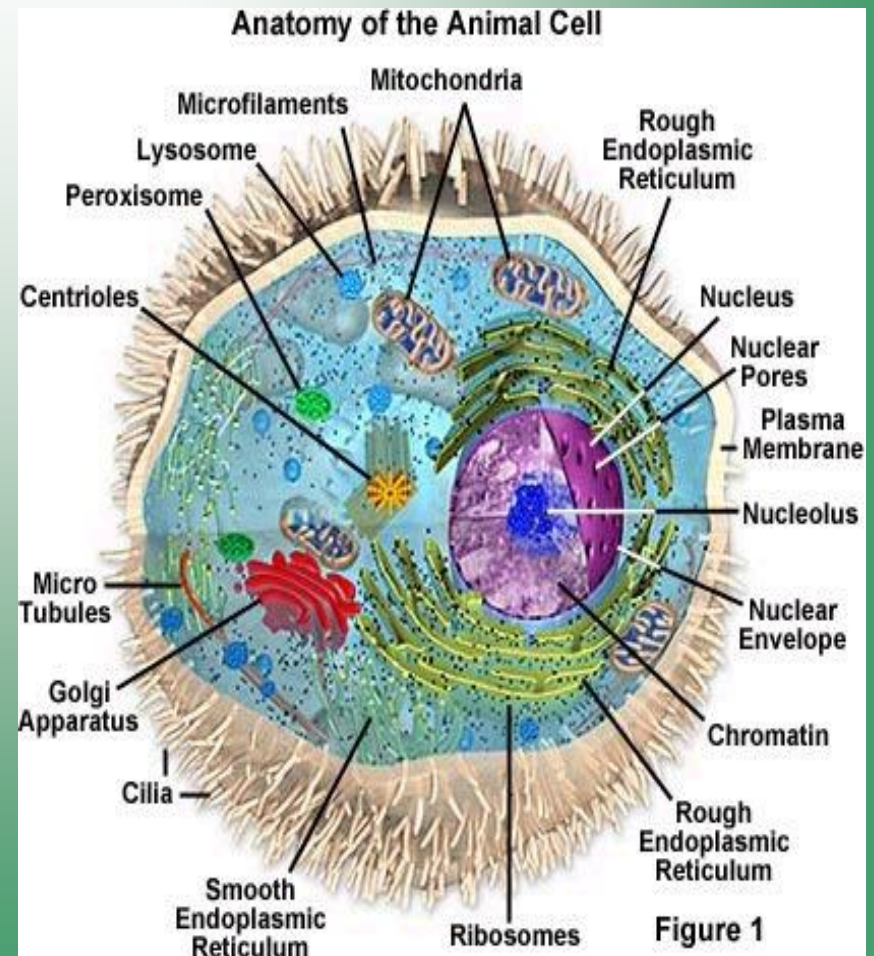
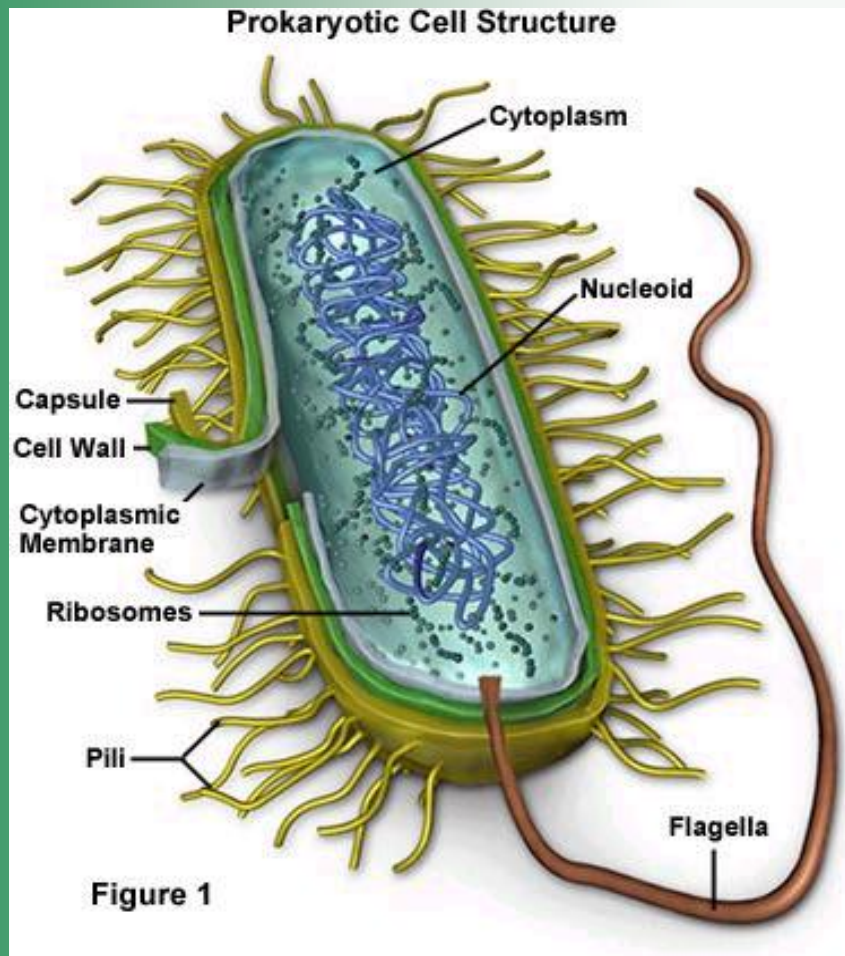
- **Prokaryotes** :do not have a nucleus or organelles (bacteria).
- **Eukaryotes**: have a nucleus and organelles (plants, fungi, animals, protists)

