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The Cell

The term of "cell" comes from the Latin word “cella” meaning a small room .The cell define as the fundamental structural and functional unit of all living organisms and can replicate independently.

Cells consist of cytoplasm enclosed within a membrane, which contains many biomolecules such as proteins and nucleic acids.

The human body is composed of trillions of cells which extremely diverse in their shape and function. They provide structure for the body, take in nutrients from food, convert those nutrients into energy, and carry out specialized functions.

The organisms can be classified based on the number of cells present in them to :-

a- unicellular (consisting of a single cell; including bacteria)

b- multicellular (including plants and animals)

* Prokaryotes are single-celled organisms, while eukaryotes can be either single-celled or multicellular.

* Cells are divided into two main types, according to (the way their genetic material is organized).

1-The prokaryotic cells ; lack a membrane-bound nucleus. Their DNA is located in a region of the cytoplasm called the nucleoid region.

2-The eukaryotic cells : have a nucleus that houses their chromatin.

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Comparison between prokaryotic & eukaryotic cells:-

Prokaryotic	Eukaryotic
Unicellular organism	Multicellular organism
Smaller than a Eukaryotic cell	Larger than prokaryotic cells
Has no true nucleus (nucleoid)	Has true nucleus
Cell division: Direct by binary fission or budding	Cell division By mitosis
Non	Have Endoplasmic reticulum, Golgi body, and Mitochondria
Have circular DNA and single chromosome	Have linear DNA and multiple chromosomes
Example: Bacteria	Examples: Fungi, Animal, and Plant

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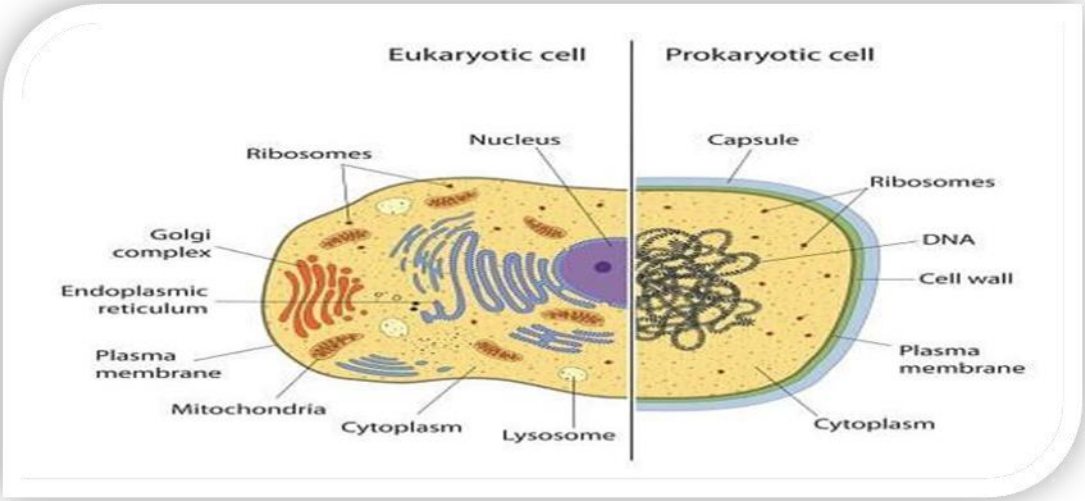

Anatomy of the cell

1- Cell membrane

There are semi – permeable membrane surrounding the cell. It helps in holding the cell together and allows entry and exits of nutrients into the cell.

