

# Cell: Structures & Functions

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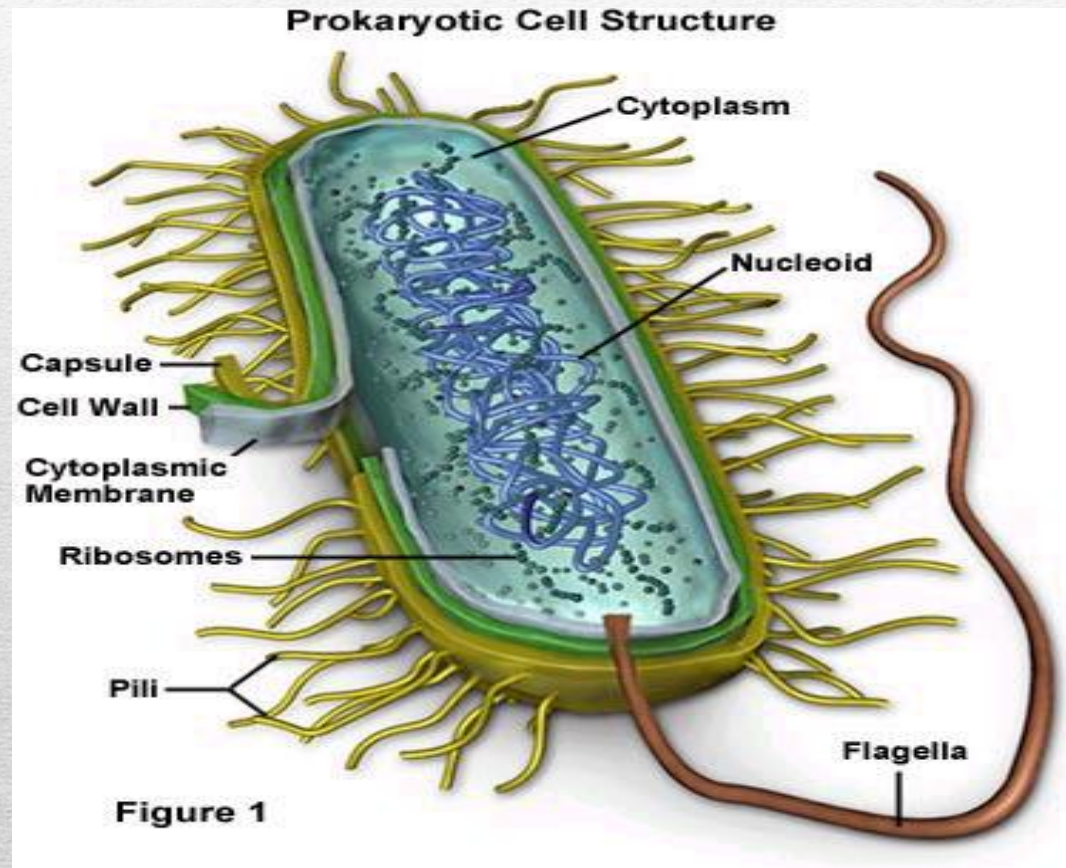
ANDUAT, Kumarganj Ayodhya

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# Cells

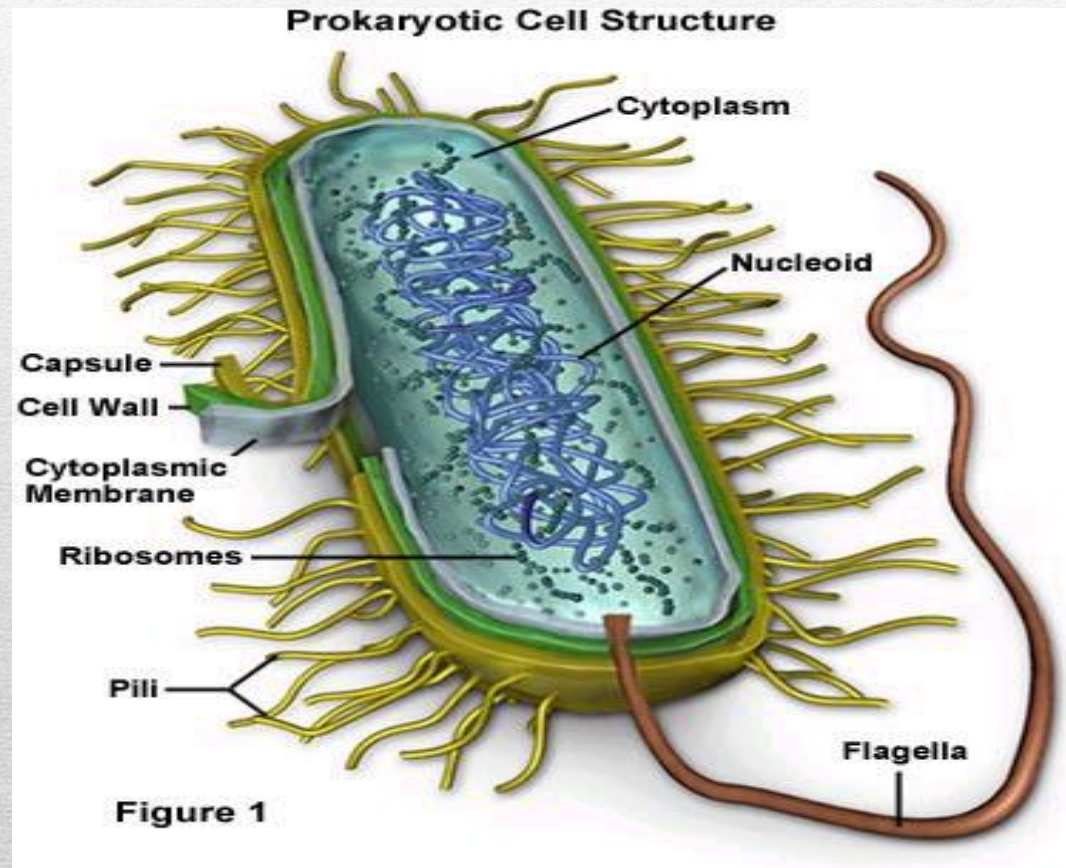
- Basic unit of life
  - Discovered by Robert Hooke in 1665
  - Three groups or kingdoms of life
    - Archaeobacteria (Greek *arche*-, “origin”) are Prokaryotes
    - Eubacteria (Greek *eu*, “true”) are Prokaryotes
    - Eukaryotes (Greek *eu*, “true,” and *karyon*, “nucleus”)
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# Prokaryotic Cells



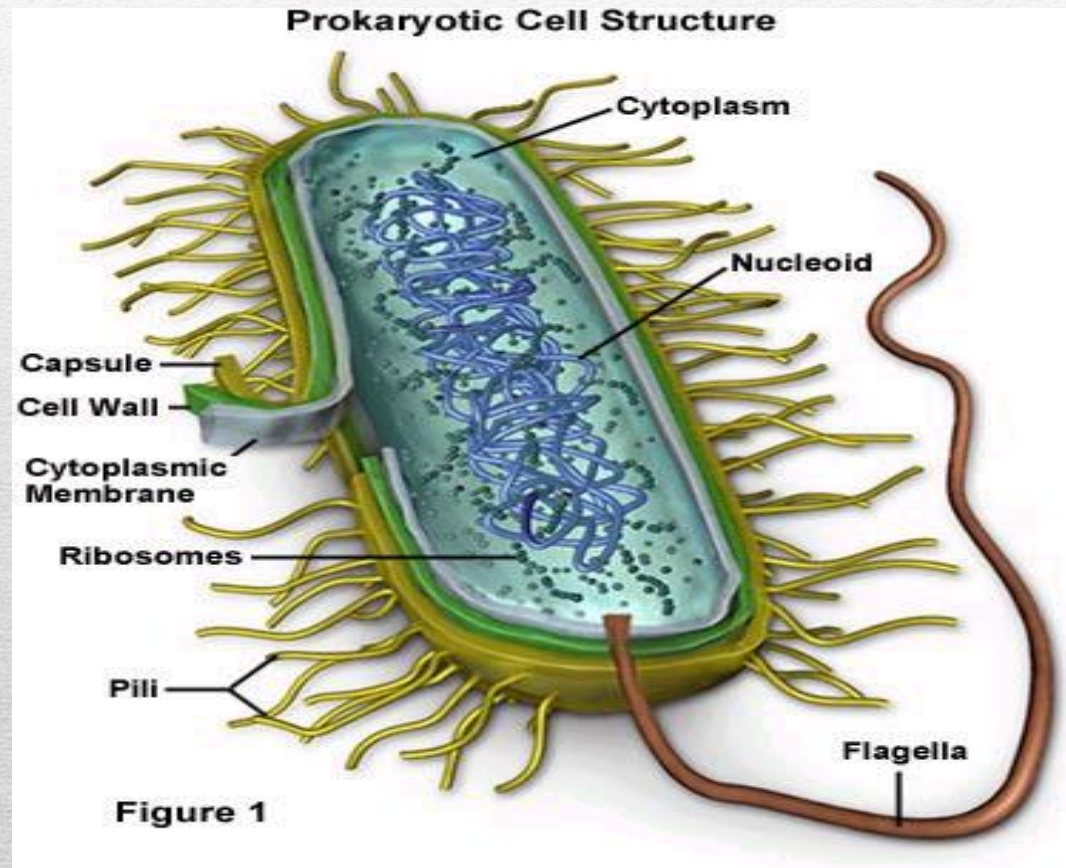
- Believed to be the first cells to evolve.
- Lack a membrane bound nucleus and organelles.
- Genetic material is naked in the cytoplasm
- Ribosomes are only organelle.