Organelles

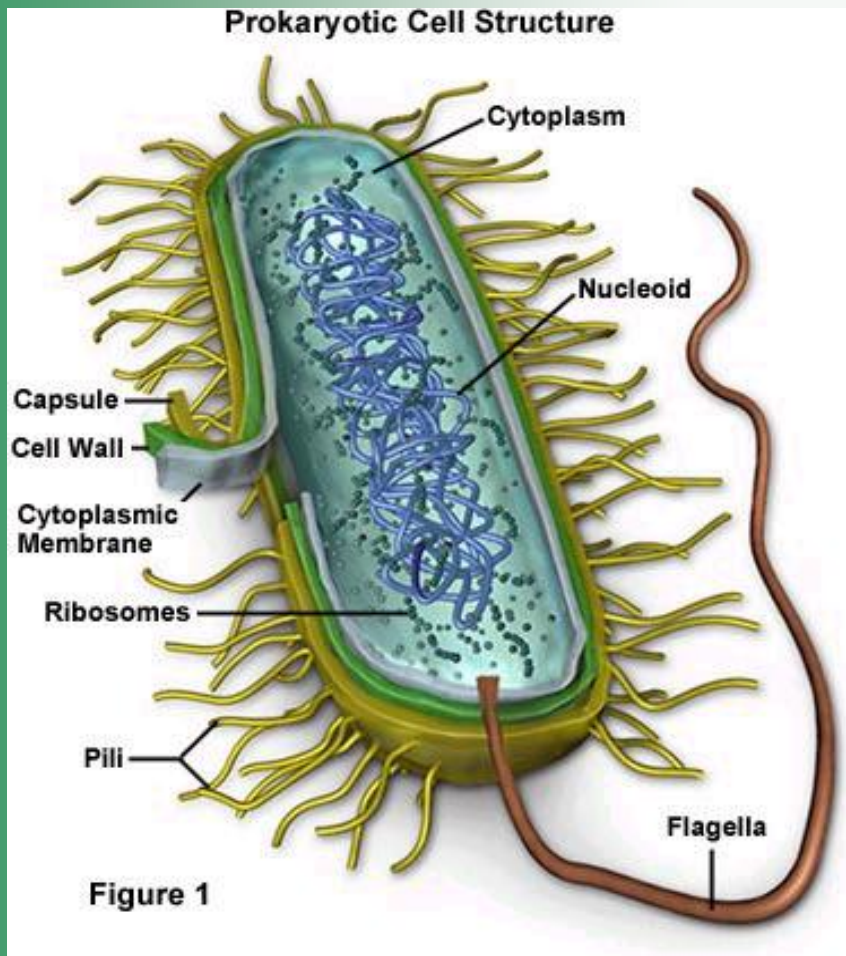
- Cell structures that have a specific function and are surrounded by a membrane that are found in eukaryotes only.



Prokaryotic vs. Eukaryotic



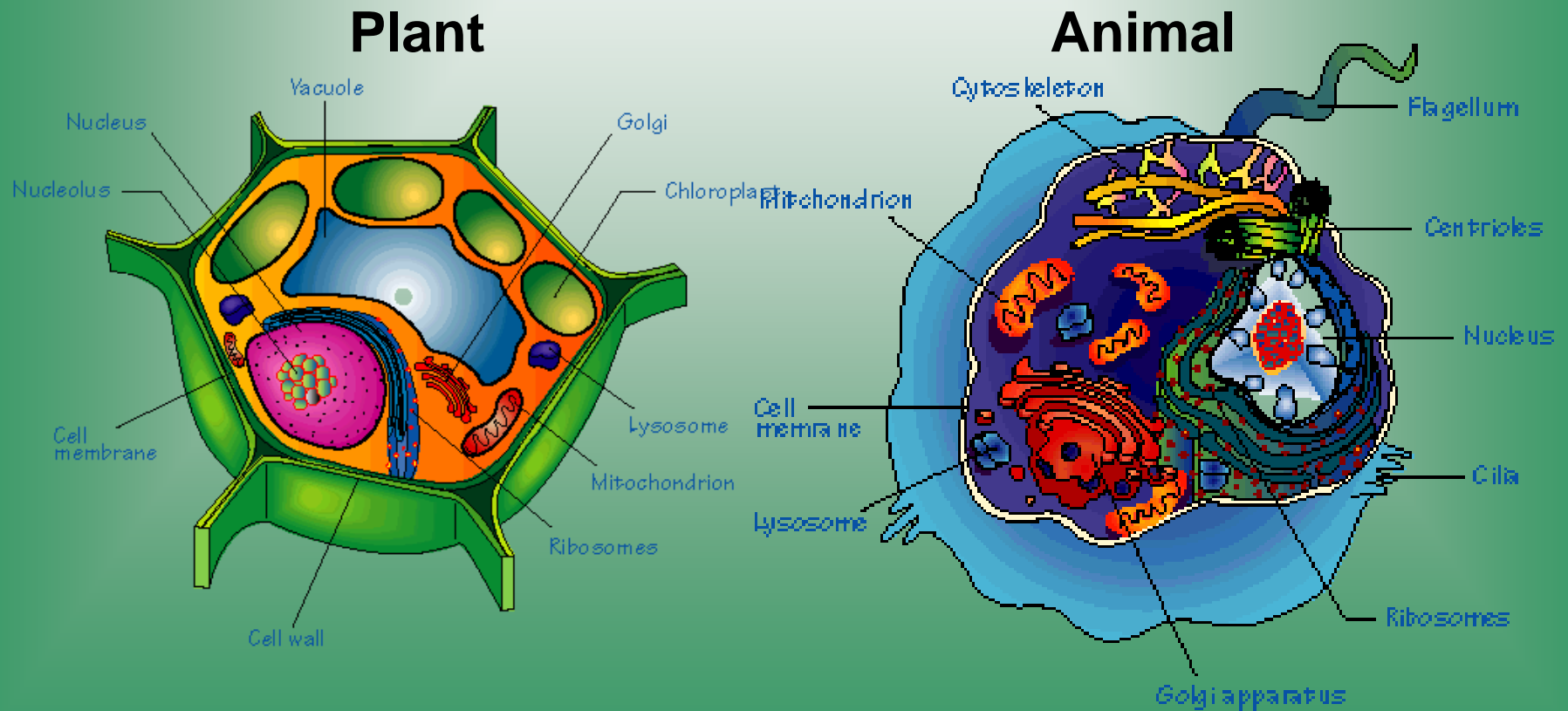
Prokaryotic Cells



- Believed to be the first cells to evolve.
- Lack a membrane bound nucleus and organelles.
- Genetic material is free in the cytoplasm
- Ribosomes are only other cell structure.

