

The Cell:

→ A Cell is the basic, living, structural and functional unit of body enclosed by a membrane. There are about 200 different types of cells in our body.

→ All cells arise from existing cells by the process of cell division, in which one cell divides into two identical cells.

→ Cell biology is the study of cellular structure and function.

Parts of a Cell:-

→ We divide the cell into three main

Parts: plasma membrane, cytoplasm, and nucleus.

① Plasma Membrane :- (or) Cell Membrane :

→ It forms outer flexible surface of the cell.

→ This relative barrier regulates the flow of materials into and out of a cell.

→ It plays a key role in communication among cells and between cells and their external environment.

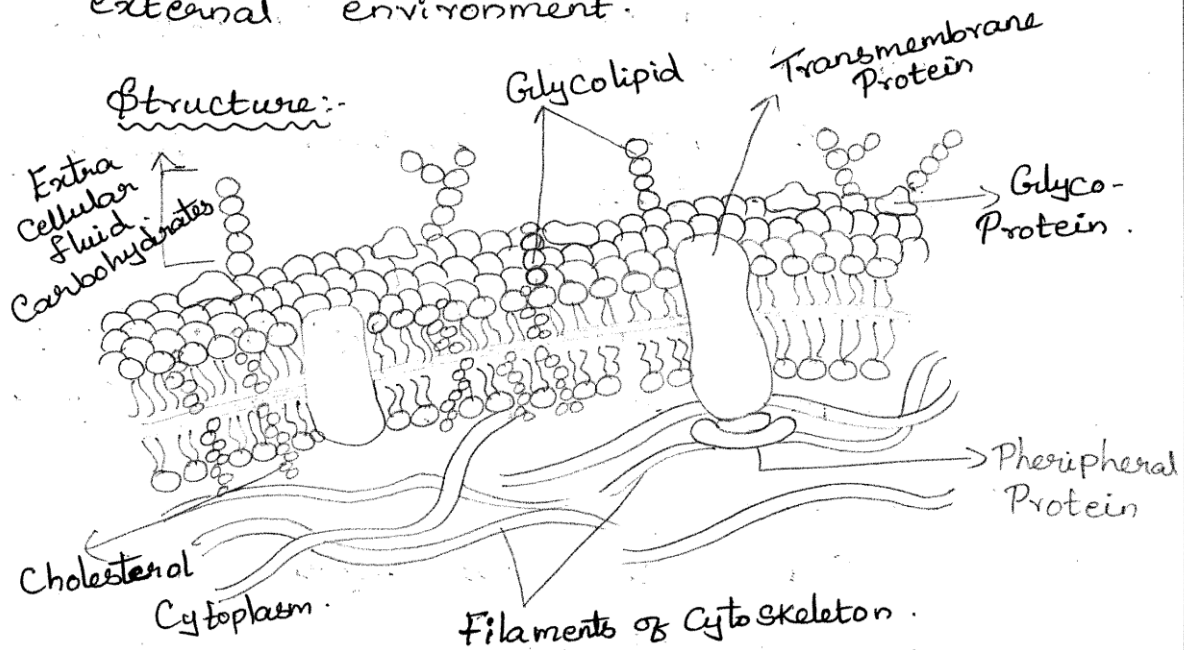


Fig: Fluid Mosaic Arrangement of lipids & Proteins.

* The membrane is composed of proteins and lipids that are held together by non covalent forces.

- * According to the fluid Mosaic Model, the membrane is a mosaic of Proteins floating like icebergs in a lipid bilayer sea.
- * Lipid bilayer → Phospholipids, Cholesterol, and glycolipids.

Functions:-

- * Protection: It Protects Cells from injury.
- * Barrier: It holds or bounds Cell Contents and maintains individuality of the cell.
- * Shape of the Cell:
It anchors structural elements of the cytoskeleton.
- * Cell recognition:
Glycoproteins and glycolipids function as receptors for specific chemical signals.
- * Cell Junctions:-
Keeping the cells together during formation of tissues.
- * Microvilli
Increasing surface area for absorption.
- * Cell Movements.
Movements like undulations and

Pseudopodia are performed by cell membrane.

