#Race The Fundamental Unit of Life...

⇒ Cell is the ~~Functional~~ basic structural & Functional unit of life.
(Fundamental) (Living organism)

* Cell → Tissue → Organ → Organ System → Living Being.

⇒ Discovery :-

- Robert Hooke - 1665 - Discovered (dead cell) and coined the term Cell.
- Antonie Van Leeuwenhoek - 1674 - Discovered First living cell
- Robert Brown - 1831 - Discovered Nucleus (control centre of cell)
- Purkinje - 1839 - Protoplasm

Cell theory :-

- Mathias Schleiden 1838 All plants are made up of cells.
- Theodore Schwann 1839 All animals are made up of cells
- Rudolf Virchow 1855 All cells came from pre existing cells.

Almost 3 trillions cells in a human body

Cell
(single) → Unicellular Org.
(many) → Multicellular Organism

- Unicelluar : Organism made up of single cell (Protozoa, Fungi, Algae)

Ex: Bacteria, Amoeba, Paramecium, Yeast, Chalmdomas

- Multicelluar : Org. made up of more than one cell.

Ex: Plants & animals

∴ Organism show variety in cell No., shape & size

- Largest living cell : Ostrich egg
- Smallest living cell : Mycoplasma [PPLO] [No cell wall]
  ⇒ Cell wall absent [Bacteria]

PPLO : Pluero Pneunonia like organisms

Cell

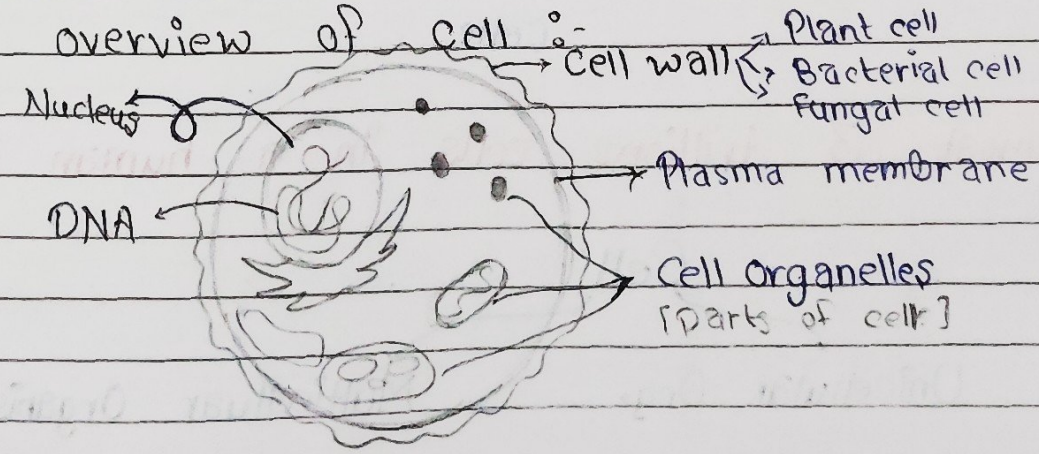
↓

Components

↓

Plasma membrane | Cell wall | Nucleus | Cytoplasm | Cell Organelle

∴ An overview of cell :-



Cell organelles :-

Single Membrane Bound (Covering)	Double Membrane Bound	Non Membrane Bound [Membrane-less]
(i) Vacuole	Nucleus	Ribosome
(ii) Lysosome	Mitochondria	Centrosome [centriole]
(iii) Golgi apparatus	Plastids	
(iv) Endoplasmic reticulum		

Protoplasm = Living content of the cell.

{Protoplasm = Plasma membrane + Cytoplasm + Nucleus}

* Cell wall is dead.

Cell wall and it's composition :-

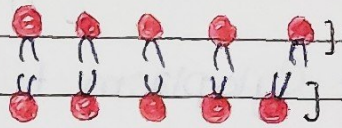
- Non living and rigid
- Forms outer covering of plasma membrane
- Provides shape to cell
- Provides structural support to cell

		(carbohydrate)
(i) Plants	✓	Cellulose
(ii) Bacteria	✓	Peptidoglycan
(iii) Fungi	✓	Chitin
(iv) Animals	✗	
(v) Virus	✗	[cell is also absent]

Plasma membrane / Cell membrane :-

- Plasma membrane is mainly composed of lipids and protein.
- Some amount of carbohydrates also present.
- Interacts with outside world.
- Controls movement of substances in and out of the cell.
- Semi-Permeable & Flexible.

"Phospho-lipid" **



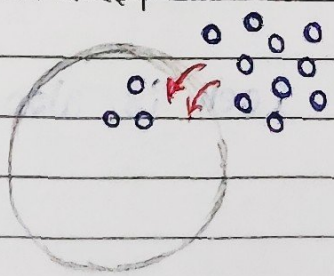
Plasma membrane is phospho-lipid bi-layer (bi → two)

Only selective materials are allowed to cross P.M.