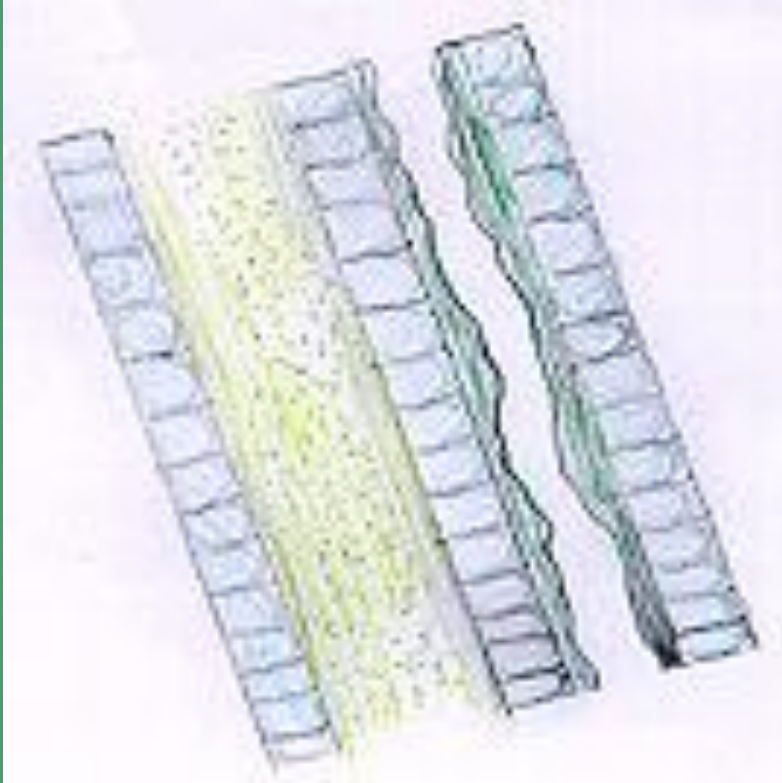
Eukaryotic

- 2 major types of eukaryotic cells-
Plant and Animal cells



Cell Structures & Functions

Cell Wall



- Found outside of the cell membrane in plant cells & bacteria only
- Contains cellulose that provides support (rigidity) & protection

Cell or Plasma Membrane

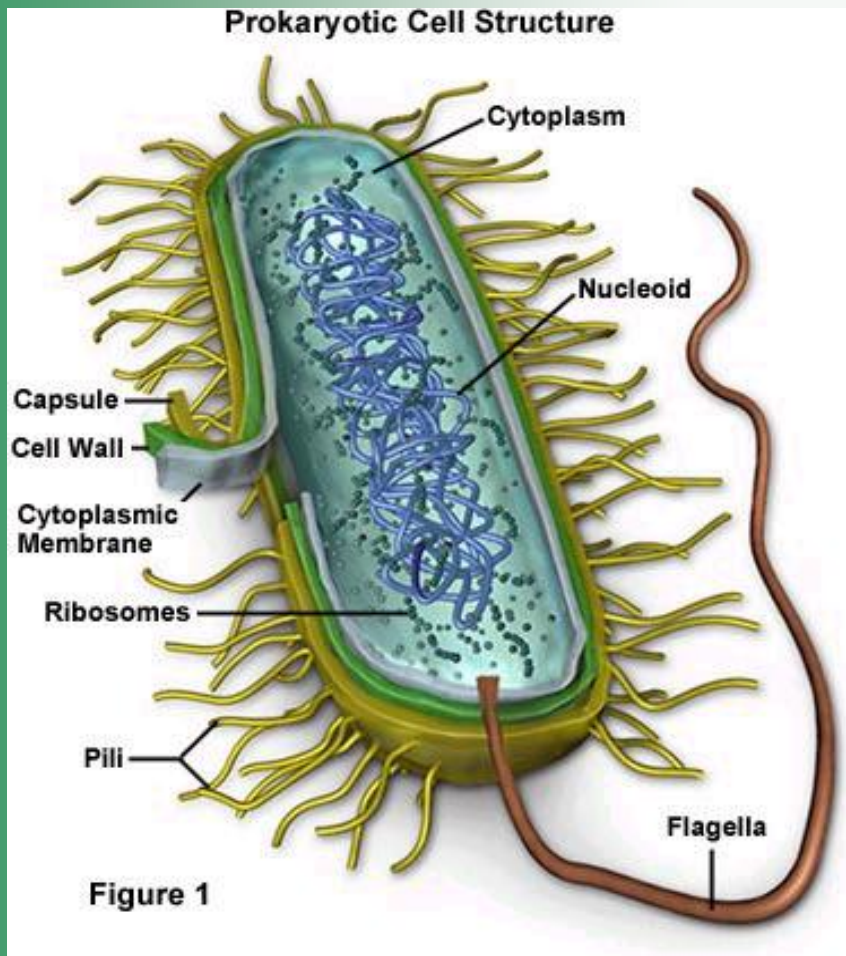


- Outer membrane of cells that controls movement of substances in and out of the cell
- Double layer (bi-layer)
- In plants and bacteria, this is within the cell wall.