# Cell Wall



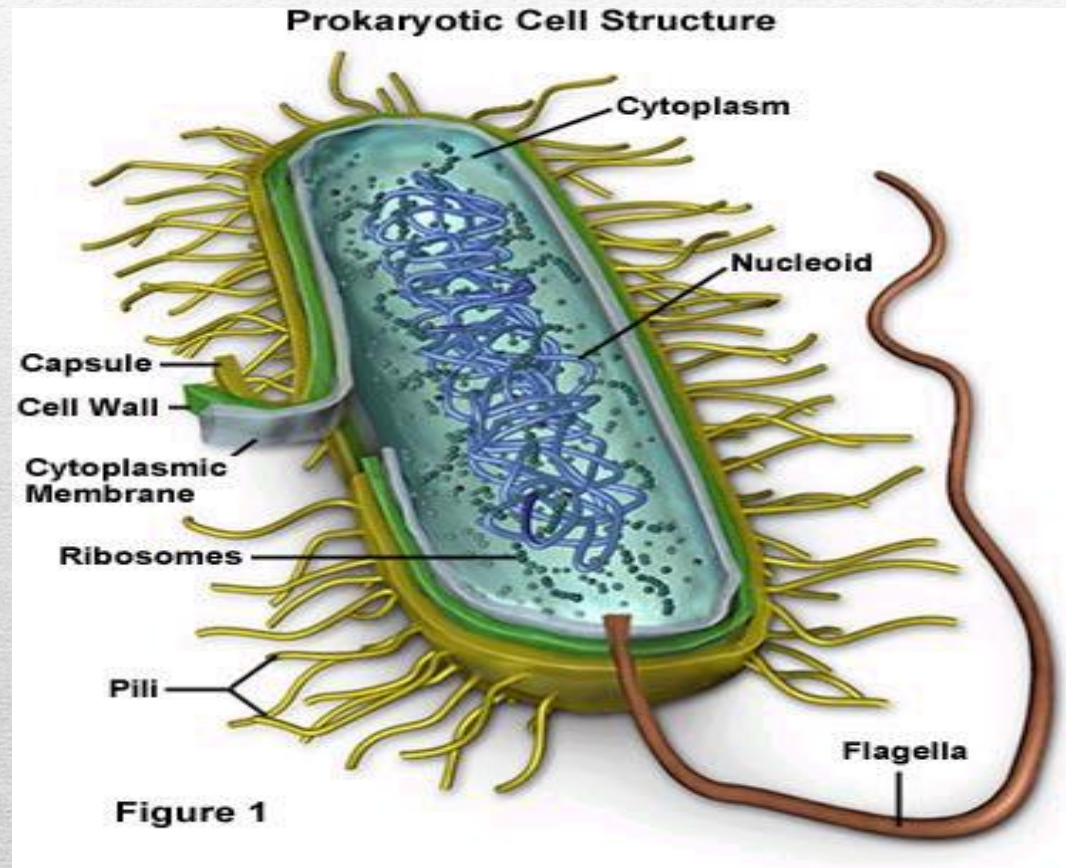
- Rigid peptidoglycan - polysaccharide coat that gives the cell shape and surround the cytoplasmic membrane. Offers protection from environment.

# Plasma Membrane



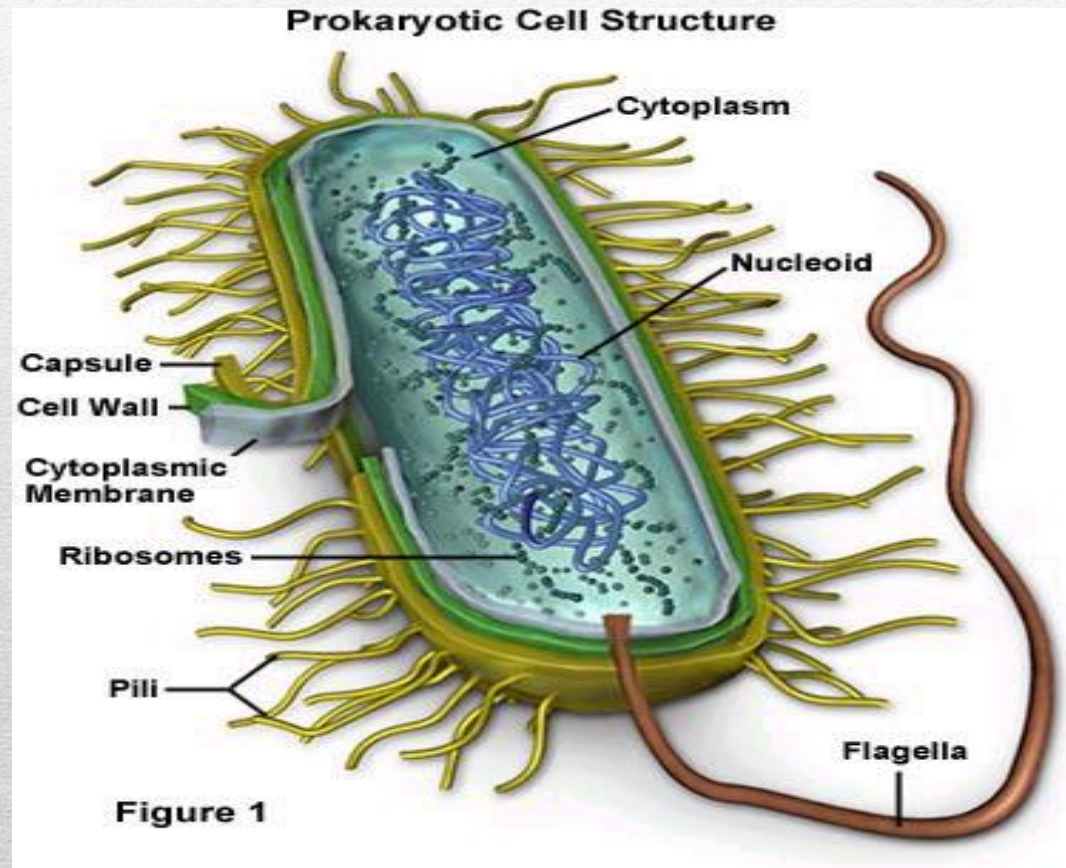
- Layer of phospholipids and proteins that separates cytoplasm from external environment.
- Regulates flow of material in and out of cell.

# Cytoplasm



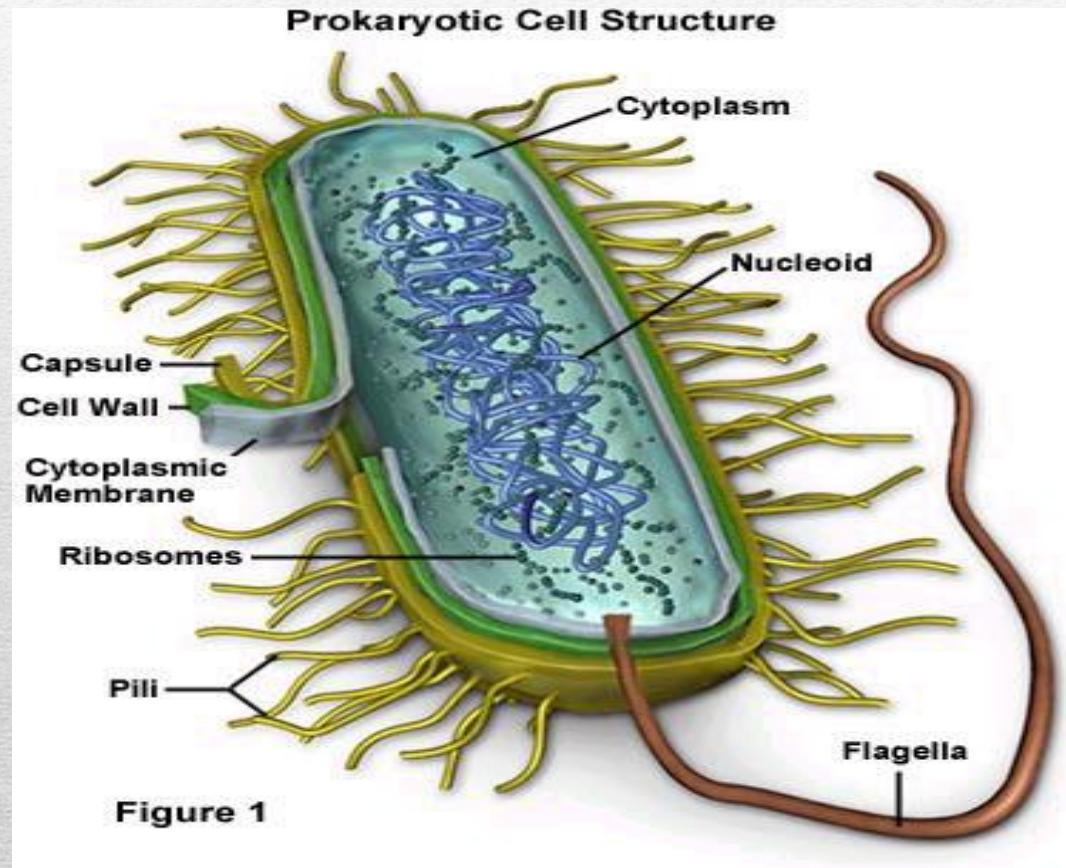
- Also known as protoplasm is location of growth, metabolism, and replication. Is a gel-like matrix of water, enzymes, nutrients, wastes, and gases and contains cell structures.

# Ribosomes



- Translate the genetic code into proteins.
- Free-standing and distributed throughout the cytoplasm.

