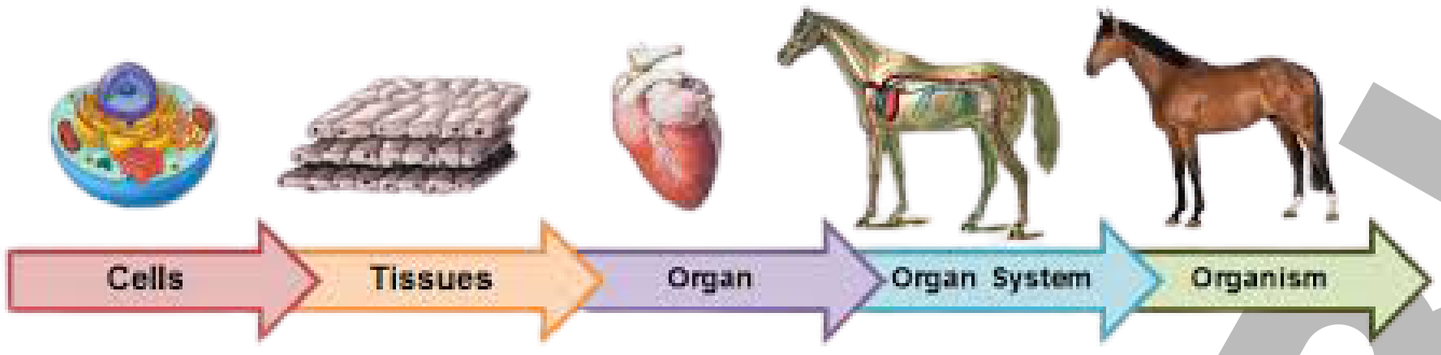
FundaMental Unit Of Life

IXth

CELL

Cell is the Fundamental Unit of life or we can also say that cell is the basic building unit of life or an organism . All living things are composed of cell.



Type of organism

On the basis of number of cells organism are of two types :-

Unicellular : Organisms composed of only one or single (uni) cell.
Example are Amoeba Chlamydomonas, Paramecium and Bacteria.

Multicellular : Organisms composed of more than one cell or many (multi) cells .
Examples are Humans , Plants and Animals.

Cell Organelles

cell has got certain specific components within it known as cell organelles. Each kind of cell organelle performs a special function, such as making new material in the cell, clearing up the waste material from the cell and so on.

Types of Cell

Prokaryotic cells : Cells which do not have a well defined nucleus and do not have a nuclear membrane.
They are only found in unicellular organisms.
Examples : Bacteria , Blue-Green algae.

Eukaryotic cells : Cells which have a well defined nucleus and also have a nuclear membrane.
They are only found in both unicellular and multicellular organism.
Examples : Human and Amoeba.

Nucleus

Nucleus is an organelle present inside is cell . It is dense , round in shape . It is bound by double membrane , containing pores called nuclear pores which allows the passage of molecules in and out .The membrane covering nucleus called nuclear membrane . The fluid which is inside the nucleus is called nucleoplasm .Nucleus contains Chromosomes and chromosomes contains genes which is responsible for inheritance.

Function

-It controls all the metabolic activities of the cell.
-It works as a storage house of genes.
-It helps in cell division.

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Cell Membrane / selectively permeable membrane / Plasma membrane

The cell membrane or plasma membrane is a biological membrane (covering) that separates the interior of the cell from the outside environment. The plasma membrane is called as <u>selectively permeable membrane</u> because it regulates the movement of substances in and out of the cell. It is flexible and made up of protein and lipids.

- - Sometimes it is also called semi permeable membrane because it allows only certain molecules to pass through it.

Flow of substances through cell membrane

Diffusion :- When substances like oxygen or carbon dioxide move in or out of cell throuh cell membrane then this process is known as Diffusion. It always moves from higher concentration area to lower concentration area . CO_2 is cellular waste and requires to be excreted out by the cell , as a result when the concentration of carbon dioxide is higher inside the cell as compared to the concentration of carbon dioxide outside of cell then carbon dioxide move out from the cell through cell membrane .
<u>Similarly</u> , In case of oxygen when the concentration of oxygen inside the cell decreases as compared to outside of cell the oxygen move inside the cell through cell membrane .

Osmosis :- When the concentration of water inside and outside of cell changes then water moves from higher concentration area to lower concentration area through selectively permeable membrane.

<u>Hypotonic solution</u> : If water moves inside of cell from outside , because the concentration outside (surrounding) is higher as compared inside of cell.
It result in swelling up of cell.

<u>Hypertonic solution</u> : If water moves outside of cell from inside , because the concentration outside (surrounding) is lower as compared inside of cell.
It result in decreasing the cell volume.

