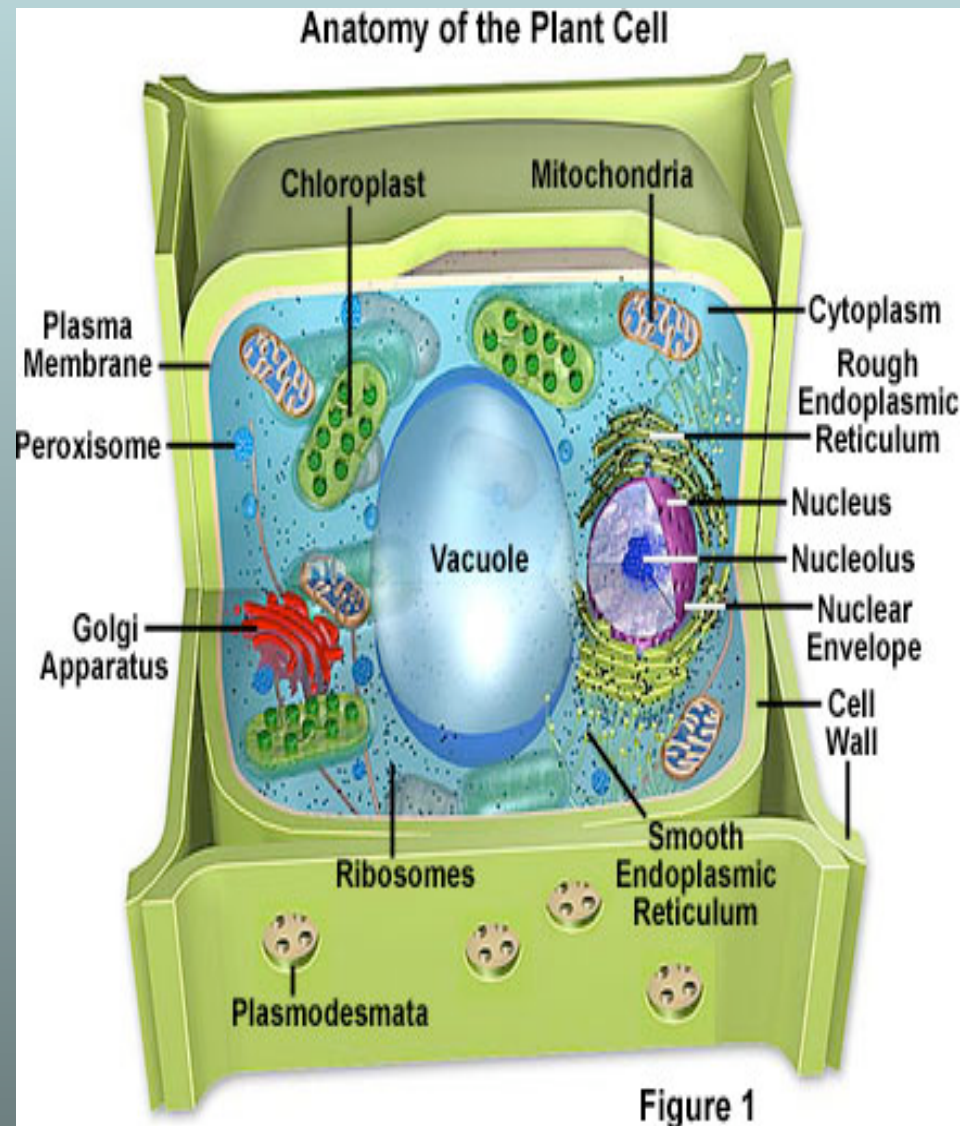
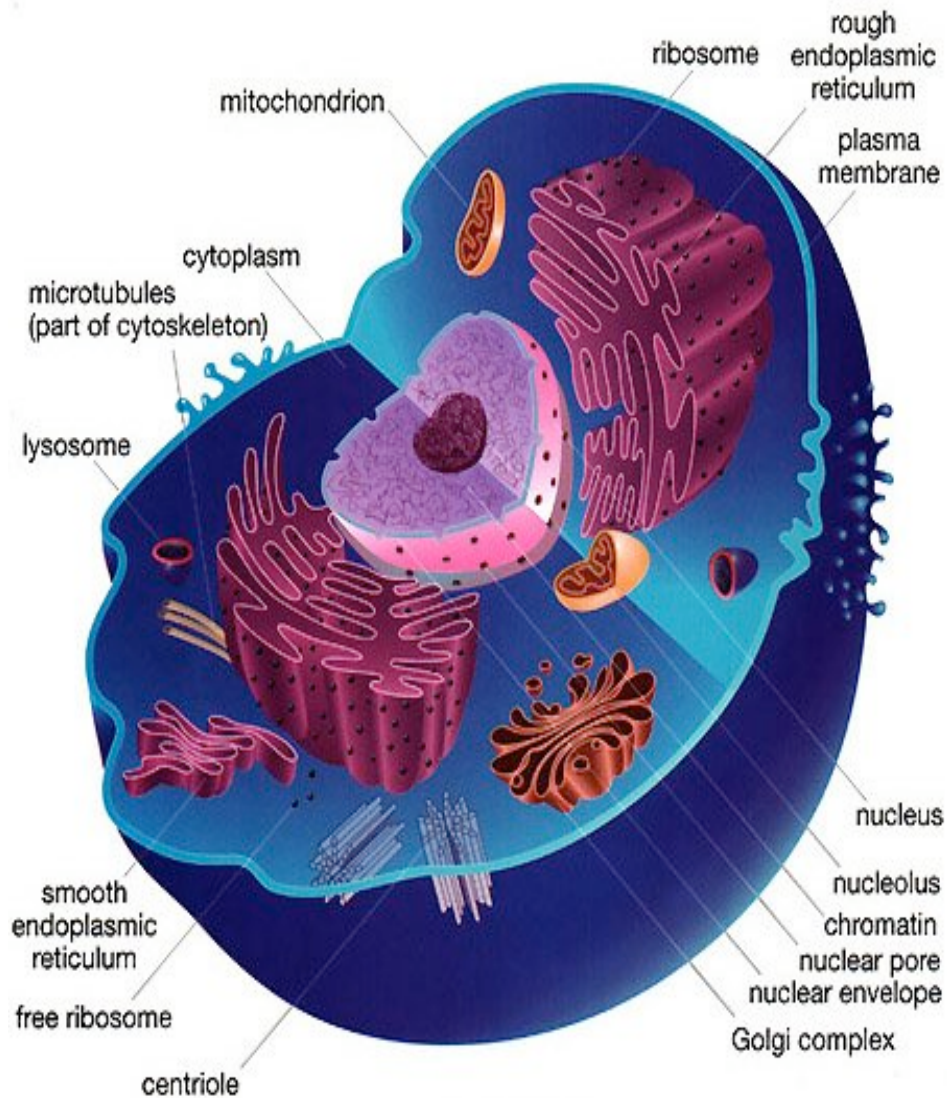
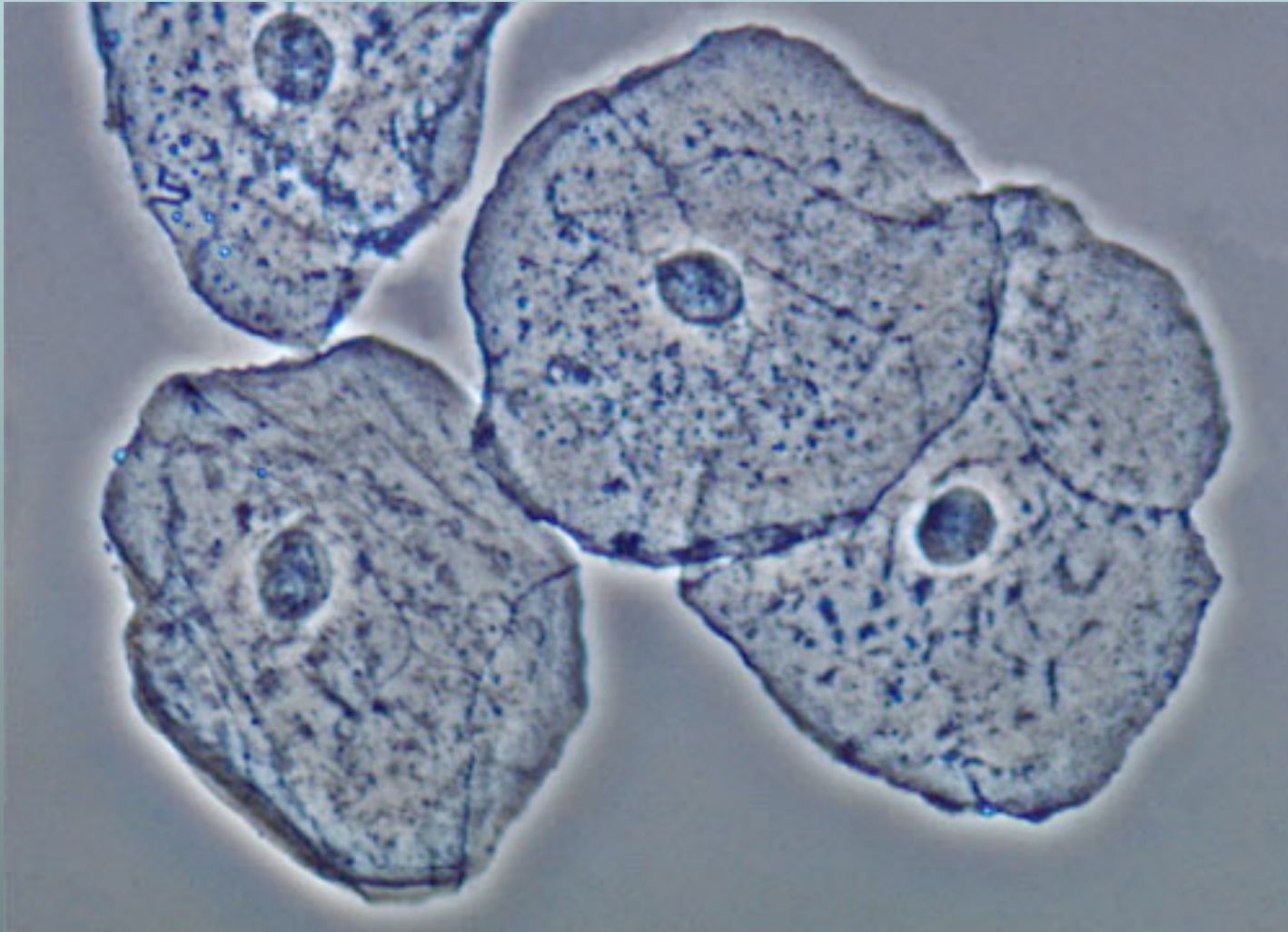