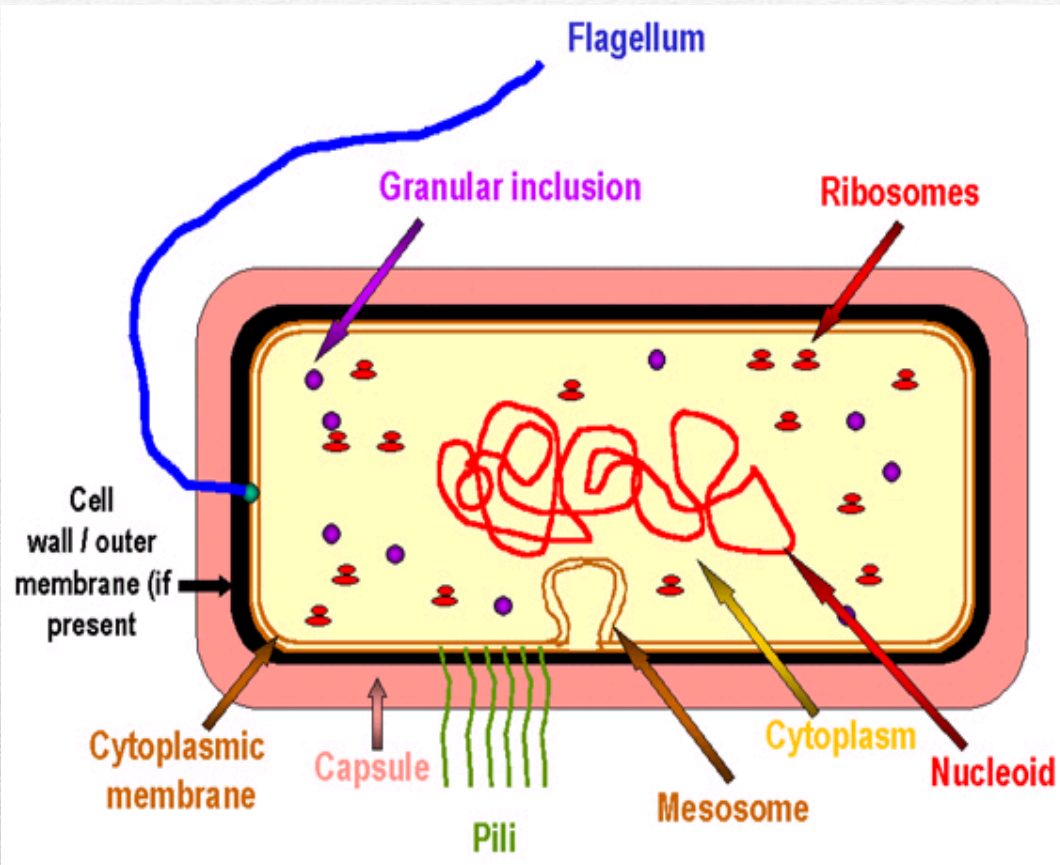
# Nucleoid



- Region of the cytoplasm where chromosomal DNA is located. Usually a singular, circular chromosome. Smaller circles of DNA called plasmids are also located in cytoplasm.

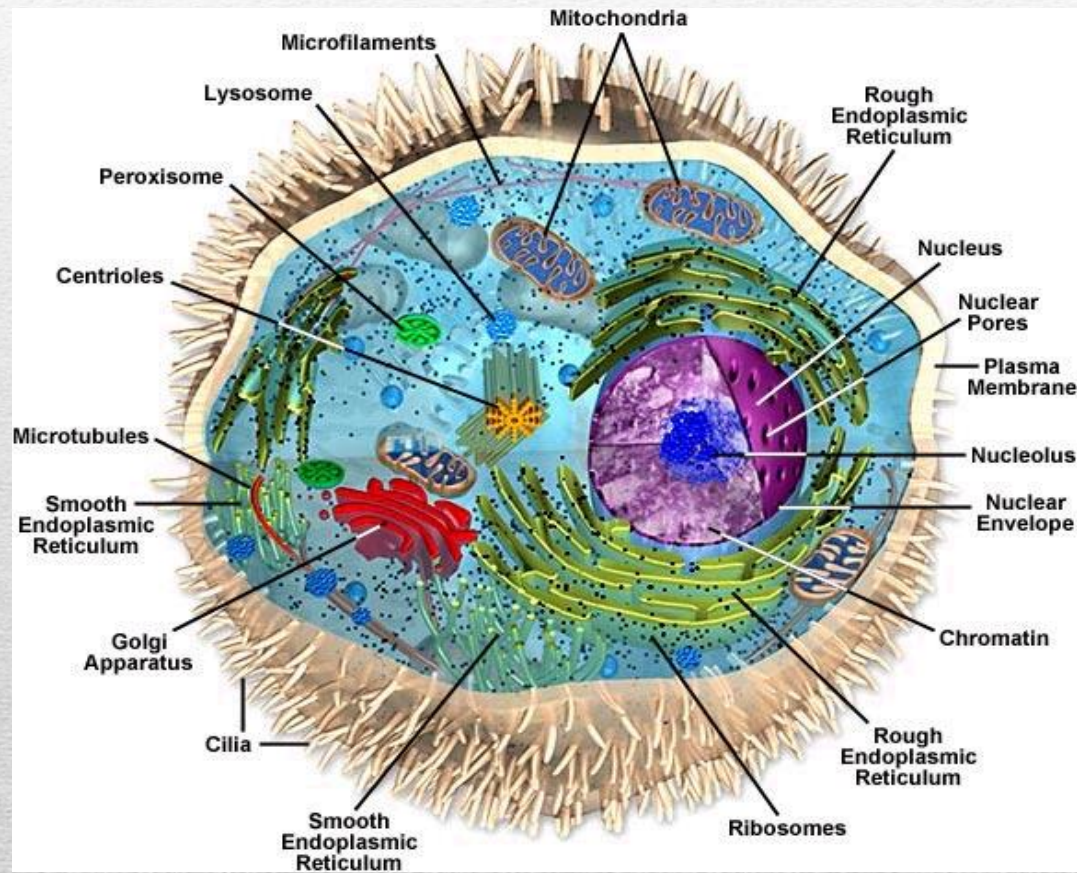


# Mesosome



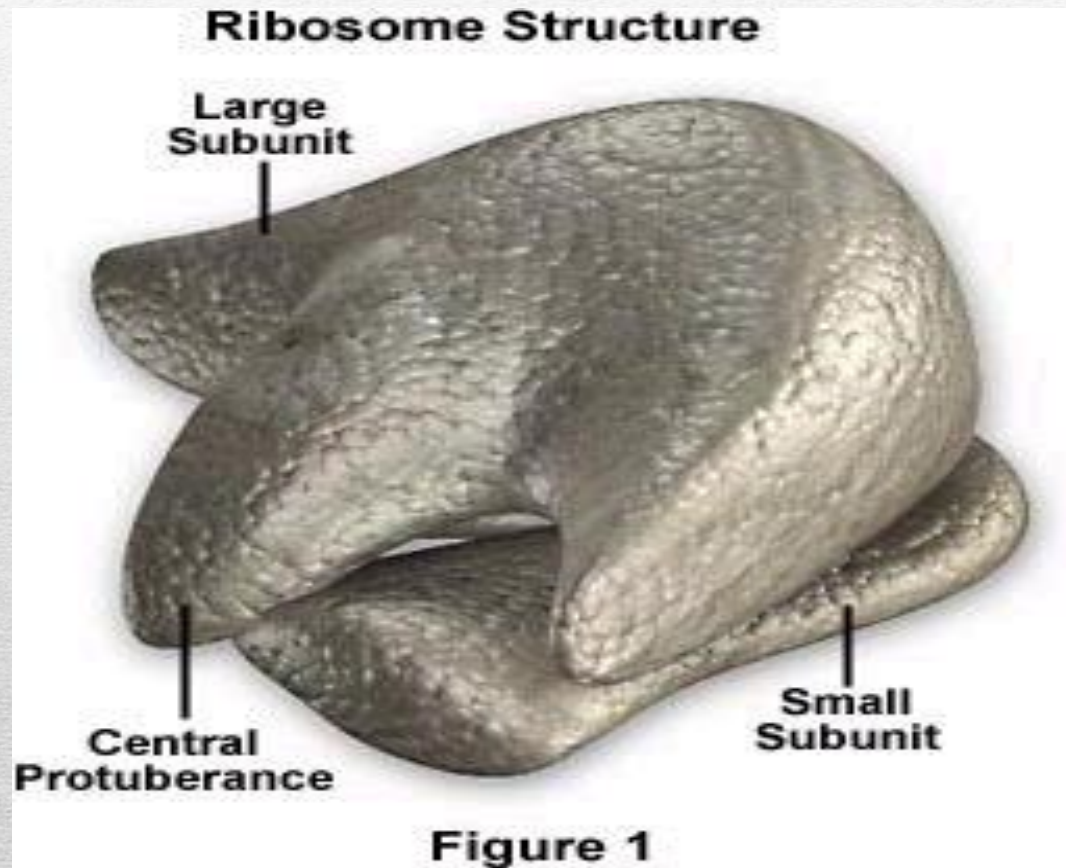
- Infolding of cell membrane.
- Possible role in cell division.
- Increases surface area.
- Photosynthetic pigments or respiratory chains here.

# Eukaryotic Cells



- “True nucleus”; contained in a membrane bound structure.
- Membrane bound organelles.
- Thought to have evolved from prokaryotic cells.