<u>Isotonic solution</u> : Because the concentration inside and outside of cell is equal as a result the water doesn't move .
In this case the volume of cell remains same.

Cell wall :- It is the hard covering of cell made up cellulose . It is only found in plant cell.
<u>Function</u> : It provides structural strength to the cell.
It protects the plasma membrane.
It prevents the dryness of cell.

Cytoplasm : The cytoplasm is a fluid-like substance that fills up the cells. Cellular organelles and structures are suspended in the cytoplasm.

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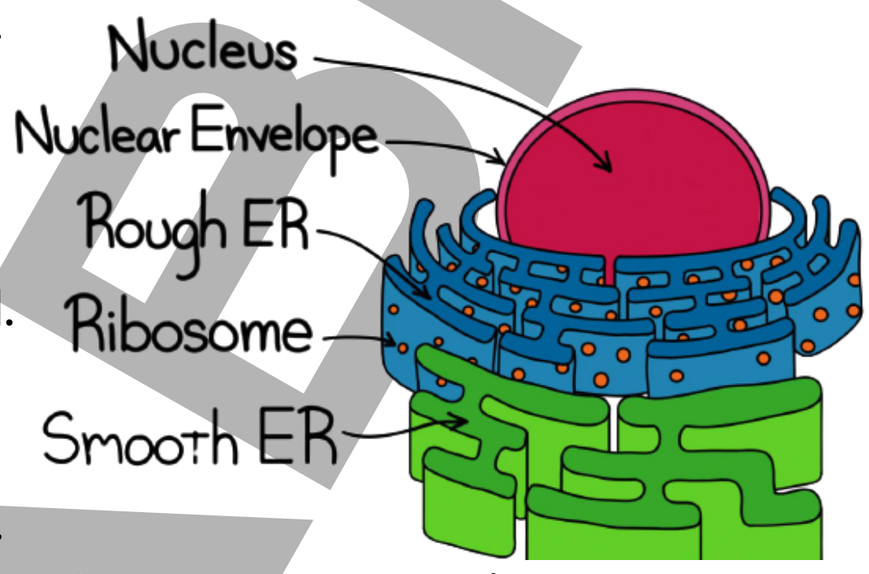
ENDOPLASMIC RETICULUM : It is a large network of membrane-bound tubes and sheets. Only found in eukaryotic cell (except sperm cell and red blood cell).
It is of two types :
Rough Endoplasmic Reticulum :It has a rough surface due to presence of ribosomes. It is also responsible for synthesis of protein.
Smooth Endoplasmic Reticulum : They are smooth because they do not have ribosomes . They help making fats and lipids .
They also help in building cell membrane .
In vertebrates SER plays a crucial role in detoxifying many poisons and drugs.



Functions : It provides internal support to cell.
It helps in transporting several substances from nuclear membrane to plasma membrane.
It helps in formation of plasma membrane and golgi apparatus.

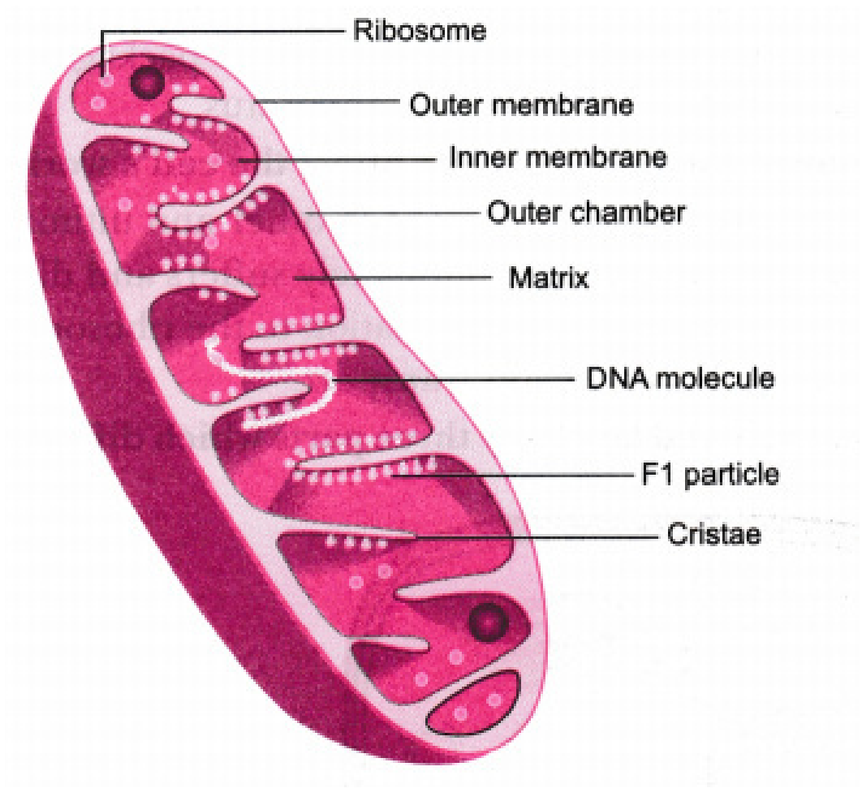
Golgi-apparatus : It consists of a system of membrane-bound vesicles (flattened sacs) arranged approximately parallel to each other in stacks .