The Cell



Human Epithelial Cells



Plant Cells



Cells have an internal structure

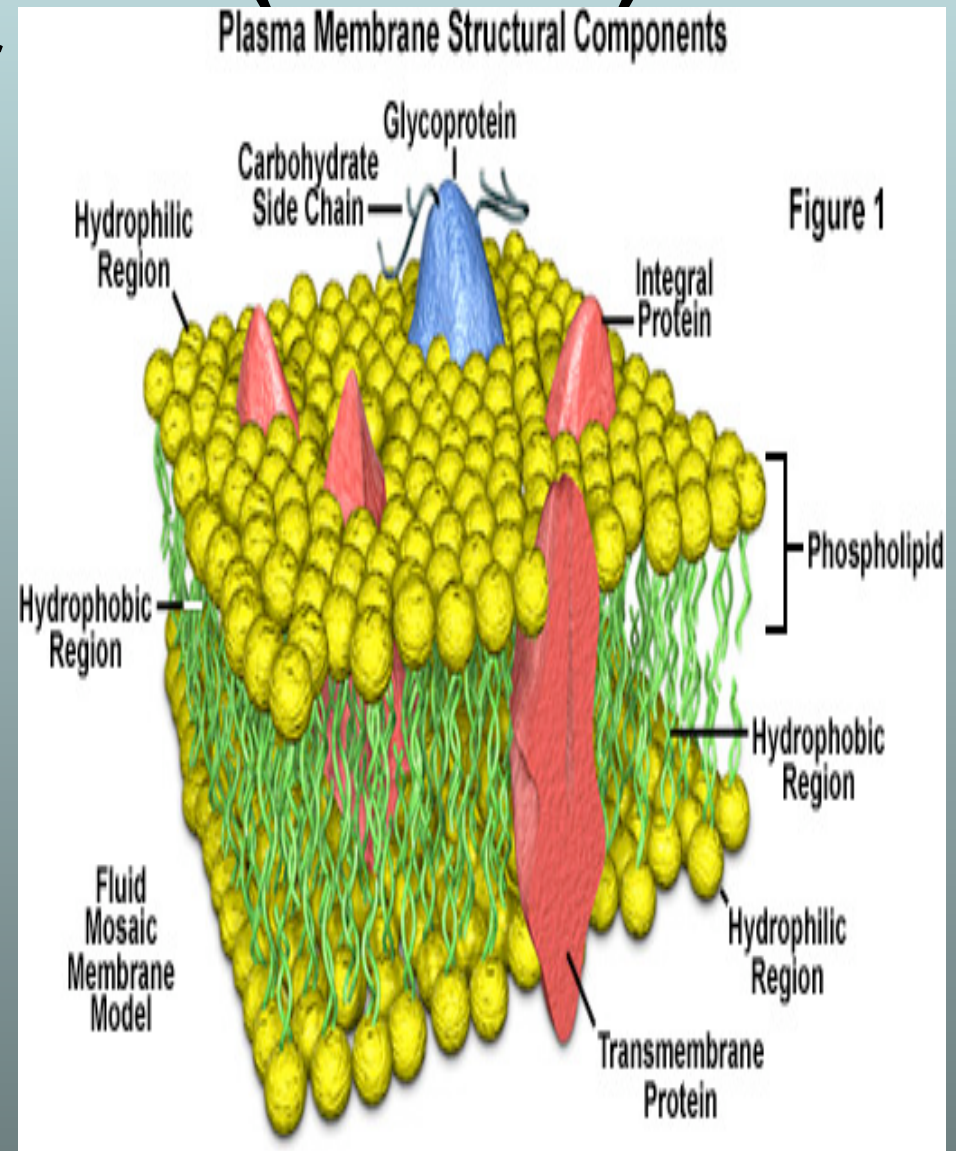
- Eukaryotic cells are organized
- Protective membrane around them that communicates with other cells
- Organelles have specific jobs (cellular processes)

Cell Membrane (barrier)

Structure: Lipid bilayer made up of proteins, cholesterol, and phospholipids.