# Ribosomes

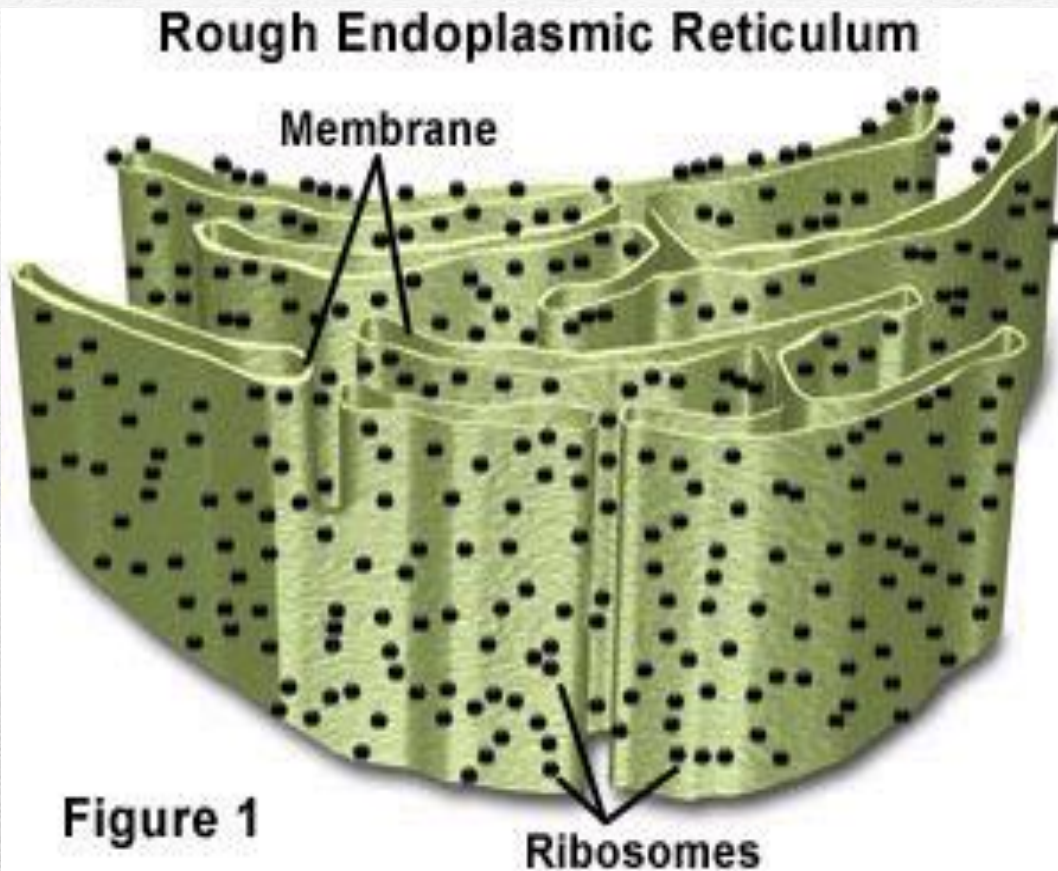


- Translate the genetic code into proteins.
- Found attached to the Rough endoplasmic reticulum or free in the cytoplasm.
- 60% RNA and 40% protein.
- [Http://micro.magnet.fsu.edu/cells/animals/ribosomes.html](http://micro.magnet.fsu.edu/cells/animals/ribosomes.html)

# Endoplasmic Reticulum (ER)

- Nickname: “Roads”
  - Function: The internal delivery system of the cell
  - Two types: Smooth and Rough
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# Rough Endoplasmic Reticulum

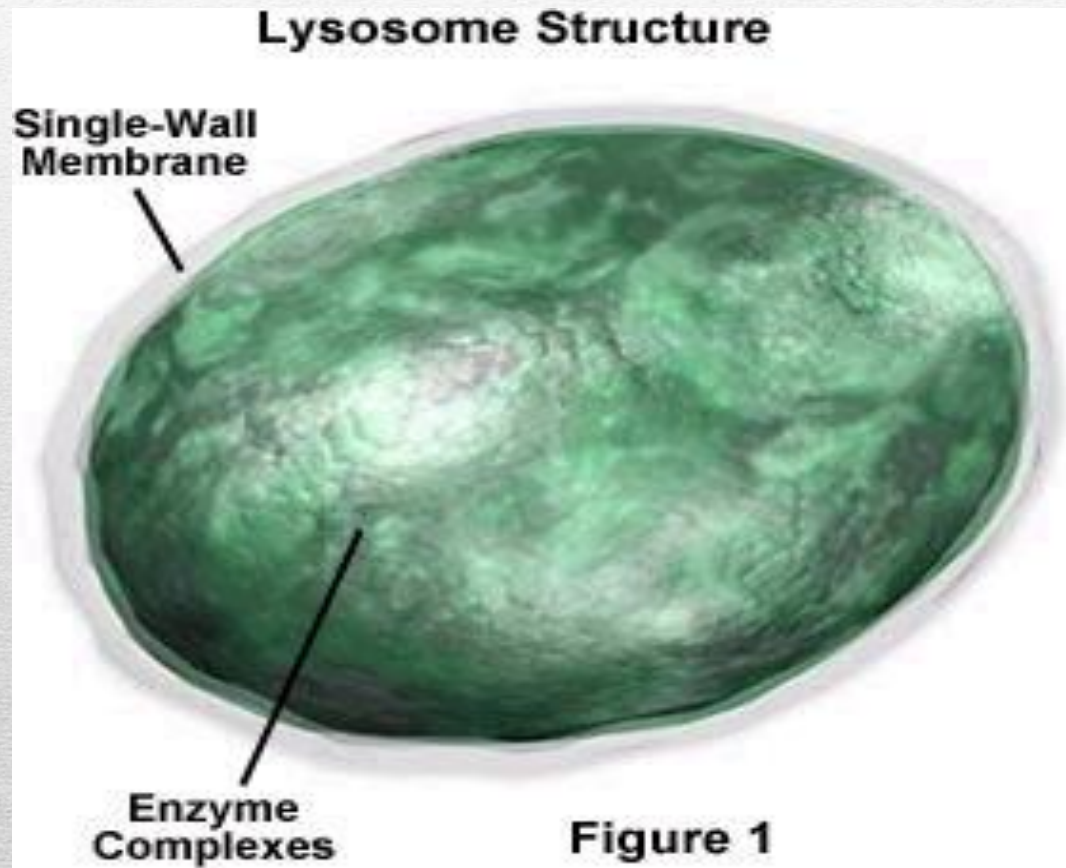


- Network of continuous sacs, studded with ribosomes.
- Manufactures, processes, and transports proteins for export from cell.
- Continuous with nuclear envelope.
- [Http://micro.magnet.fsu.edu/cels/animal/endoplasmicreticulum.html](http://micro.magnet.fsu.edu/cels/animal/endoplasmicreticulum.html)

# Smooth Endoplasmic Reticulum

- Similar in appearance to rough ER, but without the ribosomes.
  - Involved in the production of lipids, carbohydrate metabolism, and detoxification of drugs and poisons.
  - Metabolizes calcium.
  - [Http://micro.magnet.fsu.edu/cells/animals/endoplasmicreticulum.html](http://micro.magnet.fsu.edu/cells/animals/endoplasmicreticulum.html)
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# Lysosome

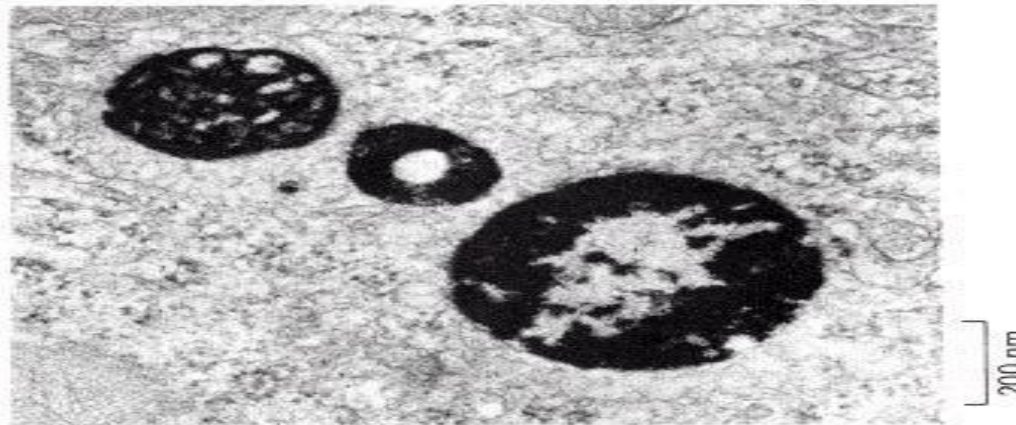
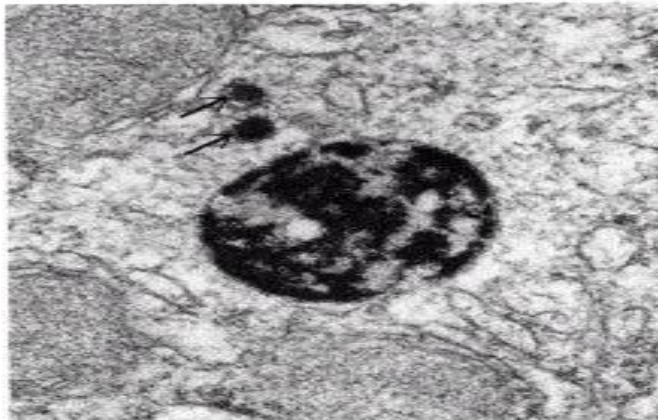


- Nickname: “Clean-up Crews”
- Function: to break down food into particles the rest of the cell can use and to destroy old cells
- Single membrane bound structure.
- Contains digestive enzymes that break down cellular waste and debris and nutrients for use by the cell.