Cytoplasm

- Gel-like mixture inside cells
- Surrounded by cell membrane
- Contains cell structure that carry out specific jobs ex. Mitochondrion, nucleus
- Provides a medium for chemical reactions to take place

Nucleoid



- In prokaryotes.
- Region of the cytoplasm where chromosomal DNA is located.
- Singular, circular chromosome.
- Smaller circles of DNA called plasmids are also located in cytoplasm.

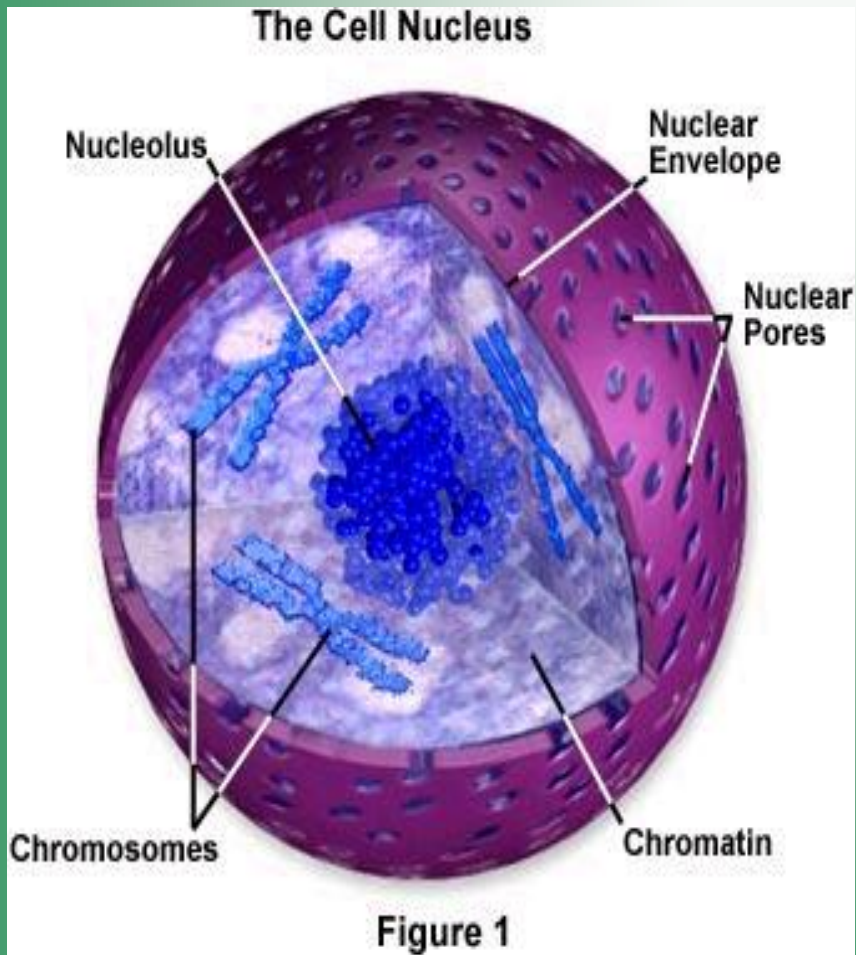
Ribosomes

- Each cell contains thousands
- Make proteins
- Found on endoplasmic reticulum & floating throughout the cell cytoplasm



Organelles

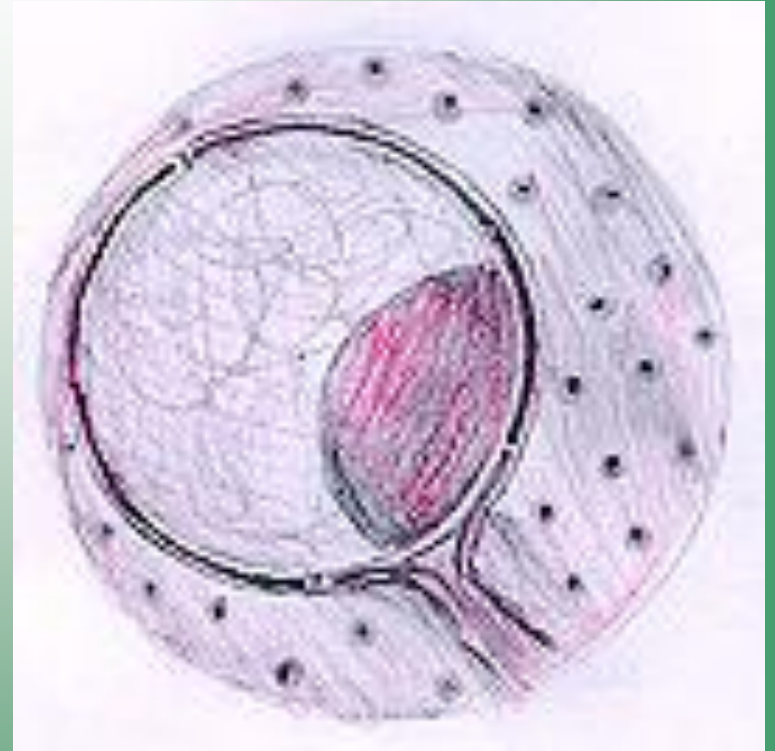
Nucleus



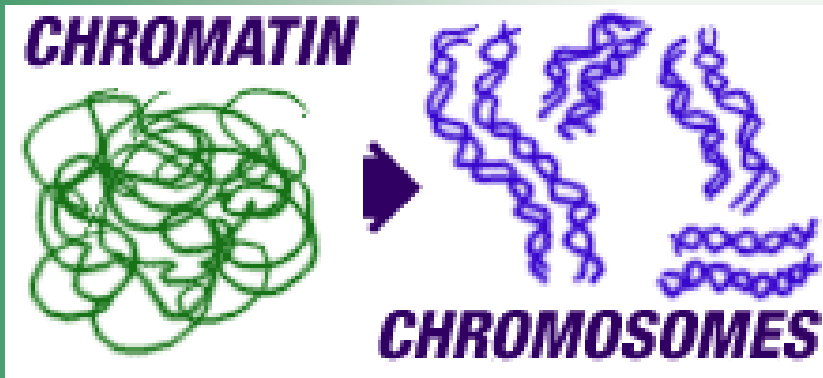
- “Control center”
- Directs cell activities
- Contains the genetic material (DNA)
- Separated from cytoplasm by nuclear membrane (or nuclear envelope).