* Enzymes:

Some membrane proteins catalyze biochemical reactions.

* Transport Proteins:

Many membrane proteins form channels that facilitate the transport (ions, water, nutrients, sugars & amino acids).

* Selective Permeability:

It allows entry to only selected substances.

* Bulk transport:

Endocytosis → intake of materials from outside to form vesicle.

Exocytosis → Throwing out of waste products.

* Impulse transmission:

Nerve impulses travel through the plasma membrane of nerve cells.

② Cytoplasm:

It has two components: the cytosol and organelles.

1) Cytosol:

* It is the fluid portion of cytoplasm that contains water (75-90%), ions, glucose,

amino acids, Proteins, lipids, ATP and waste Products.

2) Organelles:-

Organelles often Cooperate to maintain homeostasis. The Various type of Cell Organelles are:

1. Ribosomes:- (80S size)

→ Ribosomes are attached to the Outer Surface of the nuclear membrane and to the endoplasmic reticulum.

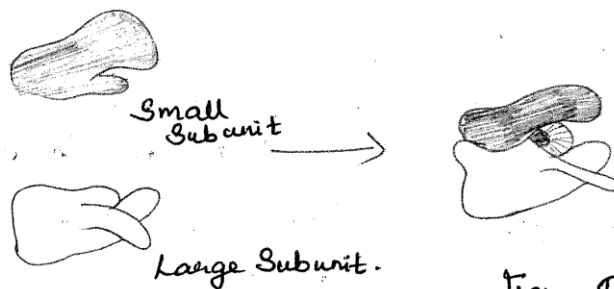


Fig:- Ribosomes

→ Ribosomes are also located within mitochondria.

Functions:-

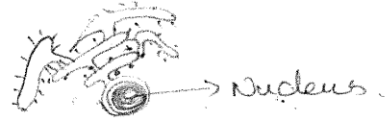
- * Free ribosomes Synthesize Proteins used in the Cytosol.
- * Mitochondrial ribosomes Synthesize mitochondrial Proteins.

2. Endoplasmic Reticulum (ER):

ER is a network of membranes

that form flattened interconnected sacs (cisternae) or tubules.

* Rough ER:-



→ It produces secretory proteins; forms glycoproteins; synthesizes phospholipids; and attaches proteins to phospholipids.

* Smooth ER:-



→ It synthesizes fatty acids and steroids, such as estrogens and testosterone.

3. Golgi Complex:-

→ The cisternae are often curved, giving the Golgi complex a cup-like shape.

→ The Golgi complex is more extensive in cells that secrete proteins.

Functions:-

* It forms secretory vesicles that discharge processed proteins via exocytosis into extracellular fluid.

* It forms transport vesicles that carry molecules to other organelles, such as lysosomes.

4. Lysosomes:-

→ Lysosomes are membrane enclosed vesicles that contain digestive enzymes.

They are formed from the Golgi Complex and contain as many as 60 kinds of powerful digestive and hydrolytic enzymes.

Functions:-

- * They carry out autophagy, the digestion of worn-out organelles.
- * They can carry out autolysis, the digestion of entire cells. Thus they are called "suicidal bags".

5. Peroxisomes:-

→ They are similar in structure to lysosomes but are smaller and contain several oxidases.

6. Proteasomes:-

→ Proteasomes are tiny barrel shaped structures, many thousands in number, in both the cytosol and the nucleus of a typical body cell.

7. Mitochondria:-

→ A cell may contain hundred to several

thousand Mitochondria (or) "Power house" of the cell, which generate most of Cellular ATP through aerobic respiration.