Function: A selective barrier that controls the entry and exit of substances.

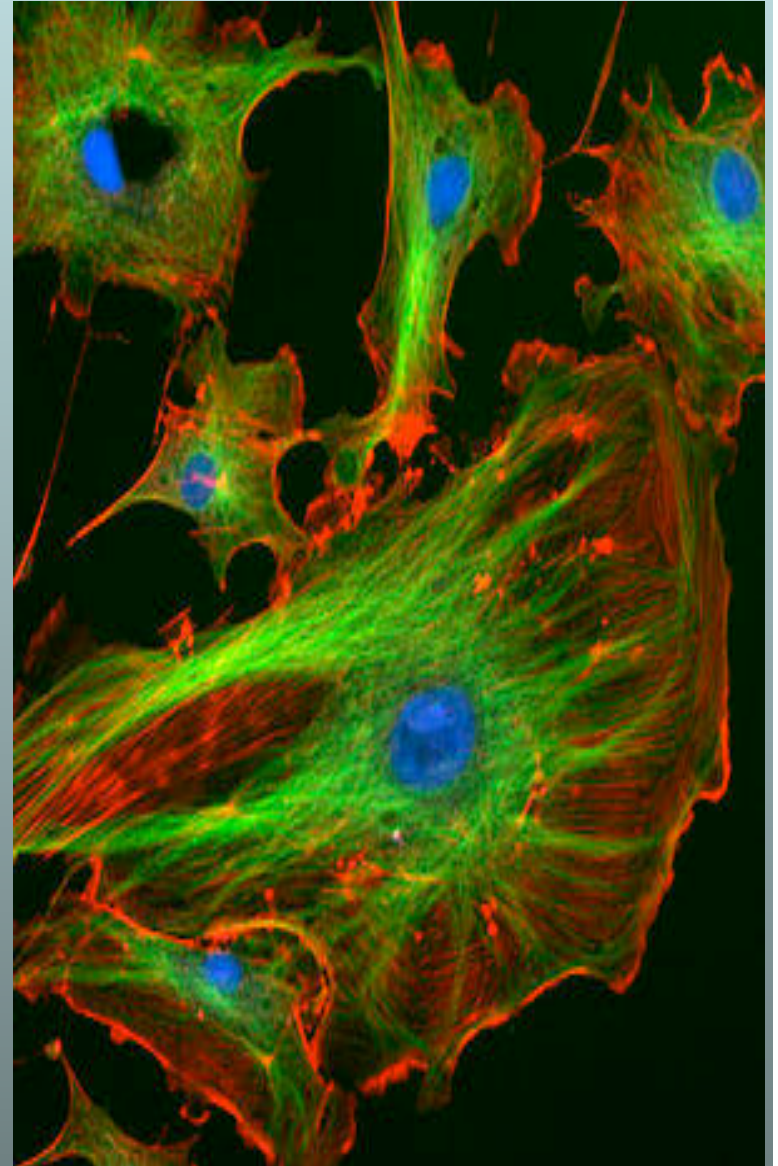
- Maintains the internal environment of the cell



Cytoskeleton (support/movement)

Structure: A frame work of protein microfilaments microtubules, intermediate filaments and microfilaments
Ex: actin and myosin.

- Function:** Helps to maintain cell shape, strength
- Internal movement of cell organelles, cell division
 - Cell locomotion and muscle fiber contraction could not take place without the cytoskeleton.



Cytoplasm (metabolism, support)

Structure: 70 % Water, 30 %
proteins, fats carbohydrates
nucleic acids and ions.

- It contains cytoskeletal (support) and organelles

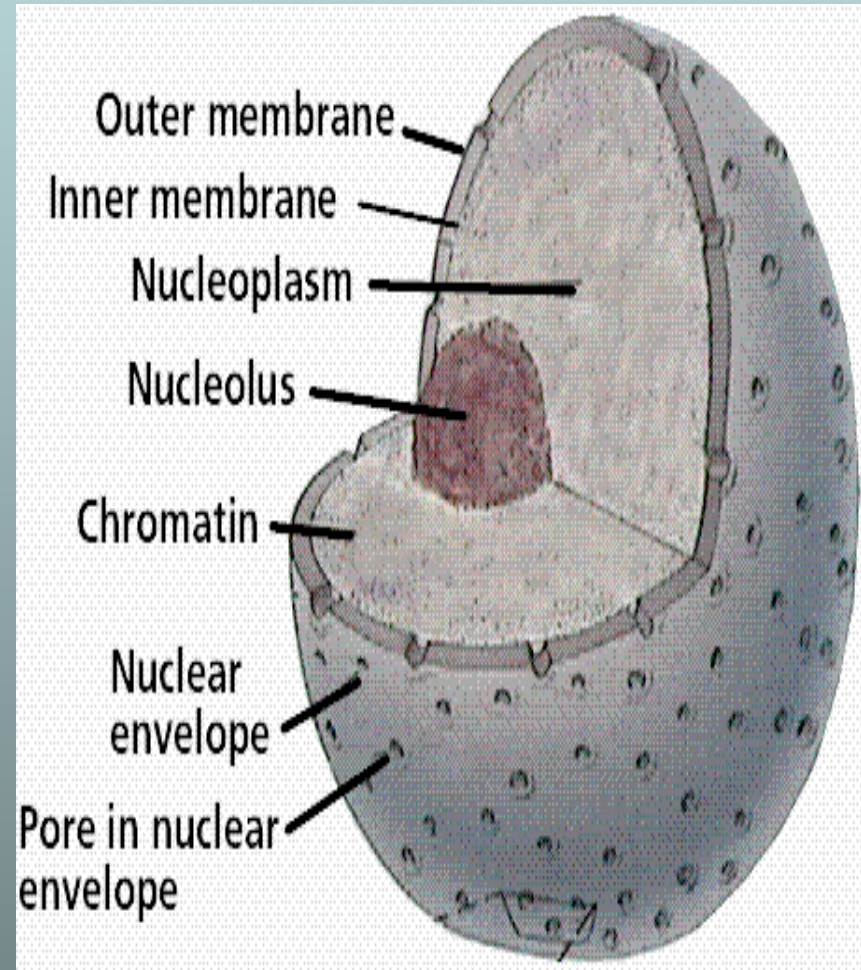
Function: It is the main site of metabolism (chemical reactions in the cell) containing numerous enzymes that build up small molecules and break down large molecules.