# Lysosome

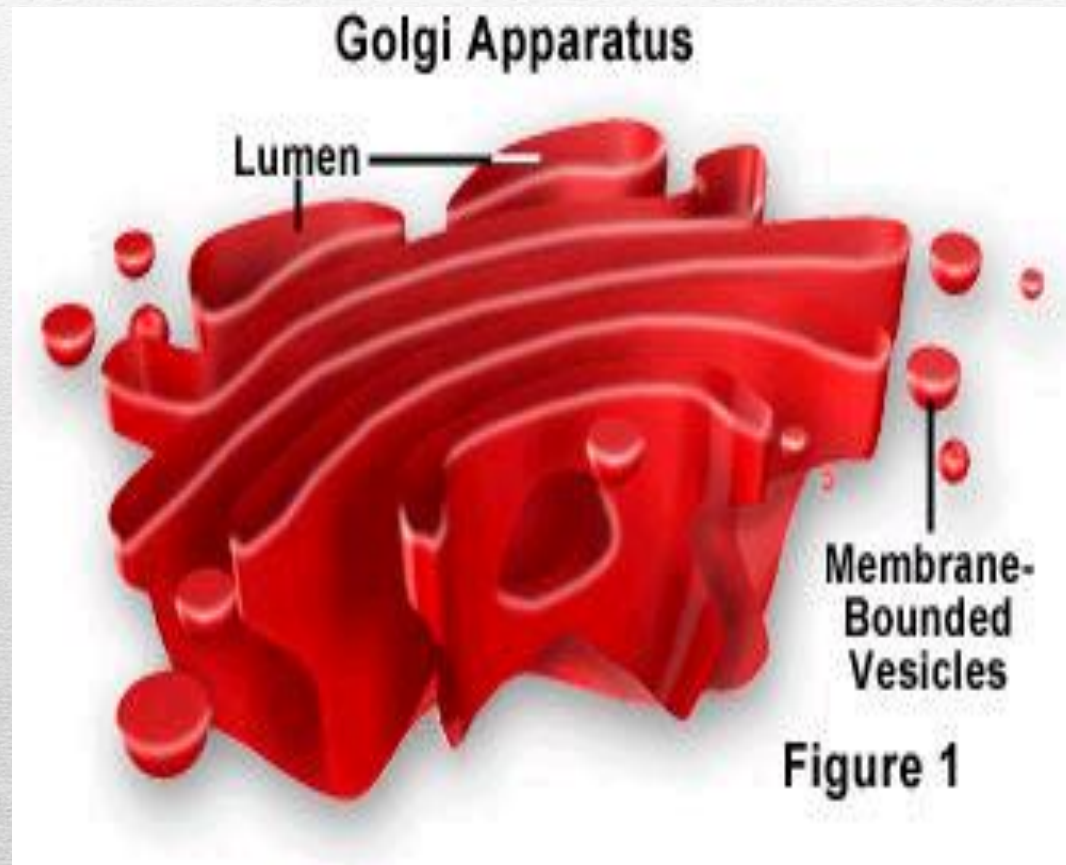
## Lysosomes

- Are the site of cellular digestion.
- contain up to 40 enzymes for digestion
- Acid Hydrolases
  - Active at acid pH (5)



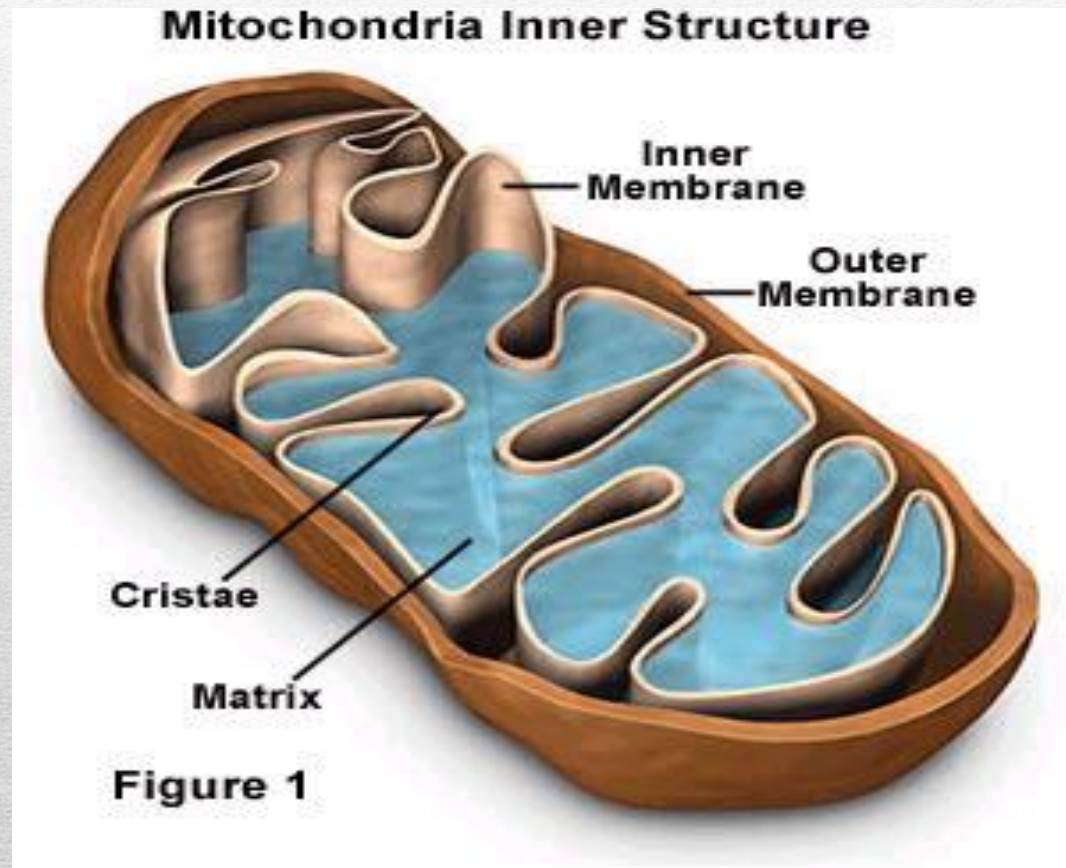


# Golgi Apparatus



- Nickname: The shippers
- Function: packages, modifies, and transports materials to different location inside/outside of the cell
- Appearance: stack of pancakes
- Modifies proteins and lipids made by the ER and prepares them for export from the cell.
- Encloses digestive enzymes into membranes to form lysosomes.

# Mitochondrion

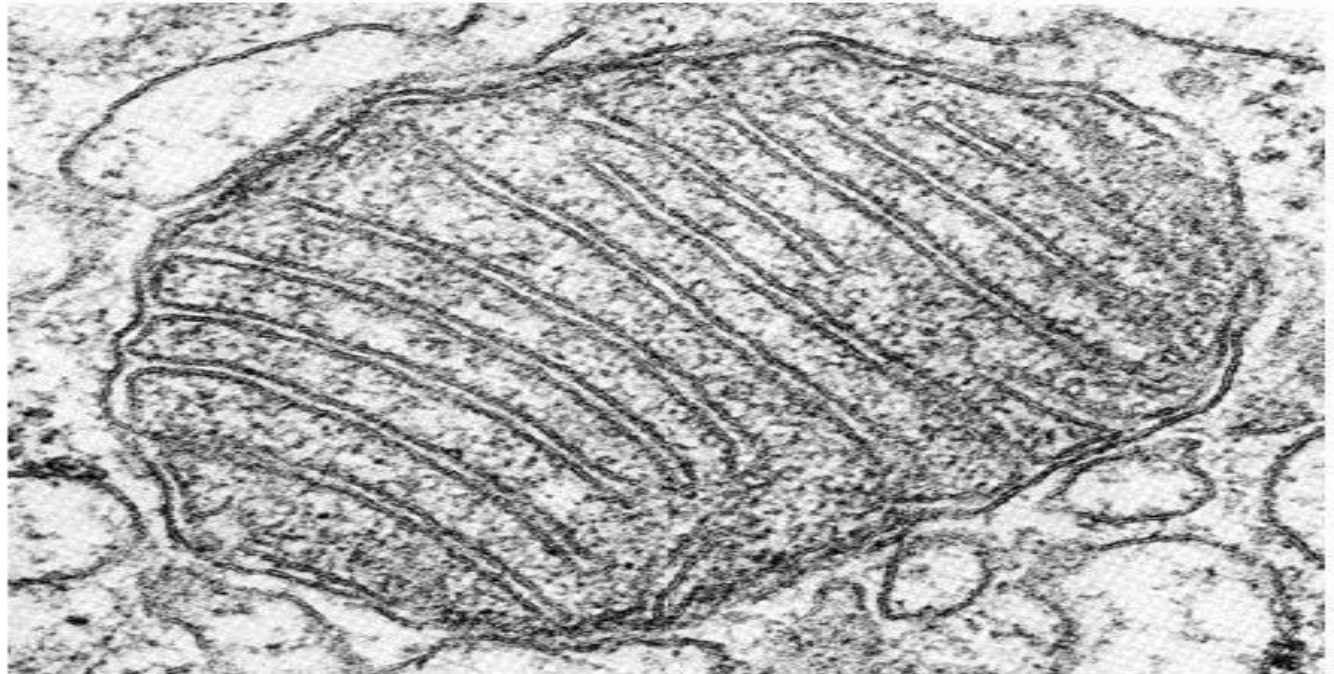


- Nickname: “The Powerhouse”
- Function: Energy formation
- Membrane bound organelles that are the site of cellular respiration (ATP production)