Transport across plasma membrane

- Passive Transport
  - Diffusion
  - Osmosis
- Active Transport

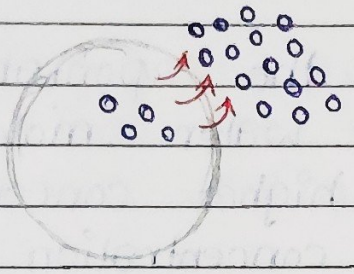
Passive Transport :-



Higher Con. → Low Con.

[No need of energy]

Active Transport :-



[Low con. → High con.]

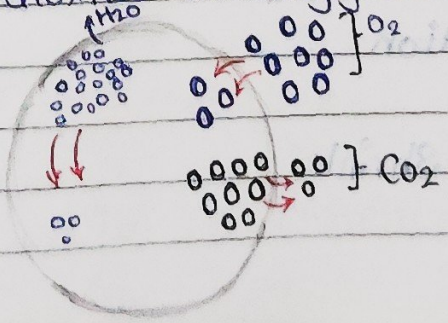
* Requires lot of energy.

	Passive Transport	Active Transport
(i)	Substance move from their higher to lower concentration.	Substances move from their lower to higher concentration.
(ii)	No energy is required.	It requires energy in the form of ATP molecules.
(iii)	It is a slow movement.	It is a rapid movement.
(iv)	Only small molecules or water molecules are transported passively.	Movement of large molecules occur by active transport.

* Diffusion :- ← quickly / Fastly

⇒ It is the spontaneous Movement of substances (solid, liquid and gases) from a region of high concentration to low concentration.

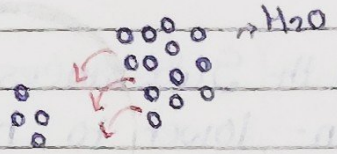
⇒ Substances like carbon dioxide or oxygen can move membrane by diffusion



* Osmosis :-

⇒ Osmosis is defined as the spontaneous movement of solvent or water molecules from the region of higher concentration to a region of lower concentration through a selectively permeable membrane.

⇒ It could be endosmosis or exosmosis.



* Endosmosis : Water molecules move inside the cell by process of osmosis.

* Exosmosis : Water molecules move outside the cell by the process of osmosis

⇒ Hypertonic, Hypotonic and Isotonic solutions.

- Hypertonic: More solute, Less water → Concentrated Solution
  ⇒ Cell Shrink
- Hypotonic: Less ~~wat~~Solute, More water
  ⇒ Cell Swell
- Isotonic: Equal Solute & Solvent
  ⇒ zero net movement of water molecules.

⇒

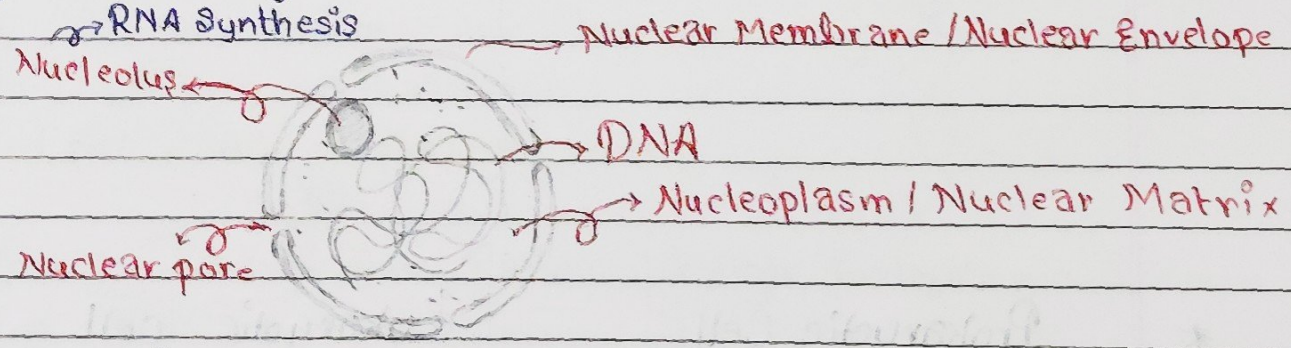
* Plasmolysis :-

- Shrinkage of protoplasm [Living content of the cell] away from the cell wall, when placed in a hypertonic solution.
- Observed only in plant cells. [In Hypertonic Solution]