Nuclear Membrane

- Surrounds nucleus, separates DNA from cytoplasm
- Made of two layers
- Openings called pores allow some materials to enter and leave nucleus



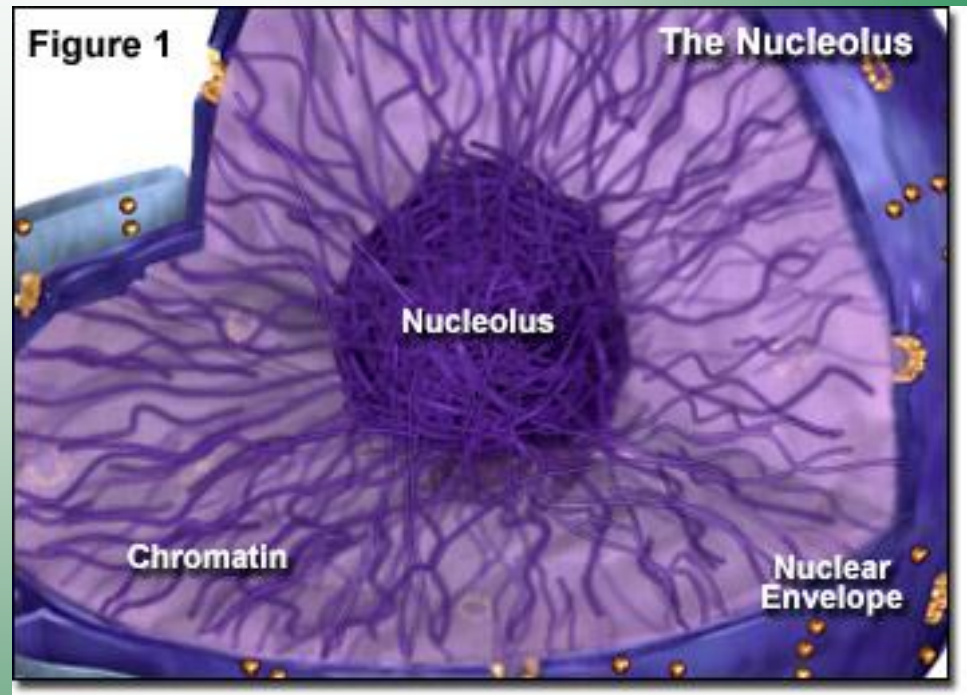
Chromatin



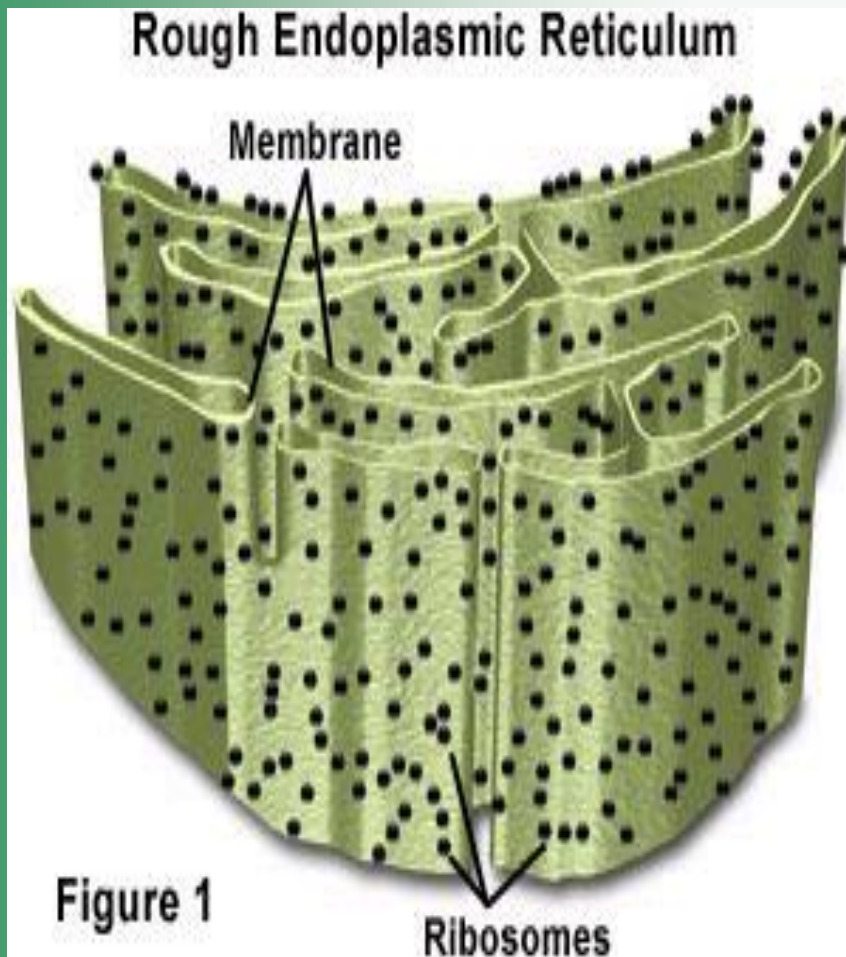
- In nucleus
- Genetic material (DNA) of cell in its non-dividing state.
- I.e. Uncoiled chromosomes
- Contain instructions for traits & characteristics

Nucleolus

- Dark-staining structure in the nucleus
- Makes ribosomes that make proteins



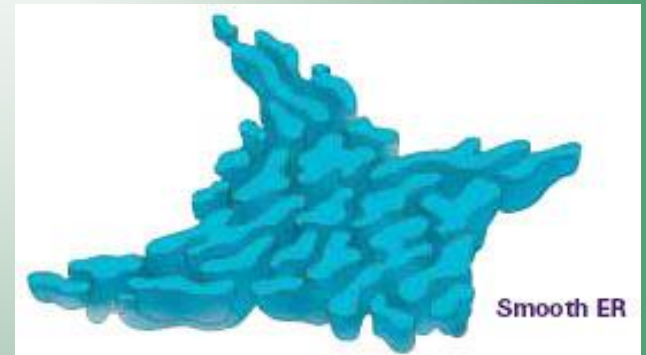
Rough Endoplasmic Reticulum



- Network of continuous sacs, studded with ribosomes.
- Internal delivery system of the cell.
- Manufactures, processes, and transports proteins for export from cell.
- Continuous with nuclear envelope.