- Supports organelles



Nucleus (controls)

Structure: It is a double membrane-bound organelle (**nuclear envelope**). It communicates with the rest of the cell via numerous **nuclear pores**. The nucleus includes the **chromatin** where the chromosomes are located and the **nucleolus**-makes ribosomes.



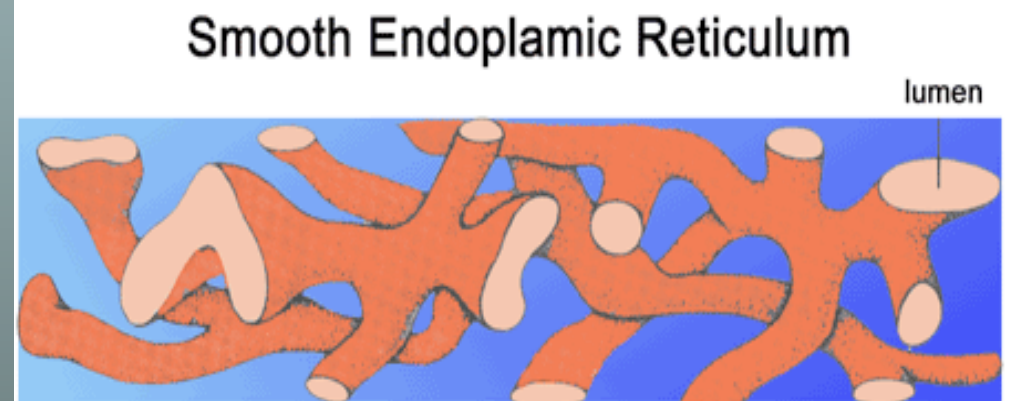
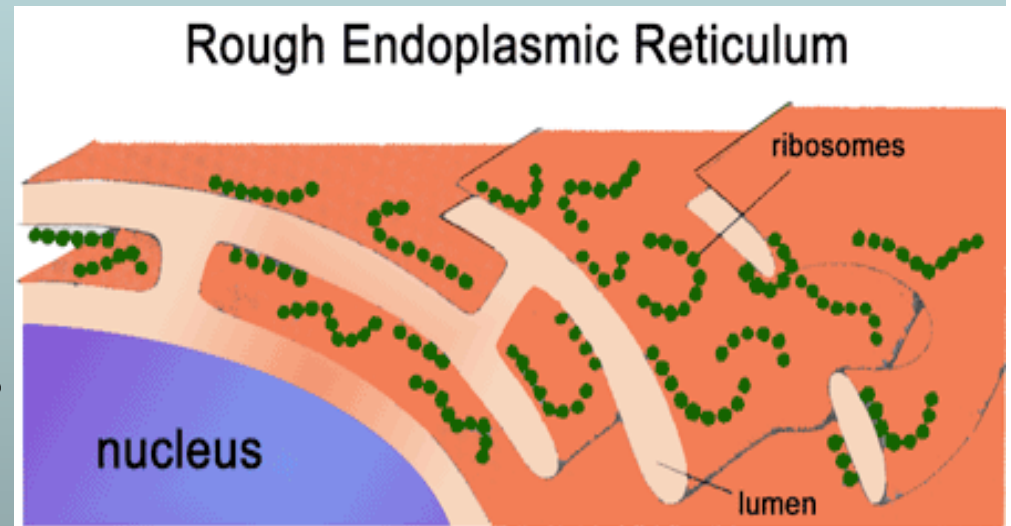
Function:

- Contains DNA which coordinates all cell activities. Ex: tells ribosome's what kind of proteins to make (**protein synthesis**).
- Also involved in cell reproduction.

Endoplasmic Reticulum (ER) (modification and transport)

Structure: 3-dimensional maze of connecting and branching channels made by a continuous membrane.

- ER can be classified as **rough ER** when ribosomes are attached to it or **smooth ER** when no ribosomes are present.



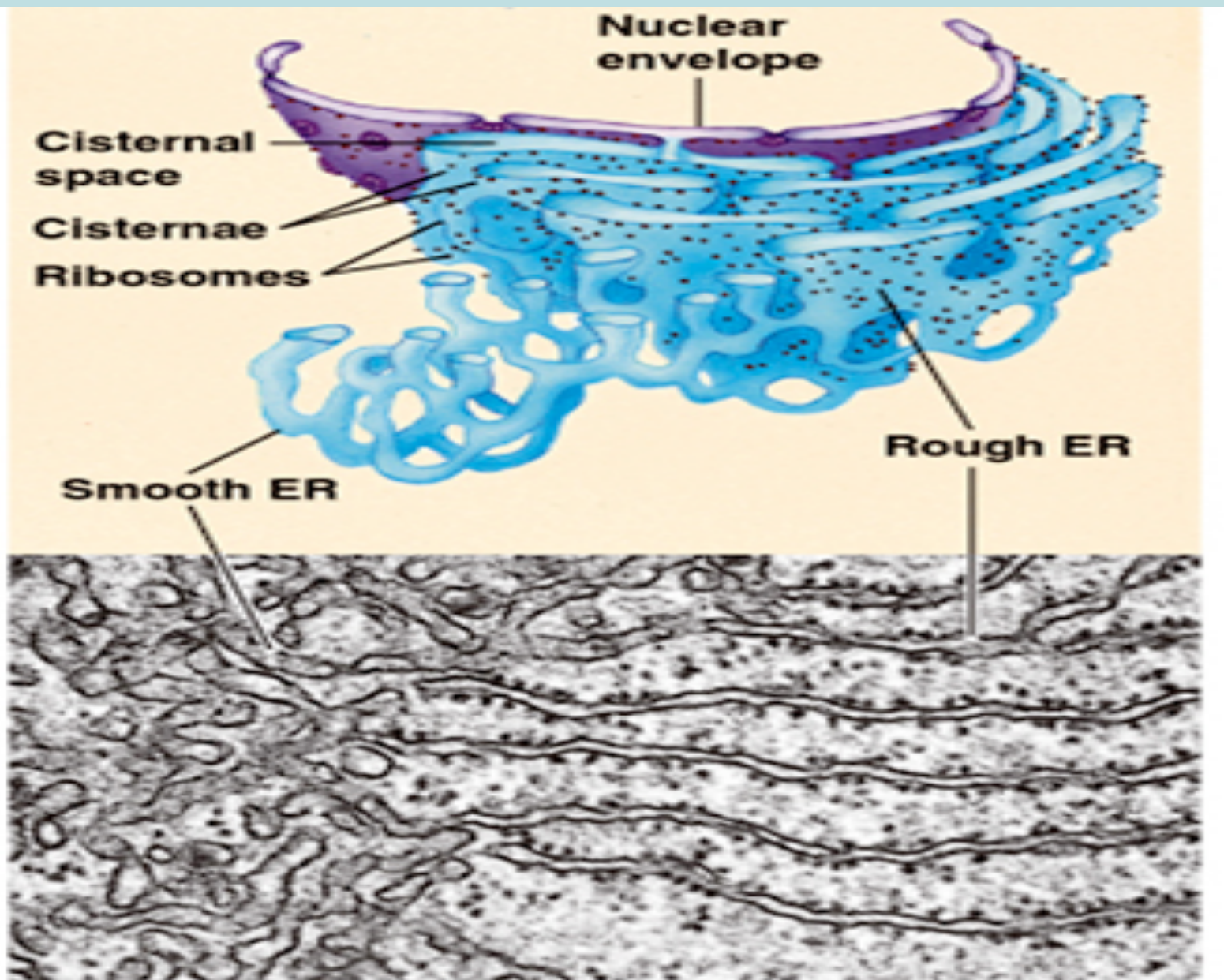
Rough ER is found mostly in cells that are making proteins for export such as digestive enzymes, hormones, or antibodies.