∴ Nucleus :-

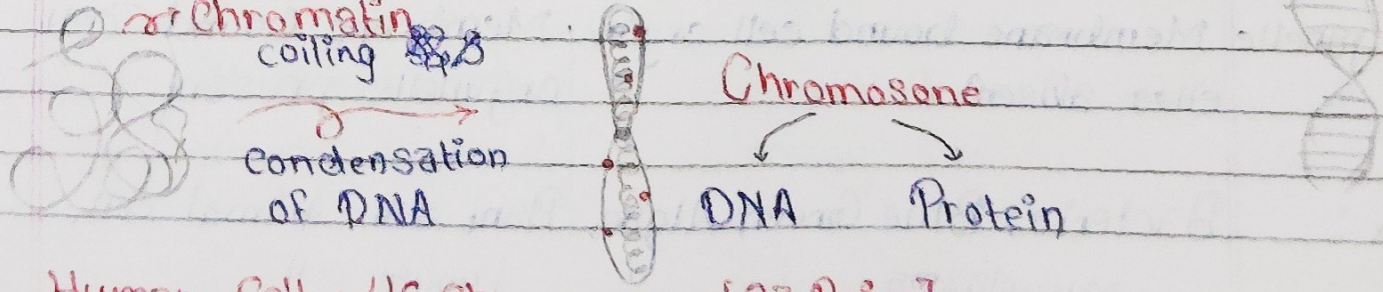
- Controlling centre of the cell
- Double membraned nuclear envelope with pores.
- Contains DNA [Heredity Material]

∴ Coordinates activities such as cell division, protein synthesis, growth, etc



* DNA : Deoxyribose Nucleic Acid.

- Thread like structure present in nucleus.
- Carries all the information about structure and function of an organism.
- Inherit / pass from one generation to another.

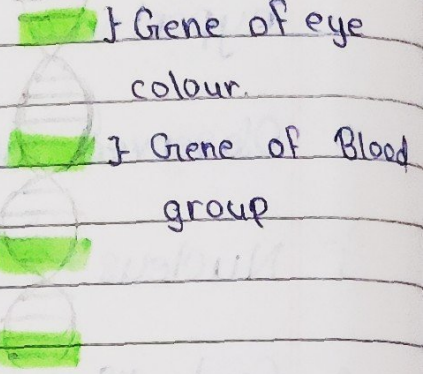


Human Cell : 46 Chromosone [23 Pairs]

* Genes

- Segment / part of DNA that carries information for a particular characters.

