

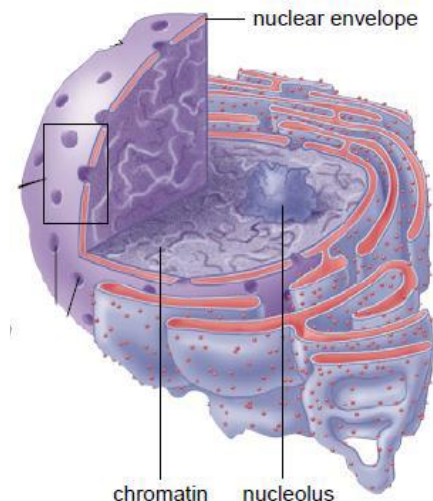
Organelles of Animal and Plant Cells

1- The Nucleus

The nucleus, which has a diameter of about 5 μm , is a prominent structure in the eukaryotic cell. The nucleus is of primary importance (function) because it stores genetic information that determines the characteristics of the body's cells and their metabolic function.

The structural features of the nucleus include the following:

- Chromatin: DNA and proteins.
- Nucleolus: chromatin and ribosomal subunits. In the nucleolus, rRNA is synthesized and assembled with proteins from the cytoplasm to form ribosomal subunits. The subunits pass from the nuclear pores to the cytoplasm where they combine to form ribosomes.
- Nuclear envelope: double membrane with pores.



2- Ribosomes

Ribosomes are small organelles where protein synthesis occurs. Ribosomes occur in the cytoplasm, both singly and in groups (i.e., polyribosomes). Numerous ribosomes are attached to the endoplasmic reticulum.

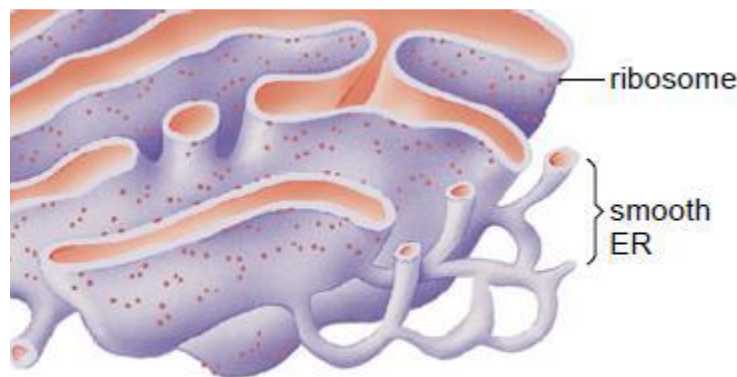
3- The Endoplasmic Reticulum

The endoplasmic reticulum (ER), consists of a network of membranous tubules and sacs called cisternae. ER is physically continuous with the outer membrane of the nuclear envelope. There are two types:

1- Rough ER have ribosome attached on the membrane and appears to be flattened saccules.

Function:

Synthesis secretory proteins, cell membrane protein and organelle protein.



2- Smooth ER does not have attached ribosomes and appear as network of interconnected tubules.

Functions:

- 1- synthesis of lipid (oils, phospholipids, and steroids) glycogen metabolism in the liver cells.
- 2- Detoxification of drugs and poisons.
- 3- Store calcium for muscle contraction.

4- The Golgi Apparatus

The Golgi apparatus consists of a stack of three to twenty slightly curved saccules. The Golgi apparatus sorts proteins into packages and packs them into membrane-bound structures, called vesicles.

- 1- The Golgi apparatus contains enzymes that modify proteins and lipids. For example, it can add a chain of sugars to proteins, thereby making them glycoproteins and glycolipids.

- 2- The vesicles that leave the Golgi apparatus move to different locations in the cell. Some vesicles proceed to the plasma membrane, where they discharge their contents. Because this is **secretion**, it is often said that the Golgi apparatus is involved in processing, packaging, and secretion.

5- Lysosomes

Lysosomes are membrane-bounded vesicles produced by the Golgi apparatus in animal cells and plant cells. Lysosomes contain hydrolytic digestive enzymes. Function: lysosomal enzymes digest macromolecules into simpler subunits and help white blood cells to digest engulfing bacteria.