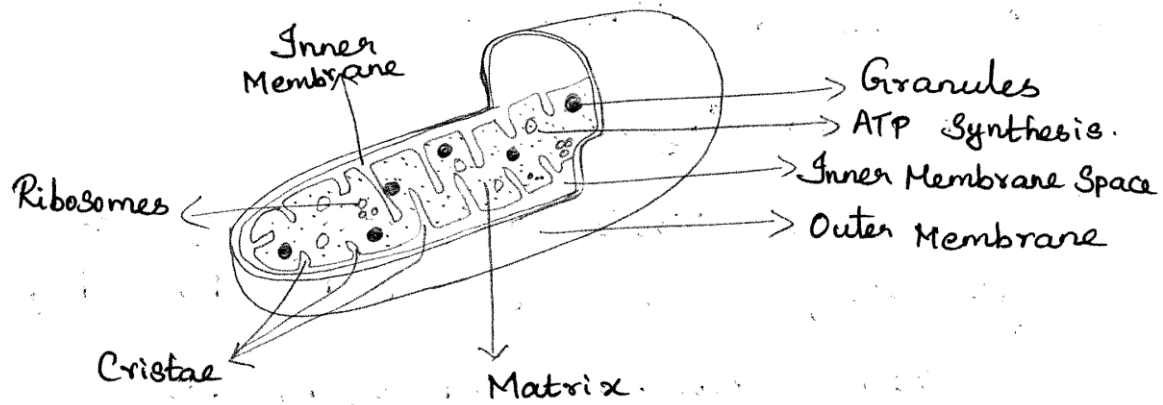


Fig:- Mitochondria.

Functions:-

1. They generate ATP through reactions of aerobic cellular respiration.
2. They can synthesize some of their proteins.
3. They also take part in fat metabolism.

8. The Cytoskeleton:-

The Cytoskeleton is a network of three types of Protein Filaments that extend throughout the cytosol.

- * Microfilaments
- * Inter-Mediate Filaments
- * Microtubules.

9. Centrosome:-

The Centrosome Consists of a pair of Perpendicularly placed Centrioles and Peri Centriolar Material.

10. Cilia and Flagella:-

These Motile Projections of the Cell Surface are formed by basal bodies.

* Cilia → Numerous, Short hair like Projections that extend from the Surface of the Cell.

* Flagella → Similar in Structure ^{to cilia}, but are typically much longer.

③ Nucleus:-

→ The Nucleus Consists of a double membrane nuclear envelope and is the largest Cell Organelle.

→ One or more Spherical bodies Called Nucleoli.

→ Nuclear Matrix is a network of intermediate filaments that Provides Shape of the nucleus.

→ Chromatic reticulum Consists of DNA Molecules.

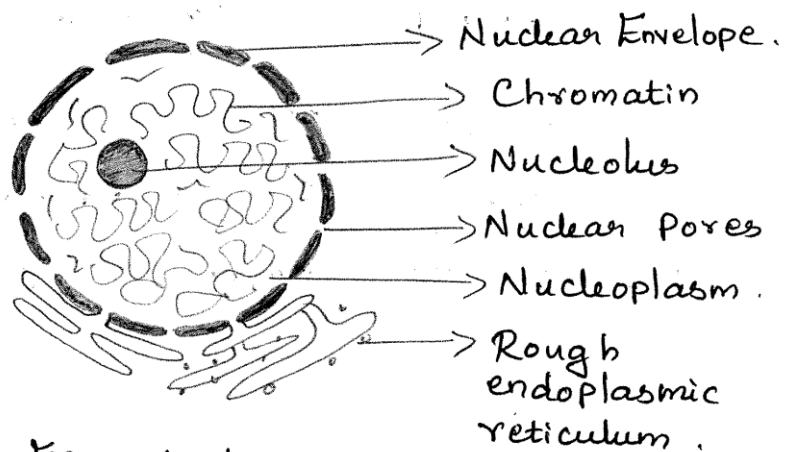


Fig:- Nucleus.

Functions:-

- * Nuclear Pores Control the Movement of Substances between the nucleus and Cytoplasm.
- * Nucleoli Produce ribosomal Subunits which Constitute ribosomes in the Cytoplasm.
- * Chromosomes Consists of genes that Control Cellular Structure and direct Cellular Functions.

Cell Membrane.

The Cell membrane is also known as the plasma membrane, is a crucial Component of Cell Structure.

It acts as a barrier, Controlling the movement of Substances in and out of the Cell.