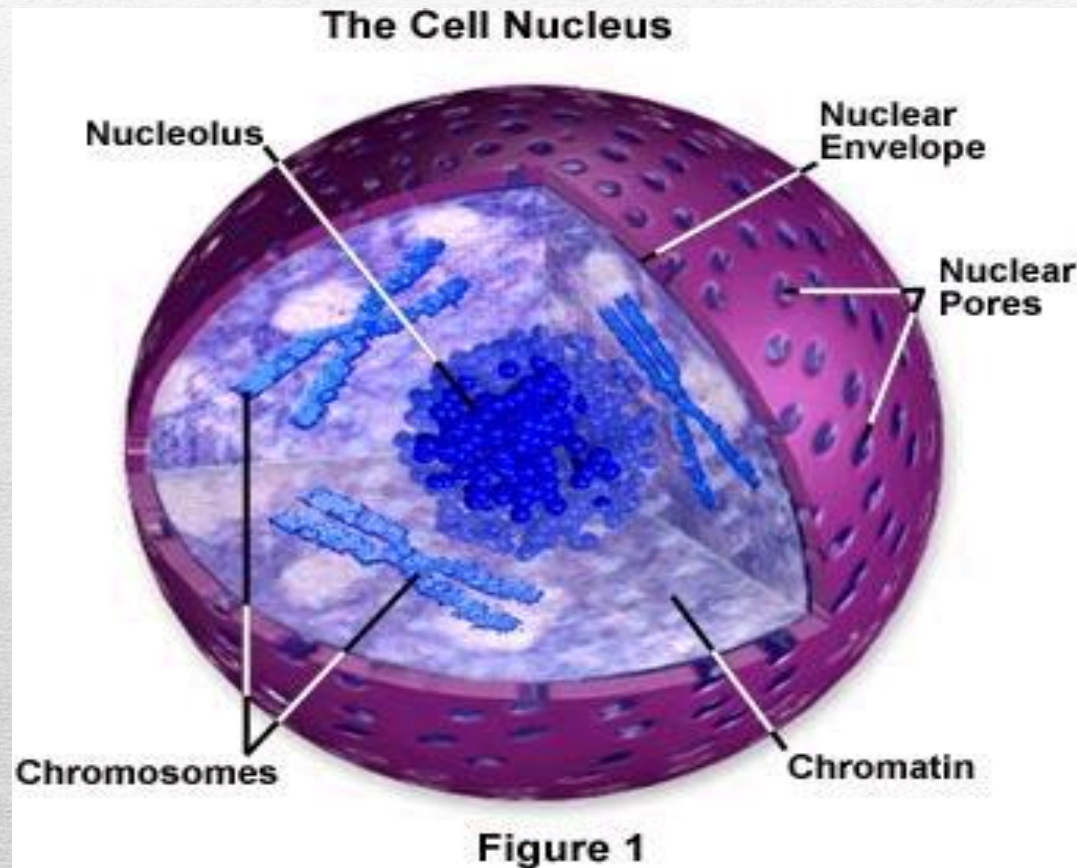
# Mitochondrion

## Mitochondria

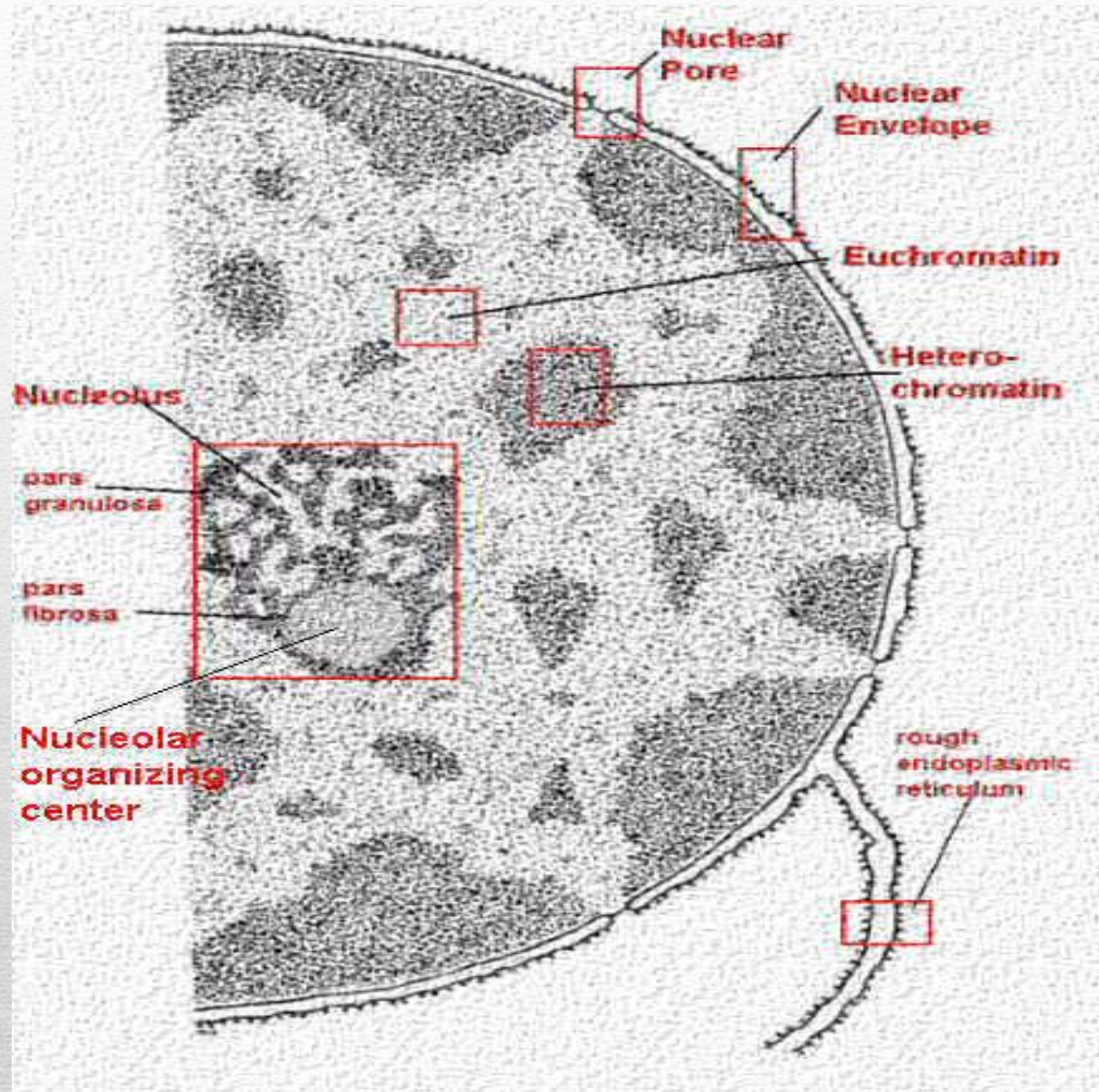
- Located throughout the cytoplasmic compartment.
- Ancient aerobic organisms in symbiosis.
- Respiratory Chain
- Energy Production.



# Nucleus



- Nickname: “The Control Center”
- Function: holds the DNA
- Double membrane-bound control center of cell.
- Separates the genetic material from the rest of the cell.