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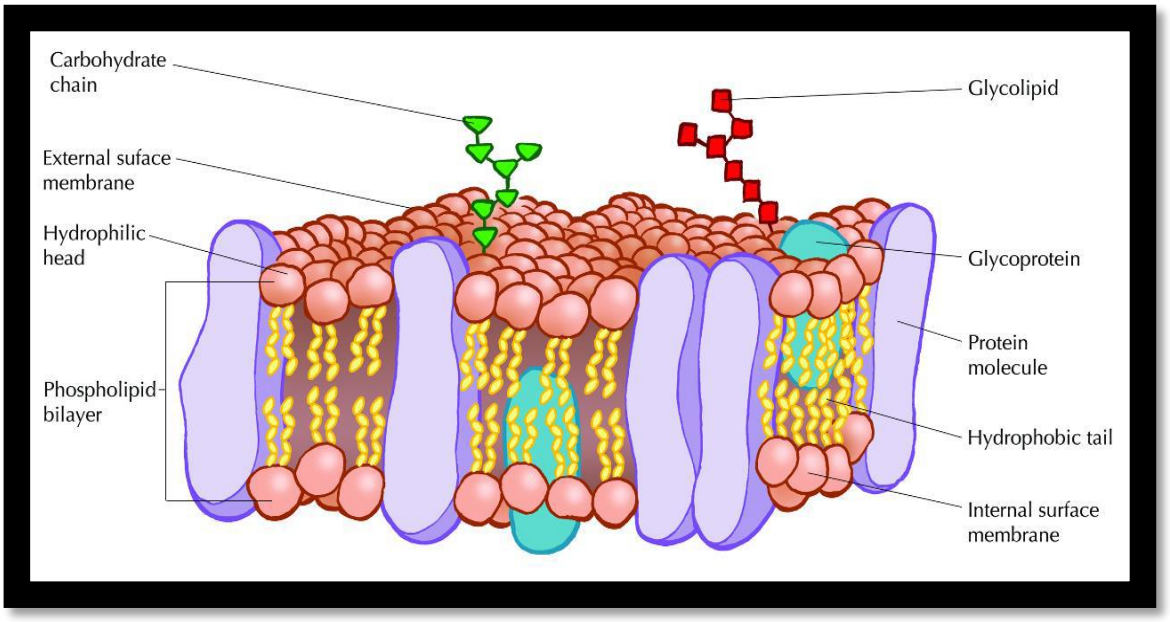

Cell membrane

2- Cytoplasm

A jelly types double membrane organelles, which are present in the inner region of the cell. It helps by keeping the cell in stable and protects the cell organelles by separating them from each other.

3- Nucleus

The largest organelle in the cell, which contains DNA (the cells hereditary information). The main role of nucleus in the cell is it controls all cellular activities.

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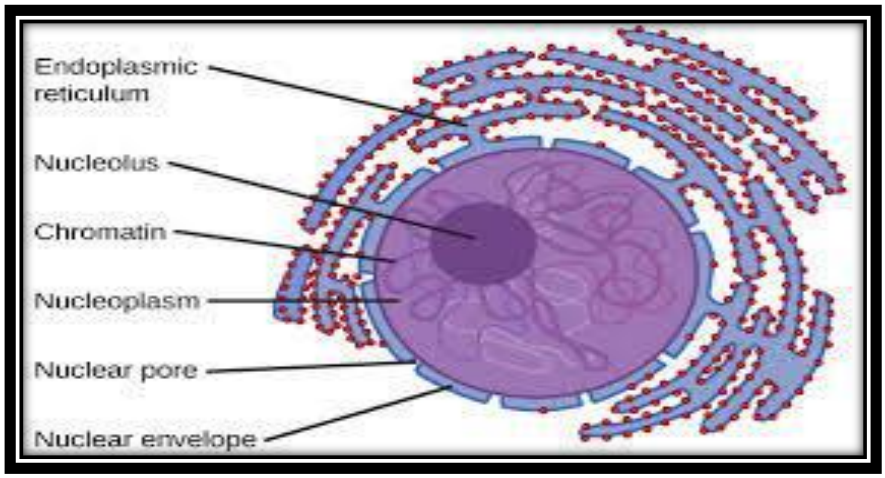
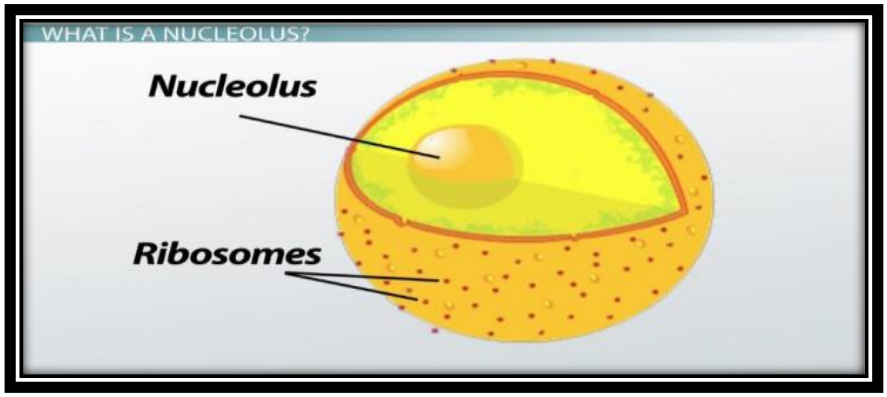


Nucleus

4- Nucleolus

It is a round body located inside the nucleus of a eukaryotic cell. It is not surrounded by a membrane but sits in the nucleus. The nucleolus makes ribosomal subunits from proteins and ribosomal RNA, also known as rRNA.