Function: Transporting and sorting of proteins for export from the cell or for use in the cell. Proteins are also modified within the ER for example by the addition of carbohydrate

Smooth ER.

Function: Helps make steroids and lipids.

- Found in the liver, helps break down harmful substances
E.x. alcohol



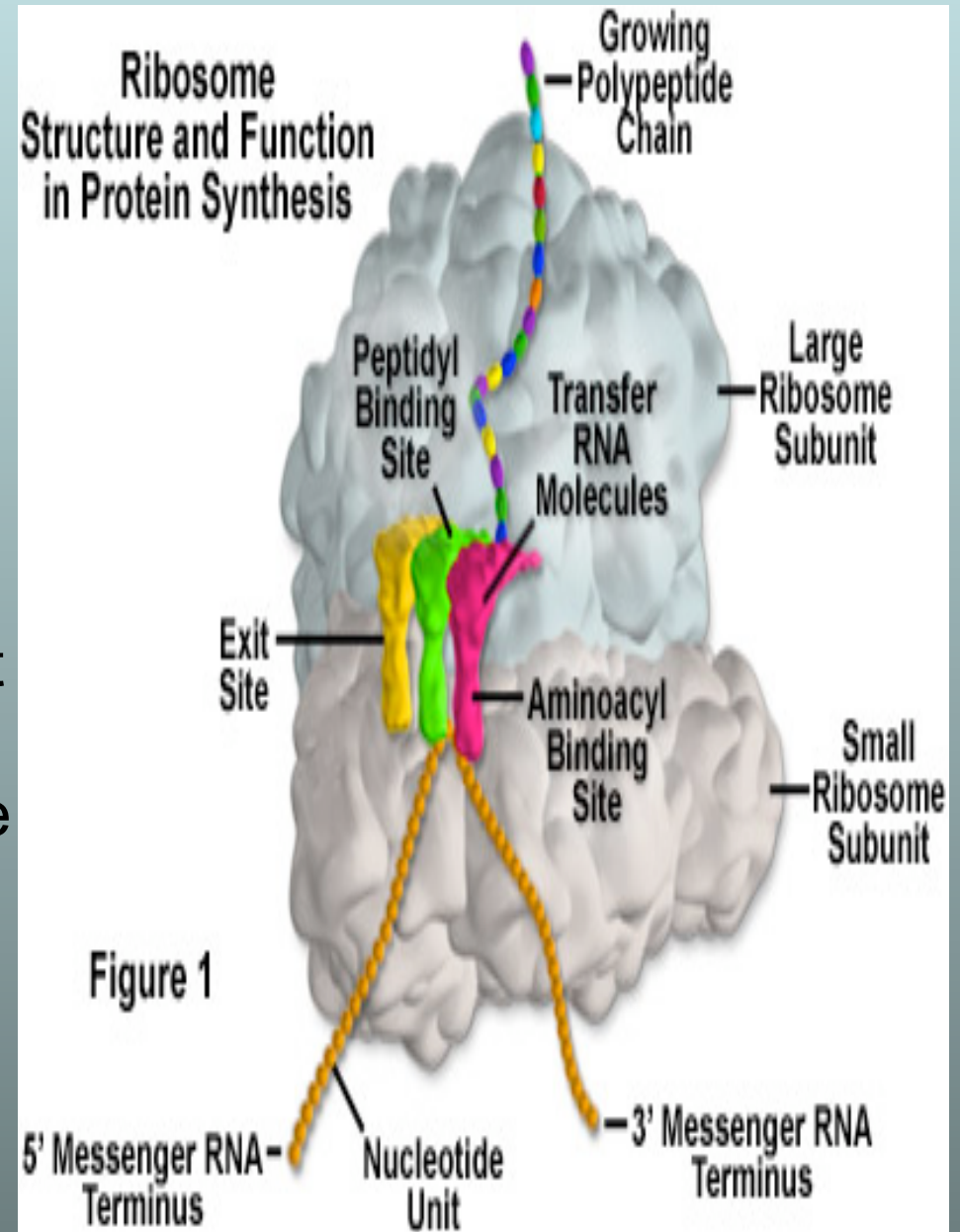
Ribosomes (makes proteins)

Structure: composed of ribosomal RNA (rRNA) and 80 different kinds of proteins.

- There are 15 000 of them in a cell.

Function: They take part in protein synthesis (making proteins). Ex: the pigment in your skin

- Some ribosomes are free in the cytoplasm other ribosomes are attached to the endoplasmic reticulum