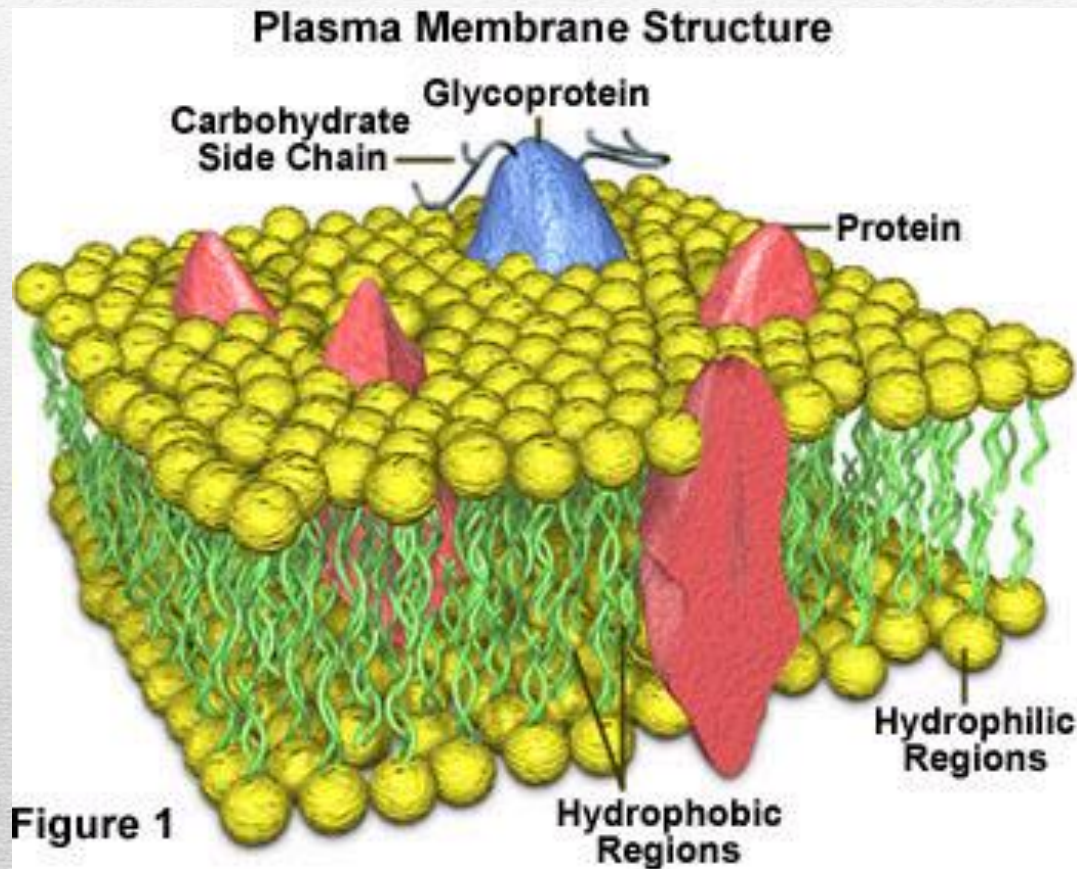


# Nucleus

# Parts of the nucleus:

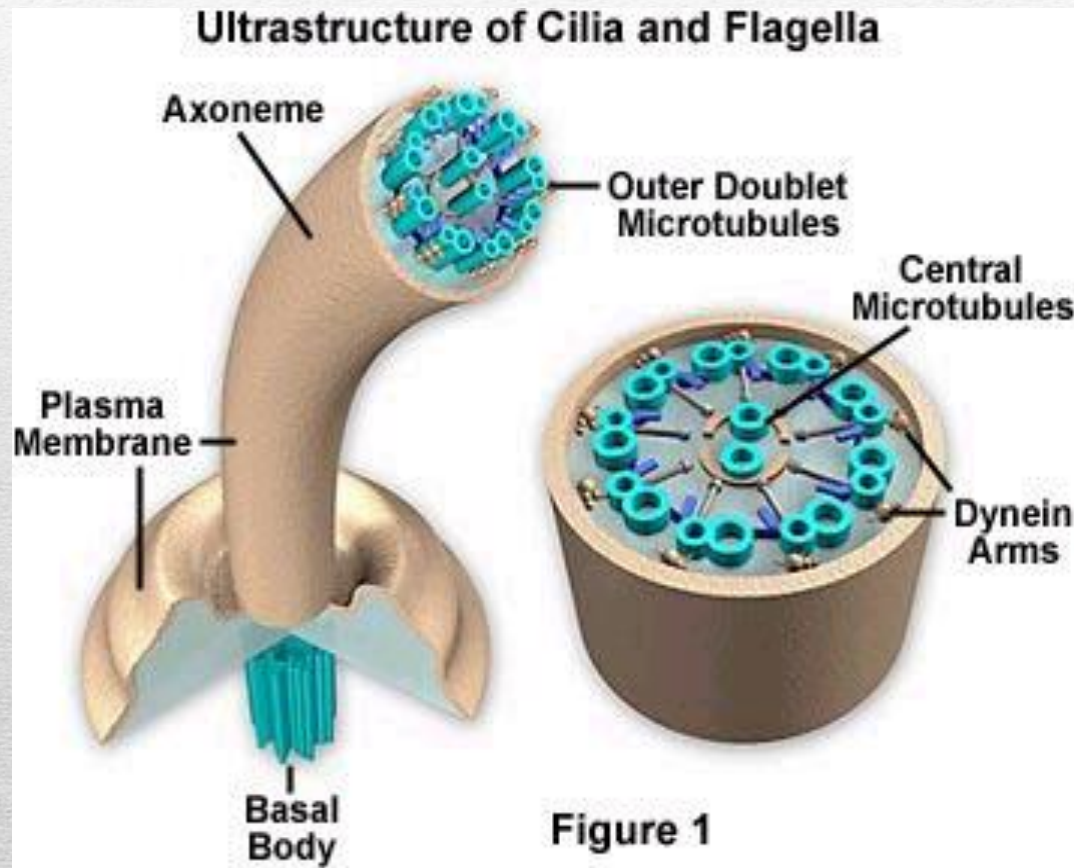
- Chromatin - genetic material of cell in its non-dividing state.
  - Nucleolus - dark-staining structure in the nucleus that plays a role in making ribosomes
  - Nuclear envelope - double membrane structure that separates nucleus from cytoplasm.
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# Plasma Membrane



- Phospholipid bi-layer that separates the cell from its environment.
- Selectively permeable to allow substances to pass into and out of the cell.
- Has receptor proteins/ transporters/ membrane enzymes

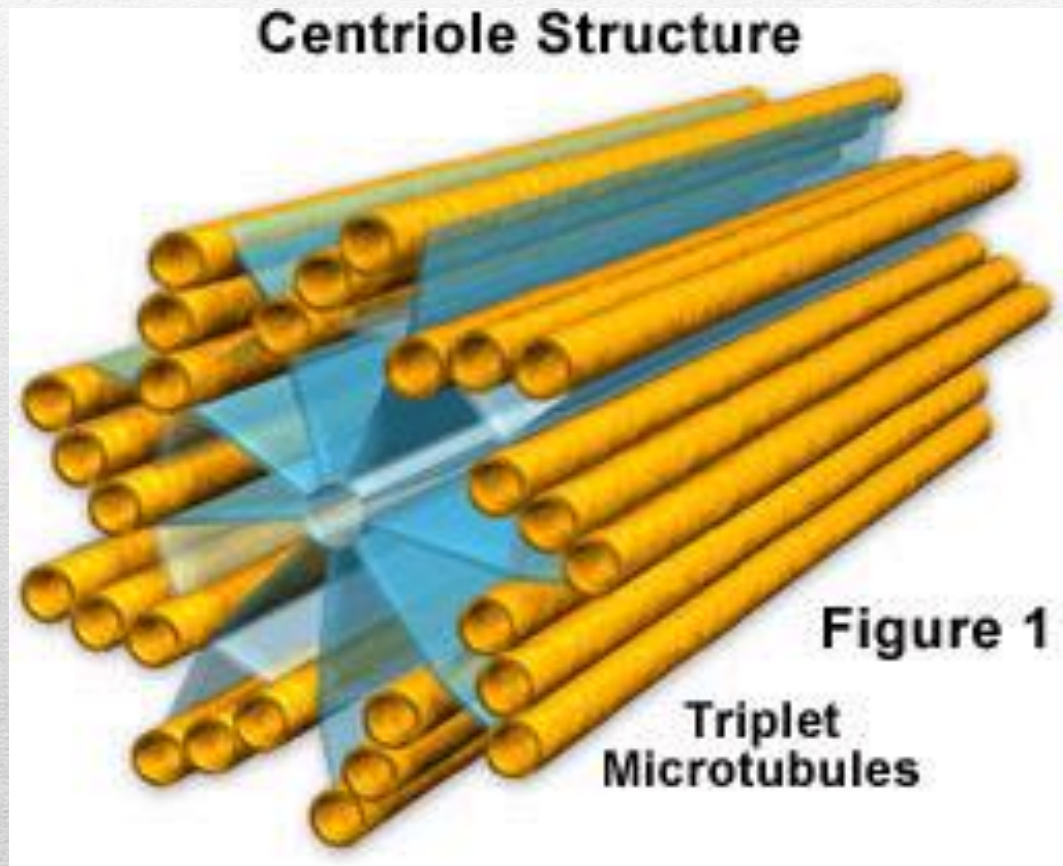
# Cilia and Flagella



- External appendages from the cell membrane that aid in locomotion of the cell.
- Cilia also help to move substance past the membrane.
- [Http://micro.magnet.fsu.edu/cells/animals/ciliaandflagella.html](http://micro.magnet.fsu.edu/cells/animals/ciliaandflagella.html)

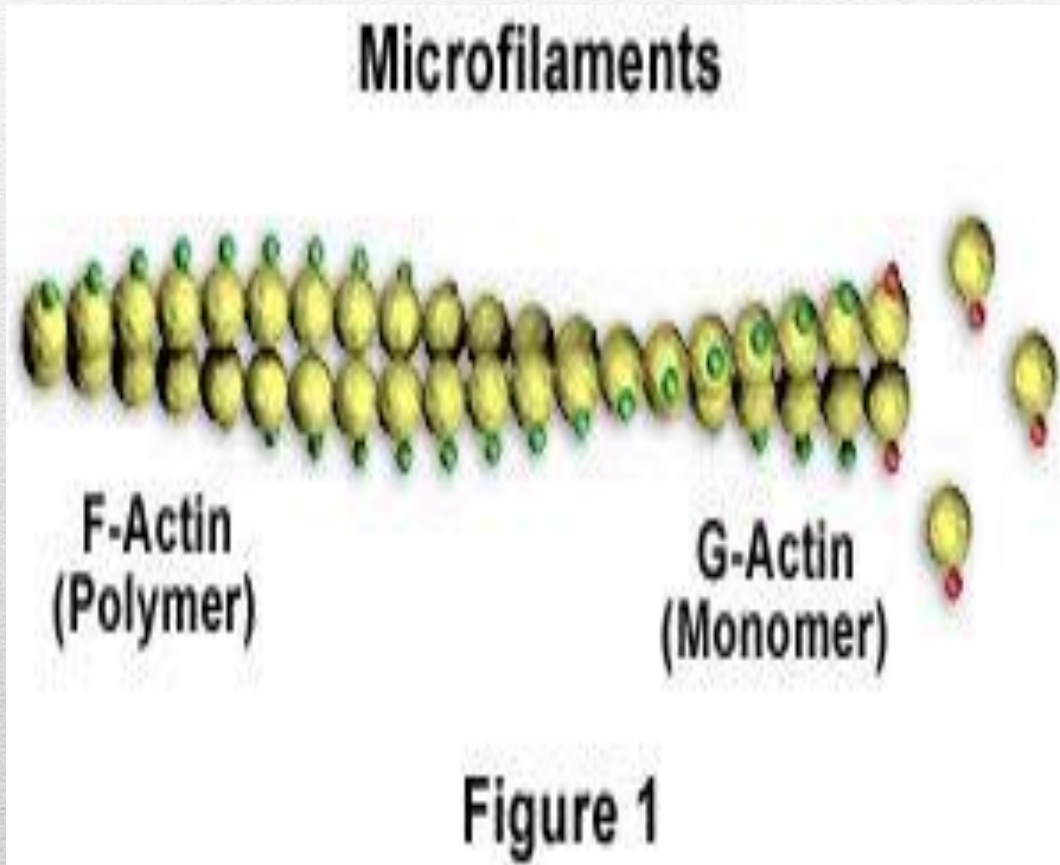


# Centrioles



- Found only in animal cells.
- Self-replicating
- Made of bundles of microtubules.
- Help in organizing cell division.
- [Http://micro.magnet.fsu.edu/cells/animals/animas/centrioles.html](http://micro.magnet.fsu.edu/cells/animals/animas/centrioles.html)