Nucleolus

5- Vacuoles

They are a fluid sacs, which are present in plant cells in greater numbers than in animal cells. The main function of this membrane sac is to store food and other waste materials.

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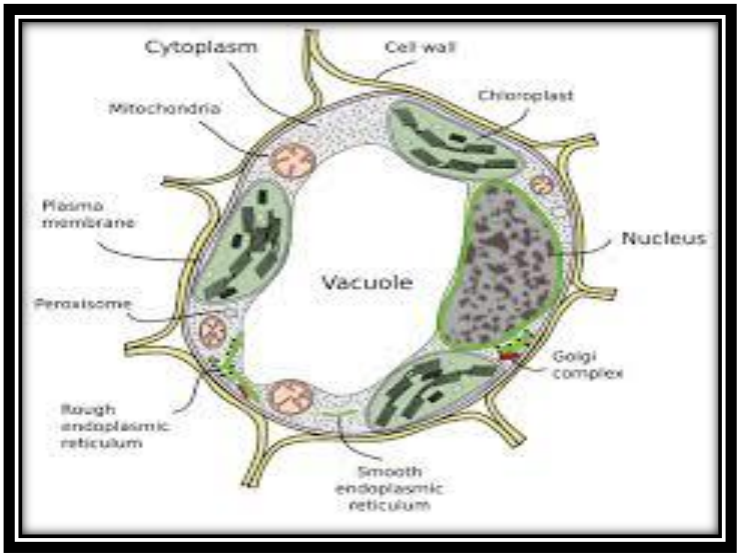

Vacuoles

6- Golgi Bodies or Golgi complex

The sac like structures, which are present in a cell to manufacture store, packing and shipping the selected particles throughout the cell. It is present in the cytoplasm. They are the site of protein synthesis, which are composed of ribosomal RNA and proteins.

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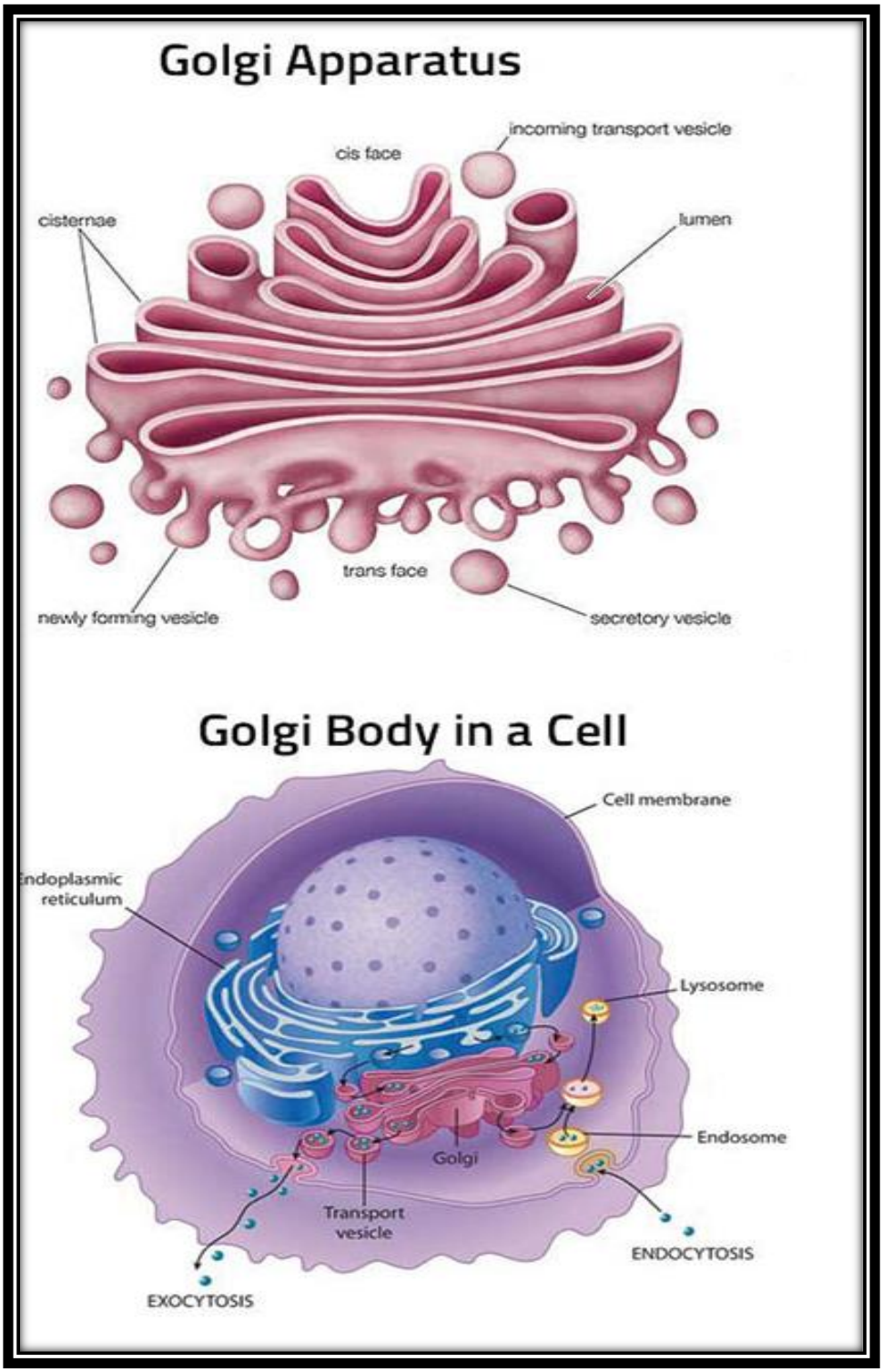