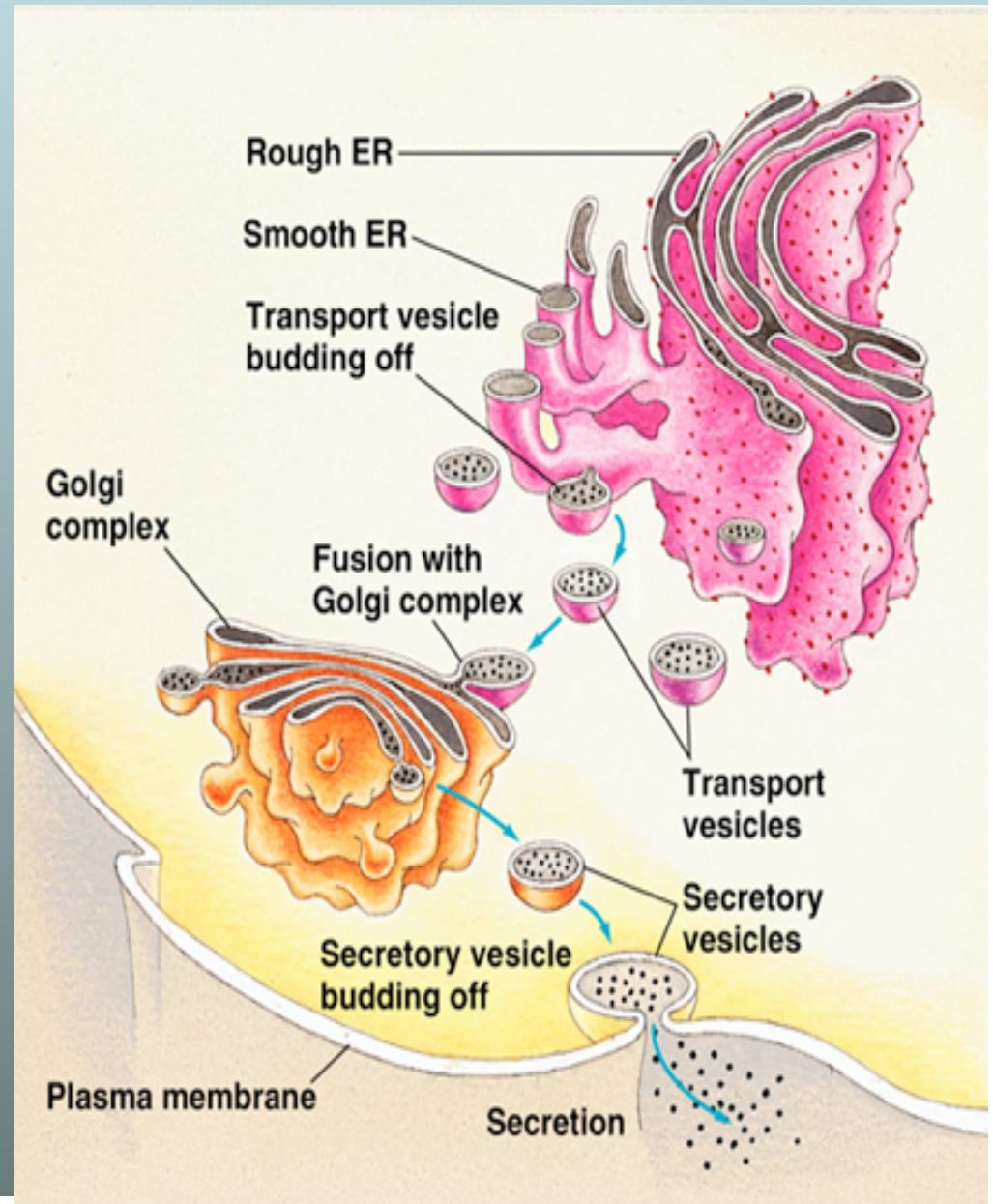


Golgi bodies (packaging and sorting)

Structure: a curved membrane stack resembling a stack of pancakes.

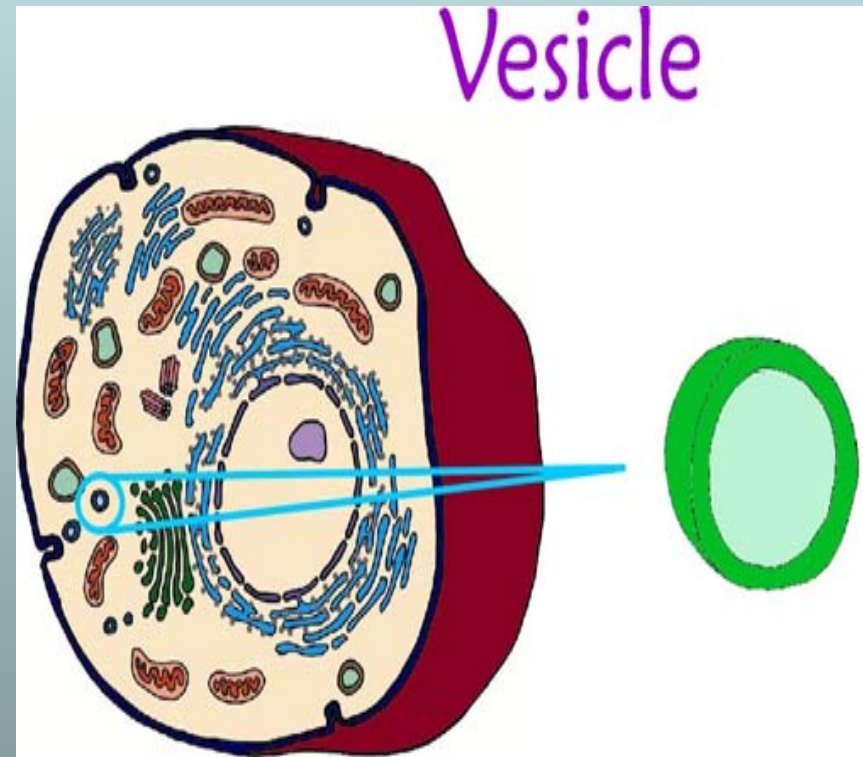
Function: Modifies proteins made in the ER

- Packages proteins for export or storage.
- Proteins made within the rough ER bud off in vesicles and are transported to the Golgi where the vesicles fuse with the membrane and the contents are further modified.



Vesicles

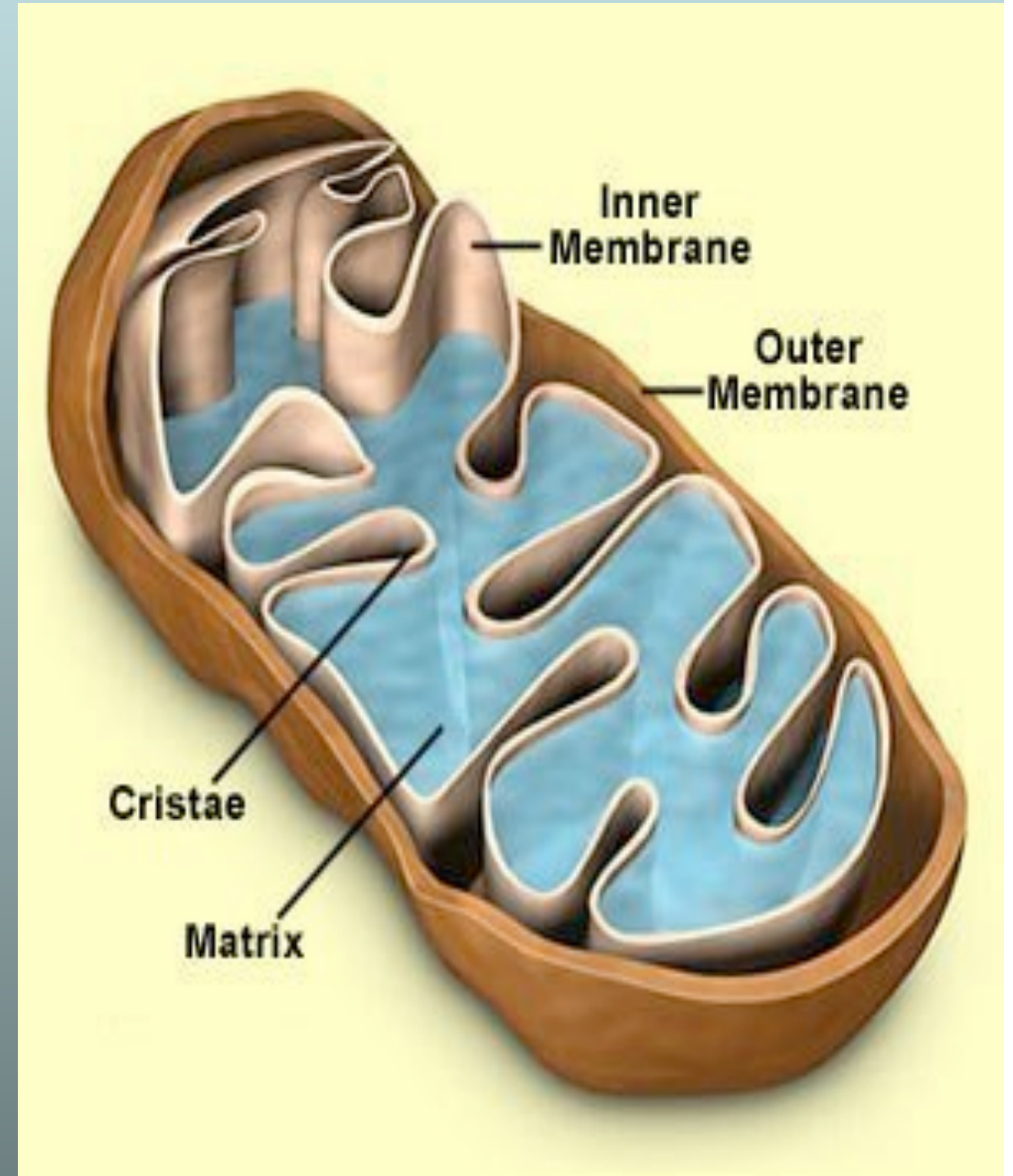
- **Structure:** small membrane bound sacs
- **Function:** Hold and transport different substances around the cell