6- Vacuoles

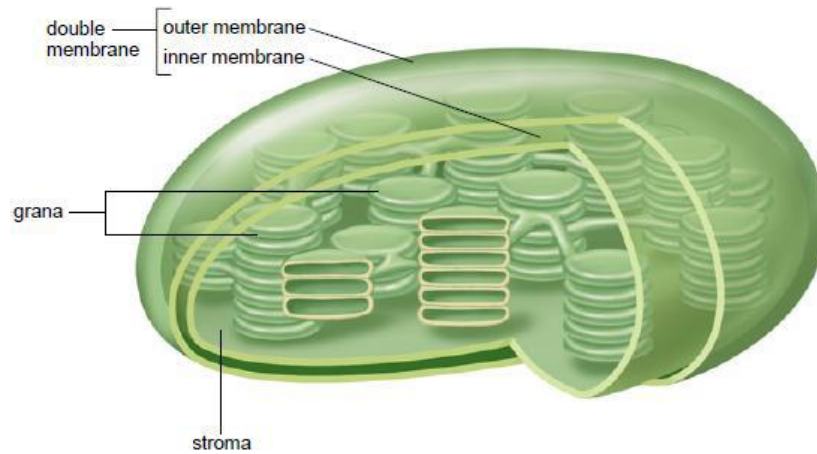
A vacuole is a large membranous sac. Animal cells have vacuoles, but they are much more prominent in plant cells.

Function:

- 1- The vacuoles present in unicellular protozoans are quite specialized, and they include contractile vacuoles for ridding the cell of excess water and digestive vacuoles for breaking down nutrients.
- 2- Plant vacuoles contain not only water, sugars, and salts but also pigments and toxic molecules.

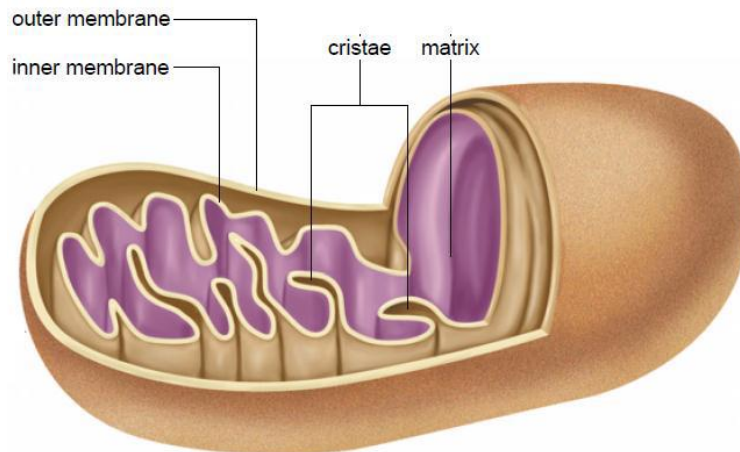
7- Chloroplast

Plant cells contain chloroplasts, the organelles that allow them to produce their own organic food. A chloroplast is bounded by two membranes that enclose a fluid-filled space called the **stroma**. A membrane system within the stroma is organized into **grana**. Chlorophyll, which is located within the membranes of grana, captures the solar energy that is needed to allow chloroplasts to produce carbohydrates. The stroma contains DNA, ribosomes, and enzymes that synthesize carbohydrates from carbon dioxide and water.



8- Mitochondria

Mitochondria, like chloroplasts, are bounded by a double membrane. In mitochondria the inner fluid filled space is called the **matrix**. The matrix contains DNA, ribosomes, and enzymes which break down carbohydrate products, releasing energy that is used for ATP production. The inner membrane of a mitochondrion invaginates to form **cristae**. Cristae provide a much greater surface area to accommodate the protein complexes and other participants that produce ATP.



9-The Cytoskeleton

it's a network of fibers extending throughout the cytoplasm.

Function:

- 1- Provide mechanical strength to the cell establish cell shape.
- 2- locomotion (several types of cell motility) intracellular transport of organelles.

Main types of fiber:

1.microtubules: determine the positions of membrane enclosed organelles and intracellular transport.

2.microfilament: determine the shape of the cell and necessary for the whole cell locomotion.

3.intermediate filament: provide mechanical strength and resistance to shear stress.