Golgi complex

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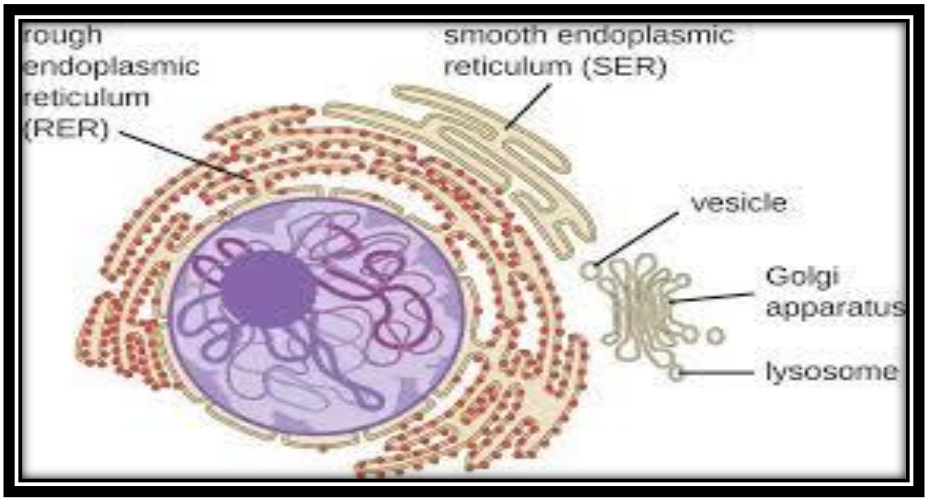
7- Endoplasmic reticulum:-

The network of membrane, which helps in transporting materials around the cell and also helps in the synthesis of lipids and proteins. It forms a connection between nuclear envelope and the cell membrane of the cell.

There are two types of ER:

a- Rough endoplasmic reticulum (RER): The outer (cytosolic) face of the rough endoplasmic reticulum is studded with ribosomes that are the sites of protein synthesis.

b- Smooth endoplasmic reticulum (SER) : which lacks ribosomes and functions in lipid synthesis but not metabolism, the production of steroid hormones, and detoxification.