Mitochondria (energy)

- Structure:** Double membrane.
The outer membrane is fairly smooth. But the inner membrane is highly convoluted, forming folds called cristae.
- The cristae greatly increase the inner membrane's surface area.

- Function:** sugars are broken down on the cristae and combined with oxygen to produce ATP - the primary energy source for the cell.
- This is known as cellular respiration.

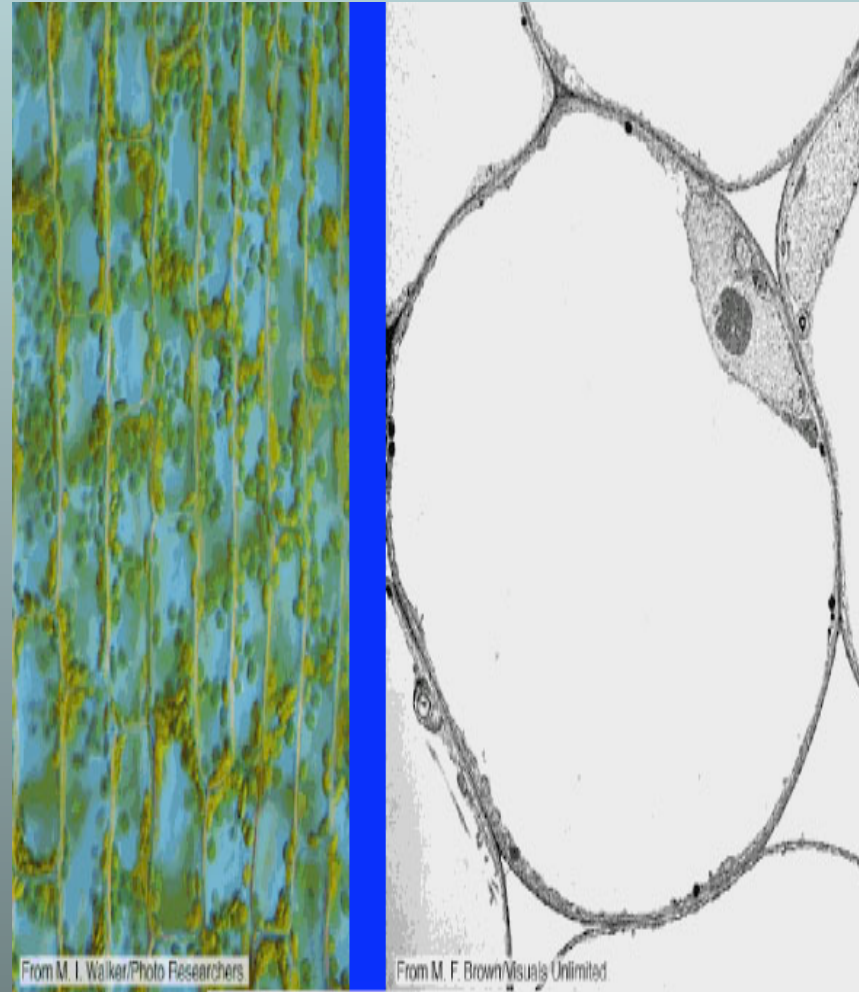


Vacuole (clean up/storage)

Structure: Fluid filled membrane-bound sac.

Function: Intracellular digestion and the release of cellular waste products.

- In animal cells, vacuoles are generally small.
- Vacuoles tend to be large in plant cells water collects in cell vacuoles producing rigidity in the plant. Without sufficient water, pressure in the vacuole is reduced and the plant wilts.

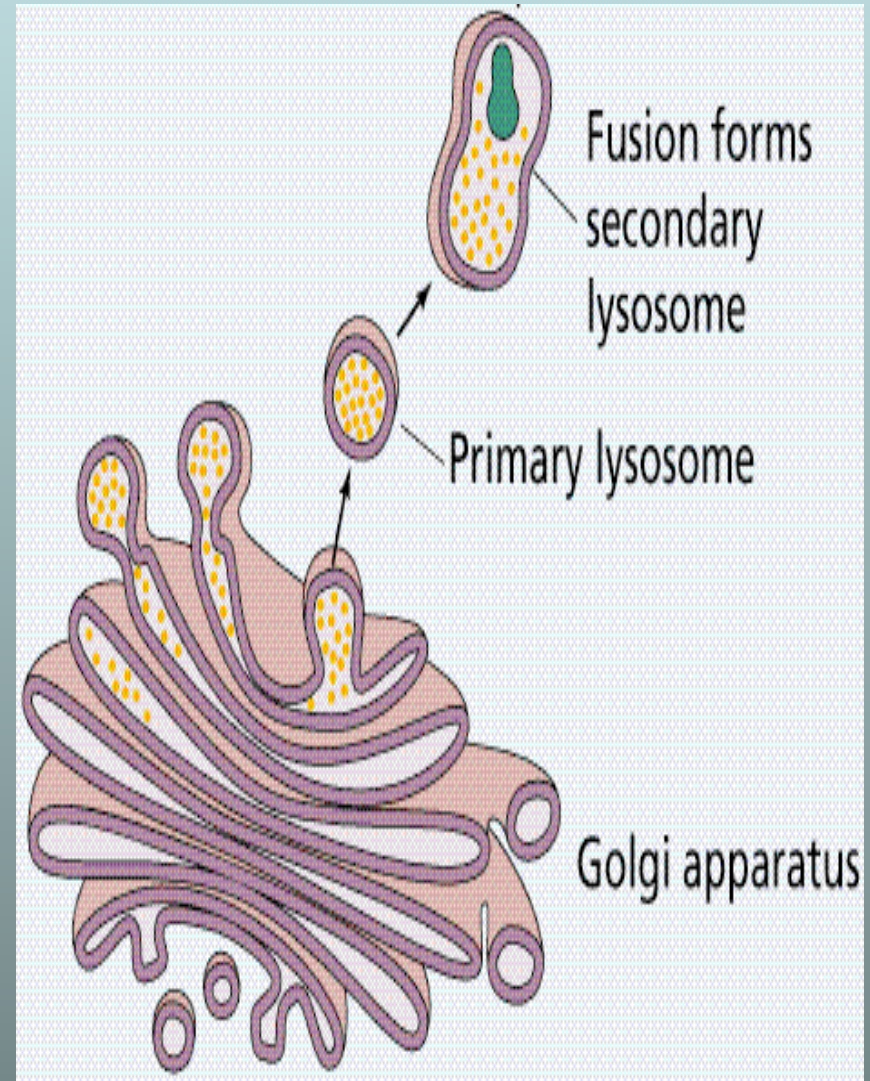


Lysosomes (destroyer)

Structure: Small vesicles formed from the golgi bodies common in animal cells but existence in plant cells is debated contain digestive enzymes.