Smooth Endoplasmic Reticulum

- Similar in appearance to rough ER, but without the ribosomes.
- Produces lipids, involved in carbohydrate metabolism, and detoxification of drugs and poisons.

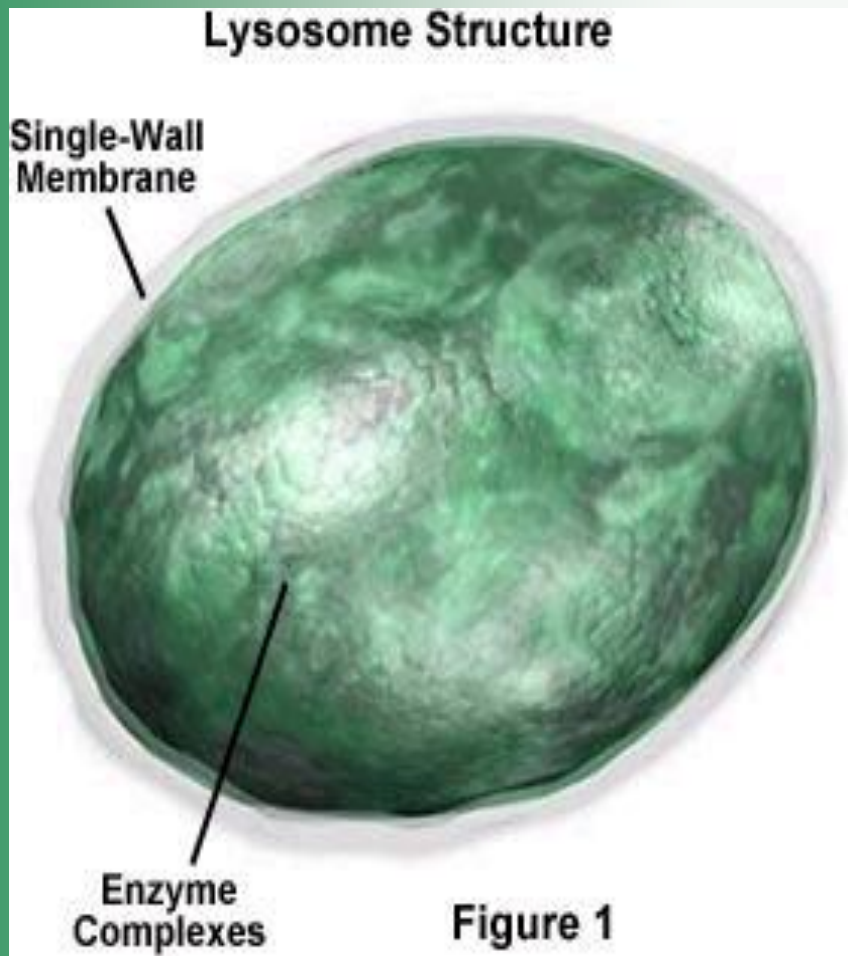


Golgi Apparatus



- Protein 'packaging plant'
- Modifies proteins and lipids made by the ER and prepares them for export from the cell.
- Encloses digestive enzymes into membranes to form lysosomes (transport pods).