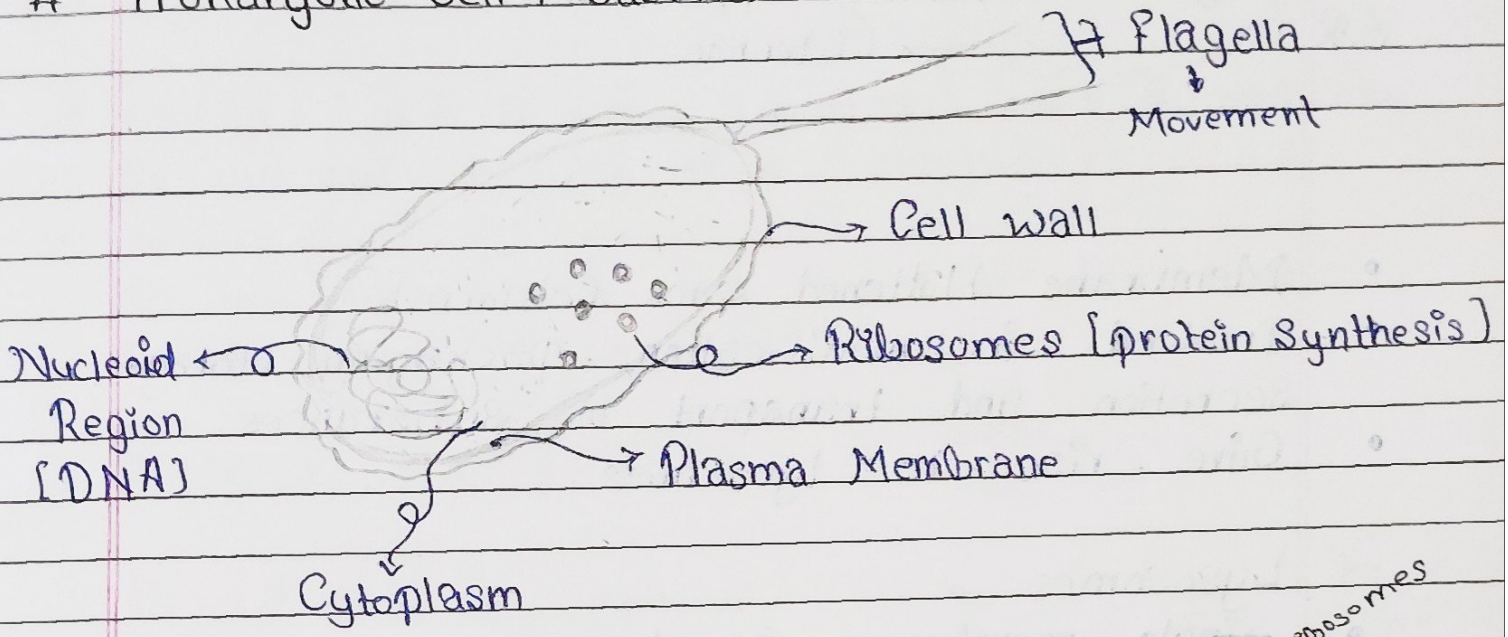
Human DNA : 2.2 m



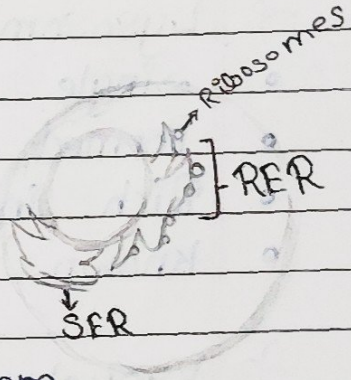
*	DNA	RNA
	Deoxyribose Nucleic Acid	Ribose Nucleic Acid
	Double Stranded	Single stranded

*	Prokaryotic Cell	Eukaryotic cell
Nucleus	Absent instead Nucleoid present.	Well defined nucleus present.
Chromosone	Single	More than one chromosome
Ribosomes	Present	Present
Organelle	Membrane bound cell organelles absent.	Membrane bound cell organelle present.
Ex :	Bacteria, Blue Green Algae, Mycoplasma	Plant cell, Animal cell, Fungal cell

Prokaryotic Cell / Bacterial Cell



Endoplasmic Reticulum :-



- Gives mechanical support to the cell.
- It is an intracellular transport system for various substances.
- Protein and lipid synthesis

#	[SER] Smooth Endoplasmic Reticulm	[RER] Rough Endoplasmic Reticulm
◦	Ribosomes not attached to their surface	Ribosomes attached to their surface
◦	Appear smooth under micro scope.	Appear rough under microscope
◦	Involved in lipid Synthesis.	Involved in protein Synthesis and secretion
◦	Involved in lipid like steroidal hormone synthesis.	Involved in formation of many protein enzymes

Golgi bodies / Golgi apparatus :-

E.R → Cisternae

- Membrane flattened sacs (cisterns)
- Involved in modification, packaging, storage, secretion and transport of substances
- Give rise to lysosomes

Lysosomes :-

- Single membrane bound
- Formed by the Golgi apparatus.
- Rich in hydrolytic (digestive) enzymes
- Known as suicidal bags of cell

Vacuole :- → Tonoplast

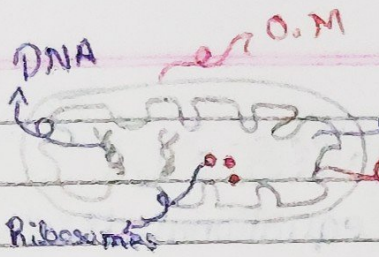
- Single membrane bound
- Contain amino acids, protein, sugar and waste product
- Maintain turgidity of cell.
- Food vacuole are formed by engulfing the food parties

⇒ Storage sac of the cell

Ribosomes :- (RNA + proteins)

- Membrane less cell organelle
- Involved in the synthesis of proteins
- Present in both Prokaryotic and Eukaryotic cell

Mitochondria :-



- Double - membraned structure, inner membrane folds over many times (cristae).
- Also called powerhouse of the cell.
- Release energy in the form of ATP [Adenosine triphosphate]

Plastids :- [Plant cell]

(i) Chloroplast :-
- Green plastid
- Pigment - chlorophyll and carotenoid
- Imparts green colour to plants
- Involved in photosynthesis.

(ii) Chromplast :-
- Coloured plastid
- Pigment - carotene and xanthophyll
- Imparts yellow, orange or red colour to the plant

(iii) Leucoplast :-
- Colourless plastid
- Pigment absent
- Storage of nutrients.

Mitochondria and Chloroplast are semi autonomous cell organelles as they contain their own DNA, RNA & ribosomes.

★ Mitochondria, Chloroplast } own DNA & Ribosome → Synthesis Proteins

	Mitosis	Meiosis
(i)	It is an equational division	It is a reductional division.
(ii)	Two daughter cells are formed	Four daughter cells are formed
iii	Daughter cells have same number of chromosomes as the parent cell	Daughter cells have half the no. of chromosomes as the parent cell.
(iv)	It helps in growth and repair of injured tissue	It is responsible for production of gametes [Sperm / Egg cell]