Function: Intracellular digestion and recycling of worn out cell parts.

- Destroys bacteria, for example in white blood cells that eat bacteria.

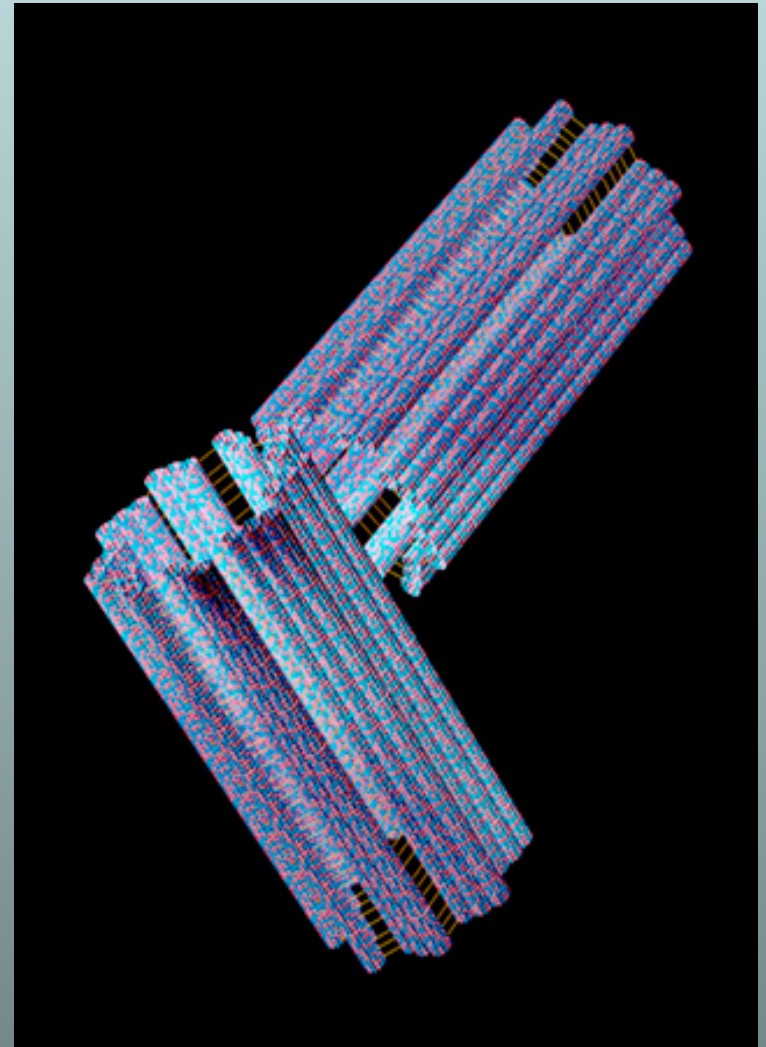


Centrioles (movement)

Structure: Made from microtubules (protein)
Found in the centrosome.

Function: Microtubules grow into a "spindle" which is responsible for separating replicated chromosomes into the two new cells when the cell divides

- Plant cells do not have centrioles.

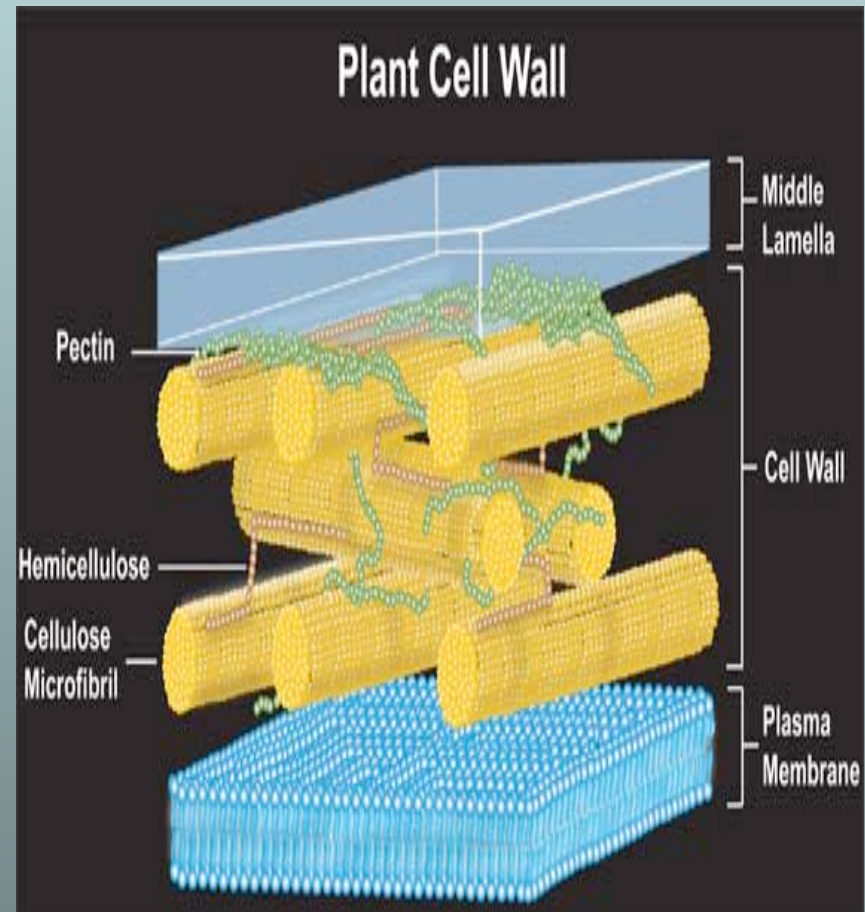


Plant Cell Wall (Protection)

Structure: rigid, made up of polysaccharides, cellulose and lignin.

Function: The cell wall provides and maintains the shape of these cells and serves as a protective barrier.

Plants, algae, fungi, bacteria



Chloroplast (energy)

- Structure:** Contains a Pigment called chlorophyll
- Have a double outer membrane which surrounds an interior filled with liquid and more membranes

- Function:** Photosynthesis takes place on the membranes
- light energy is converted to chemical energy with carbon dioxide and water