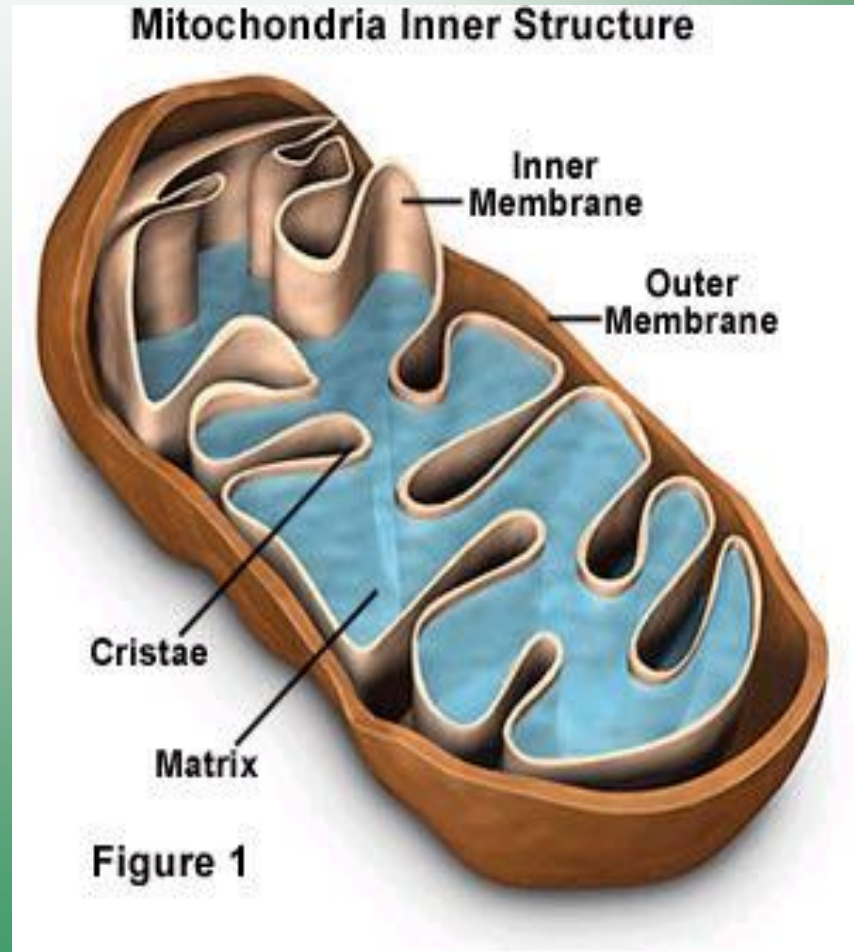
Lysosome



- Digestive 'plant' for proteins, fats, and carbohydrates
- Digestive enzymes break down cellular waste and debris
- Transports undigested material to cell membrane for removal
- Cell breaks down if lysosome explodes

Mitochondria

- Cell “powerhouse”
- Membrane bound organelles that are the site of cellular respiration (use glucose to produce cell energy, ATP)
- Active cells like muscles have more mitochondria

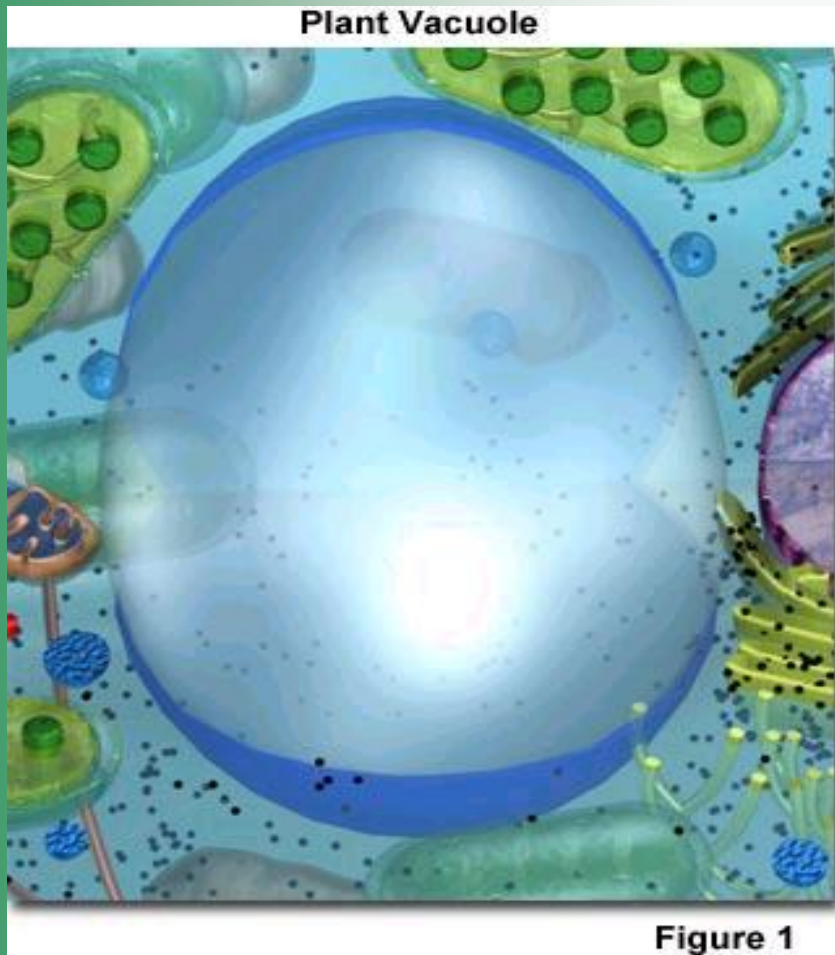


Animal Vacuole

- Membrane-bound sacs for storage, digestion, and waste removal
- Contains water solution