# Microfilaments

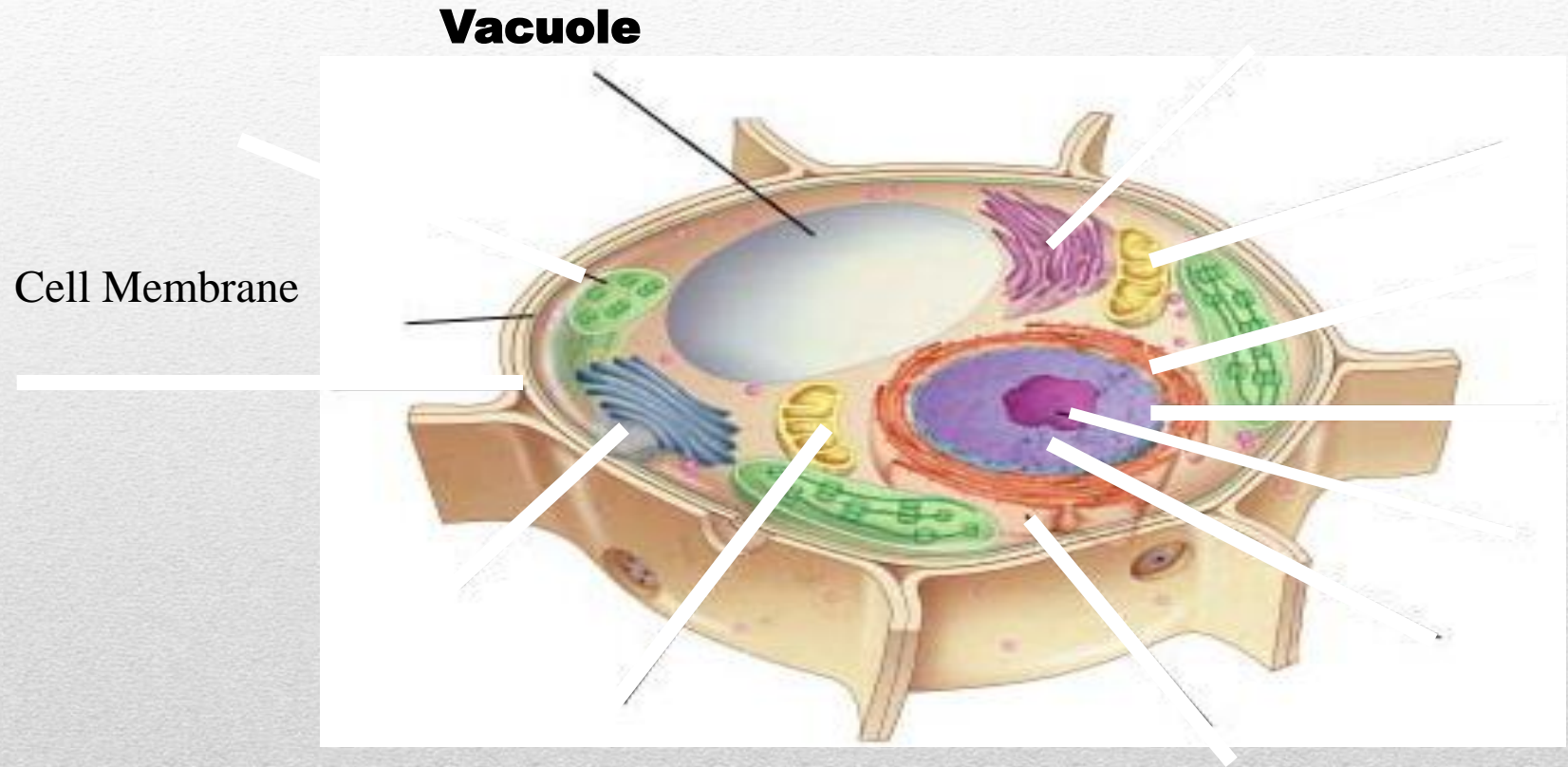


- Solid rods of globular proteins.
- Important component of cytoskeleton which offers support to cell structure.

• [Http://micro.magnet.fsu.edu/cells/animals/microfilaments.html](http://micro.magnet.fsu.edu/cells/animals/microfilaments.html)

# Plant Cell

Section 7-2



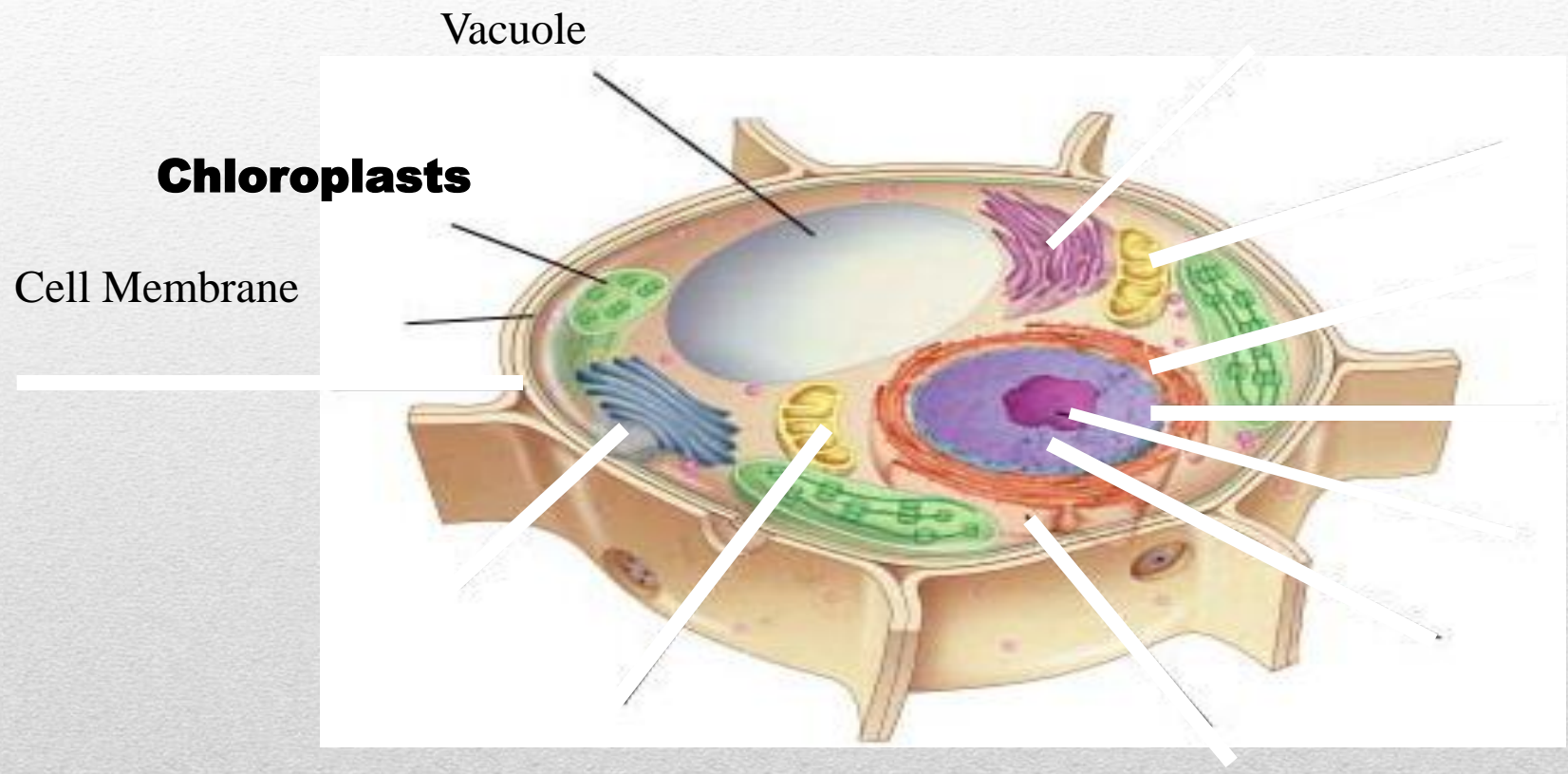
# Eukaryotic Cell Organelles and Function

## Vacuoles

- Function: stores water
    - This is what makes lettuce crisp
      - When there is no water, the plant wilts
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# Plant Cell

Section 7-2

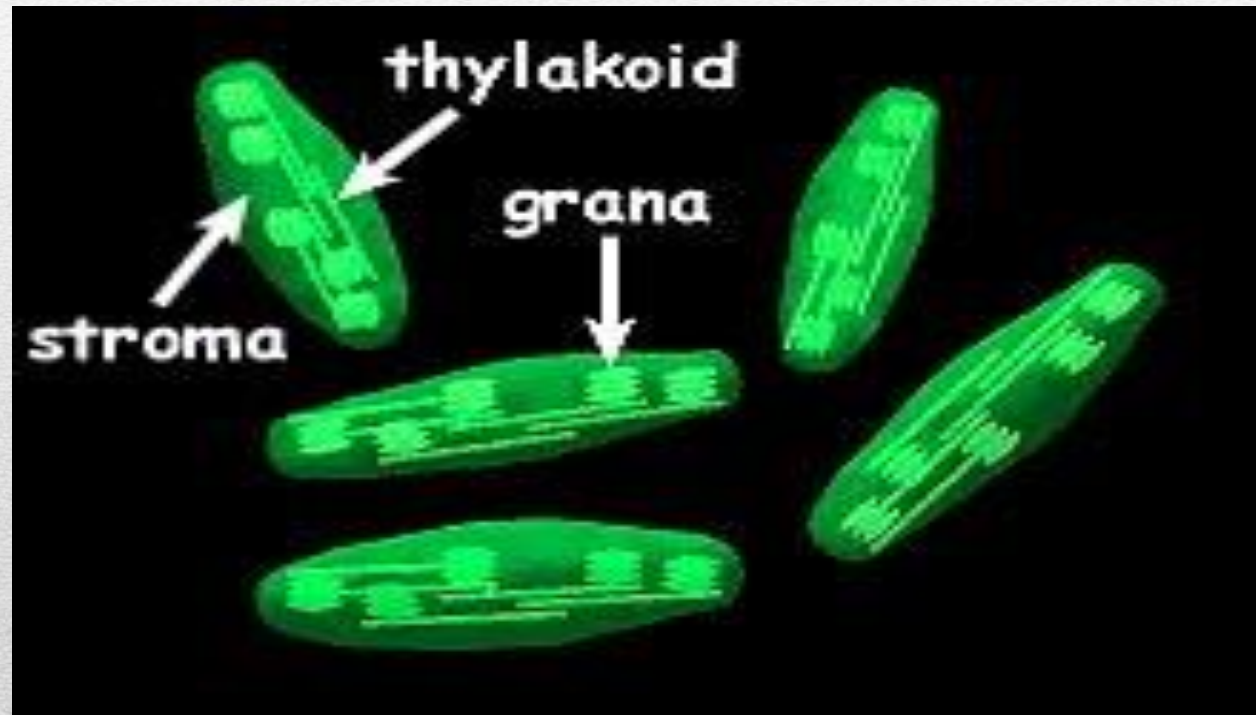


# Eukaryotic Cell Organelles and Function

## Chloroplasts

- Function: traps energy from the sun to produce food for the plant cell
  - Green in color because of chlorophyll, which is a green pigment
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# Chloroplasts



# Eukaryotic Cell Organelles and Function

## Cell Wall

- Function: provides support and protection to the cell membrane
  - Found outside the cell membrane in plant cells
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**Questions?**

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