Endoplasmic reticulum

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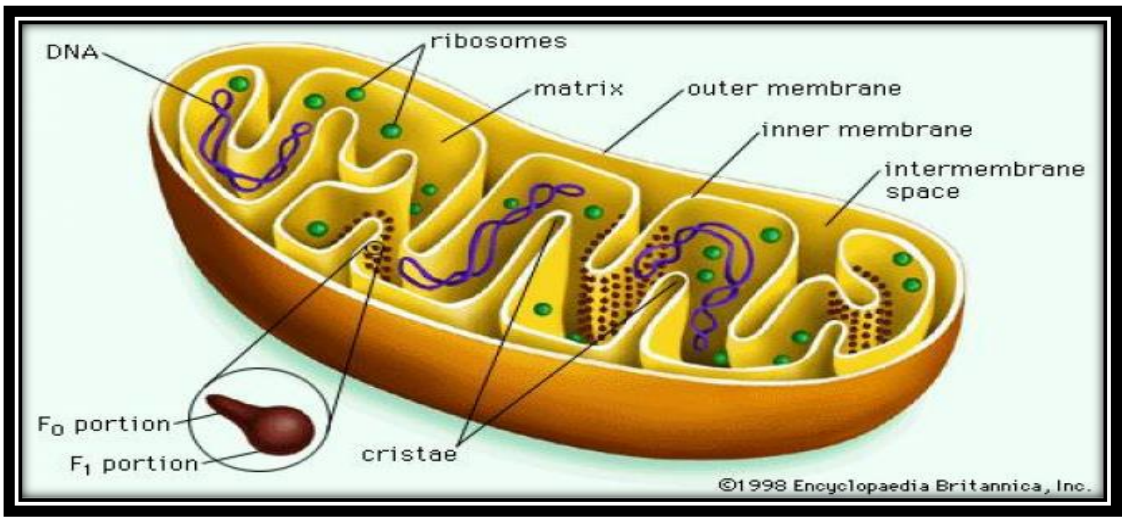
8- Ribosomes

Are small particles which are found individually in the cytoplasm and also line the membranes of the rough endoplasmic reticulum. Ribosomes produce protein. They could be thought of as "factories" in the cell.

9- Mitochondria

They are rod shaped organelles, plays an important role in releasing energy and they are powerhouse of the cell.

(which cell organelle is called the Powerhouse of the cell? Why ?)



Mitochondria

10- Lysosomes

A lysosome is a membrane-bound organelle found in many animal cells. They are spherical vesicles that contain hydrolytic enzymes that can break down many kinds of biomolecules.

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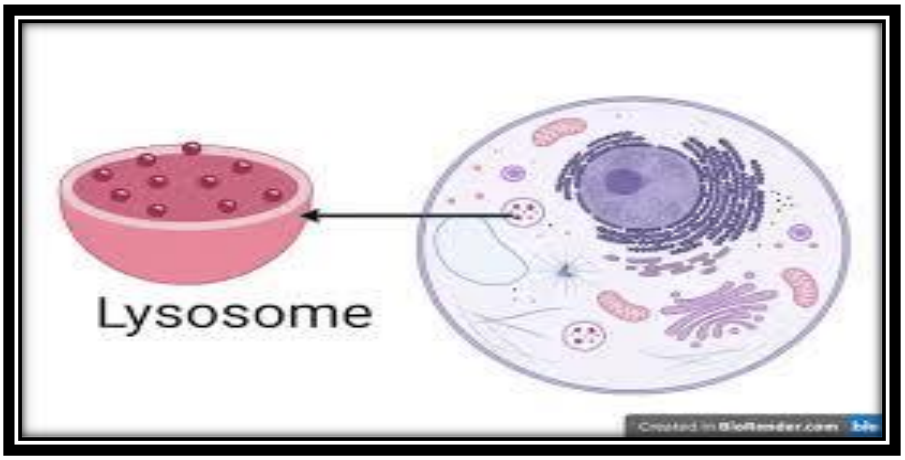
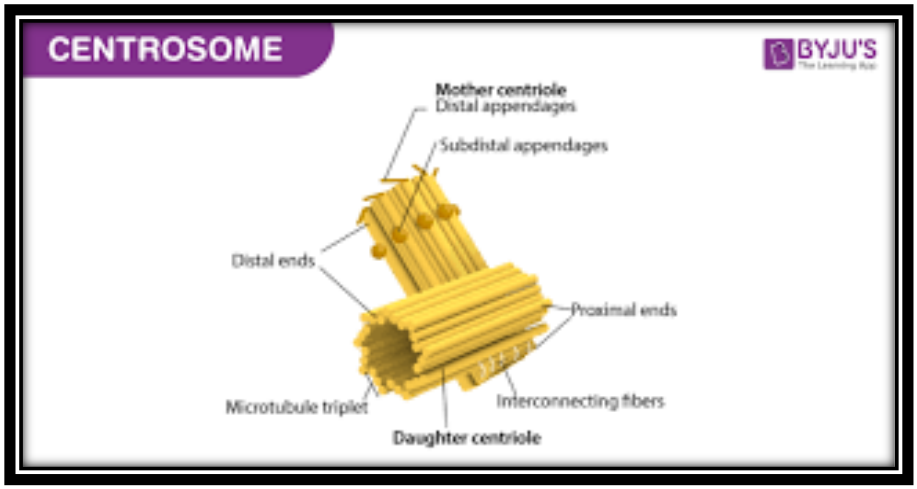