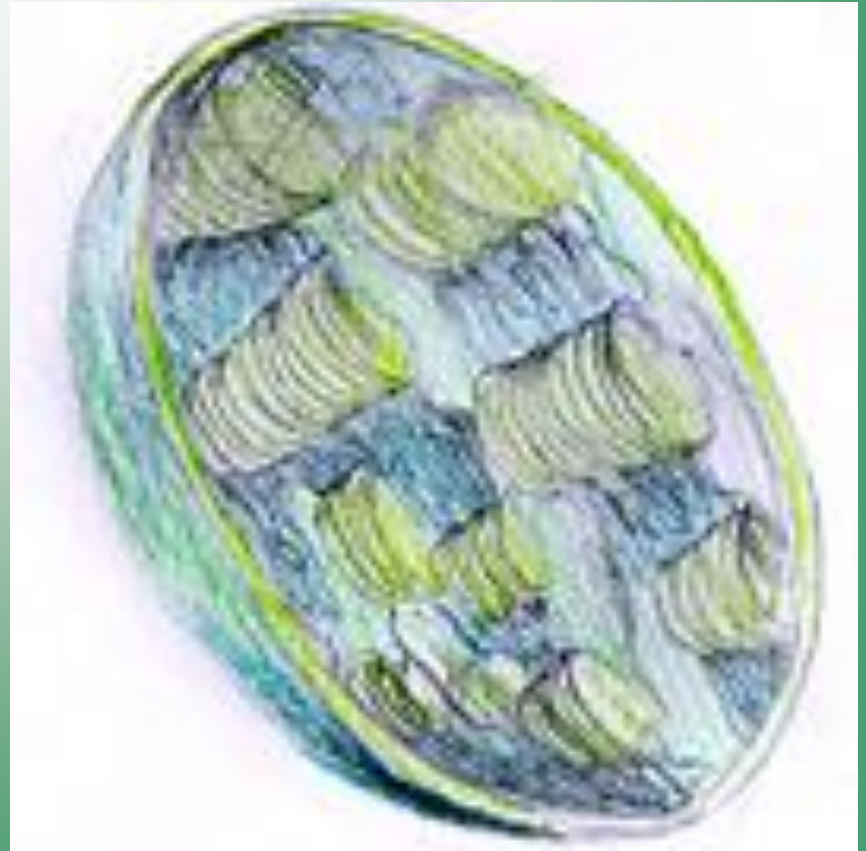
Plant Vacuole



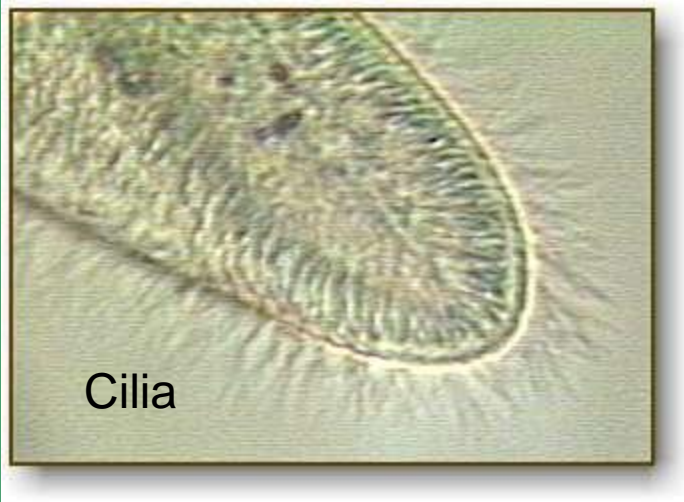
- Plants have large central vacuoles that store water and nutrients needed by the cell.
- Help support the shape of the cell.

Chloroplast

- Usually found in plant cells
- Contains green pigment chlorophyll
- Where photosynthesis takes place
- Produces plant food (sugars) and oxygen gas

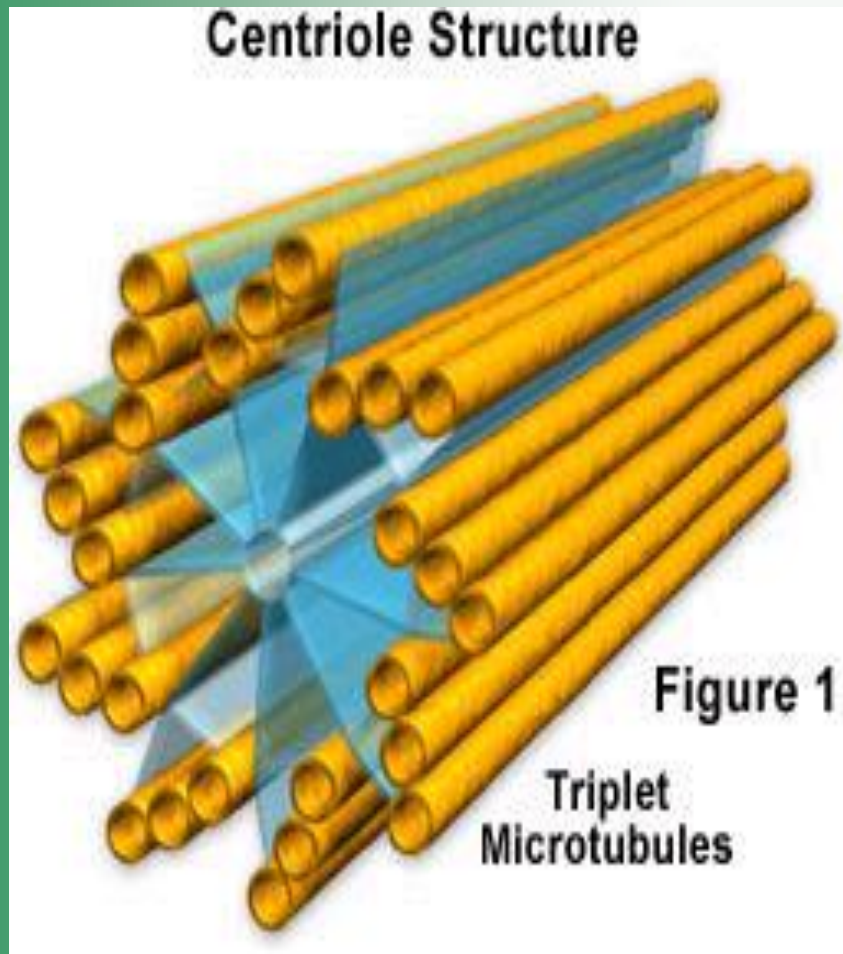


Cilia and Flagella



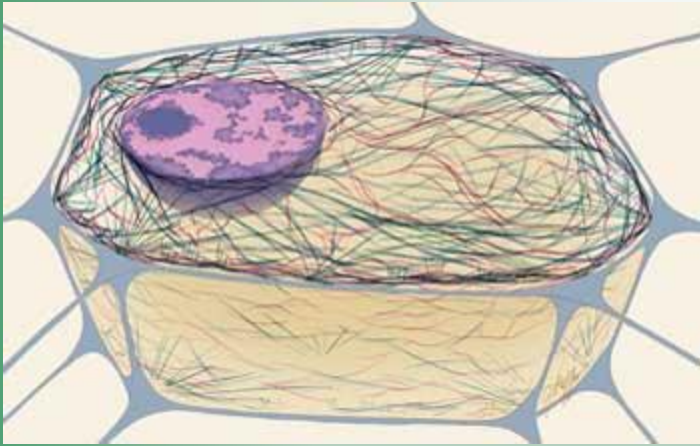
- External appendages from the cell membrane that aid in locomotion (movement) of the cell.
- Cilia also help to move substance past the membrane.

Centrioles



- Found only in animal cells.
- Self-replicating
- Made of bundles of microtubules.
- Help in organizing cell division.

Cytoskeleton



- The cell's skeleton
- Made of microtubules and filaments
- Give the cell shape, strength and ability to move