Lysosome

11- Centrosomes : are cellular components that appear like a disc in shape and composed mainly of a protein called tubulin and play important role in cell division**.**



Centrosome

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12- Plastids (in plants only) :-

It is found in the cells of plants, algae, and some other eukaryotic organisms. Plastids are the site of manufacture and storage of important chemical compounds used by the cells of autotrophic eukaryotes. They often contain pigments used in photosynthesis, and the types of pigments in a plastid determine the cell's color.

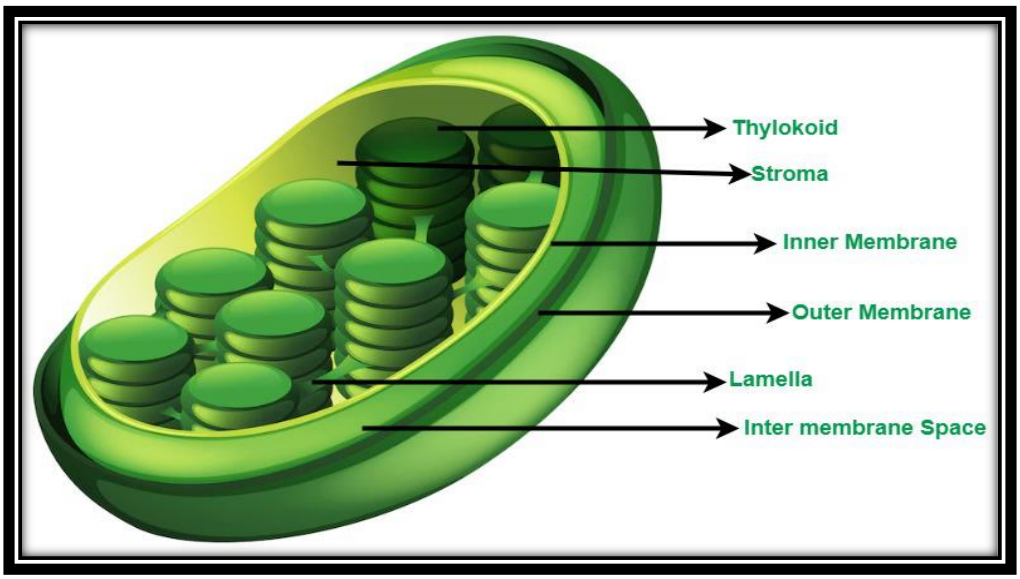
*In plants, plastids may differentiate into several forms :

1- Chloroplasts

2- Chromoplasts

3- Leucoplasts

The plastids have a double membrane envelope consisting of the outer and inner membrane (phospholipid layers). The space within the double membranes is covered with an aqueous matrix known as stroma. This aqueous matrix contains various enzymes and proteins that are essential for cellular processes



Plastids

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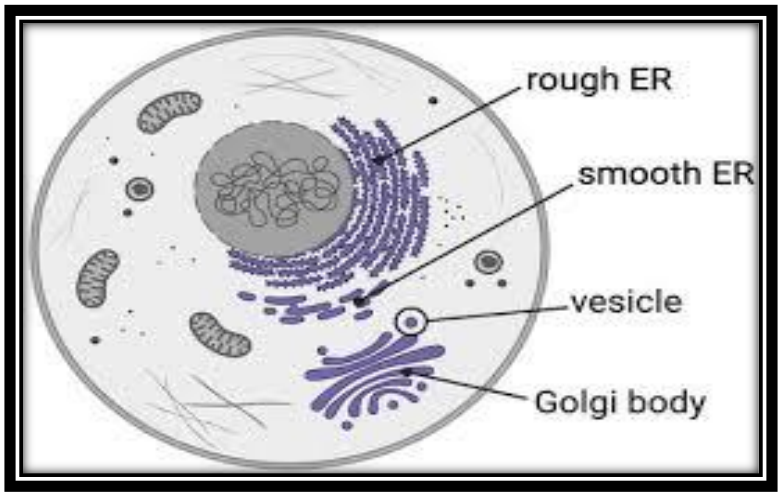
13- Vesicle

Vesicles are small cellular containers that perform a variety of functions. They can be used to move molecules, secrete substances, digest materials, or regulate the pressure in the cell.



Vesicle