Golgi-apparatus

Function : It modify , pack , store and transport plenty of substances.
It helps in formation of lysosomes.

Lysosomes : They are membrane-bound sacs like structured.
They are filled with digestive enzymes.
Functions : They help in digesting foreign substances and worn-out cell organelles.
When the cell becomes damaged or is about to die then lysosomes get burst and the powerful enzyme inside them digest their own cell
This is the reason they are also known as suicide bag of cell.

Mitochondria : Mitochondria have two membrane coverings. The outer membrane is porous while the inner membrane is deeply folded. Outer membrane is smooth whereas the inner membrane is projected in folds to make finger like structures called cristae.
It as it's own DNA and ribosomes.



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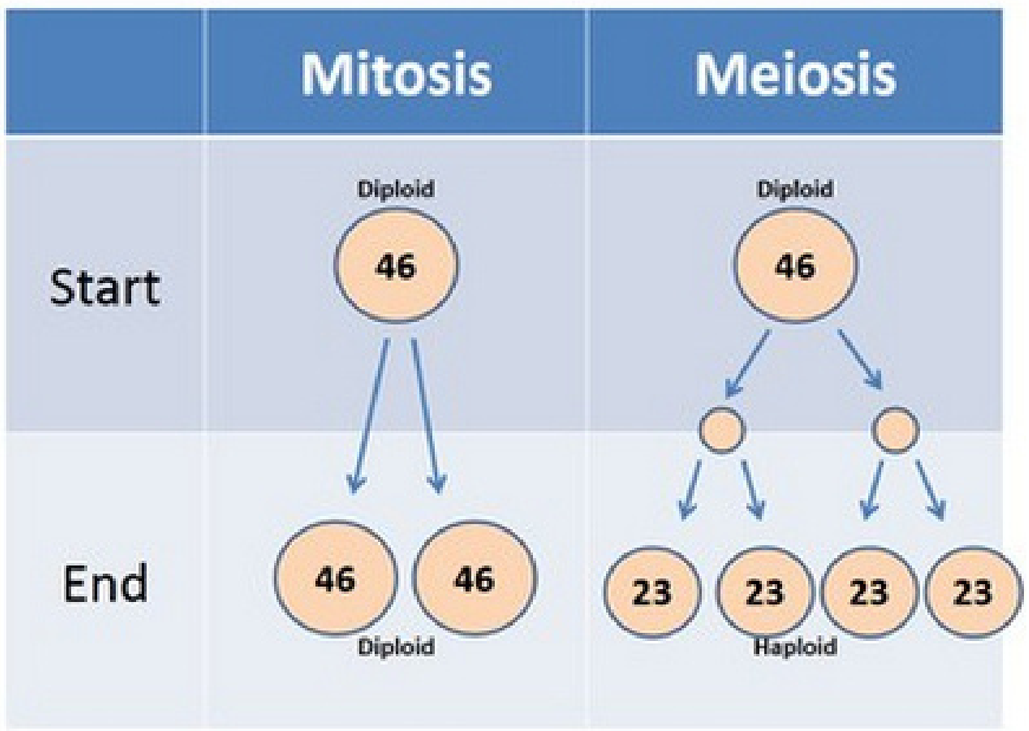
Function : It provides the energy for vital activities of cell. It stores and provide energy during reactions inside cell. This is the reason they are called power house of cell.

Plastids : Plastids are only present in plant cells. They have their own DNA and Ribosomes .
These are of two types:
Chromoplasts: Chromoplasts containing the pigment chlorophyll are known as chloroplasts. Chloroplasts are important for photosynthesis in plants. Chloroplasts also contain various yellow or orange pigments in addition to chlorophyll.
Leucoplasts : Leucoplasts are primarily organelles in which materials such as starch, oils and protein granules are stored.

VACUOLES : They are storage sacs filled with solid or liquid . They are used to several protein , fats .starch and amino acid
The size of vacuoles in plant cell is much bigger than that of animal cell , they can consume up to 50-90% of total volume of a plant cell.

Cell Division : The process by which new cells are made is called cell division.
They are of two types :
Mitosis : The process of cell division by which most of the cells divide for growth . Mother cell is divided to form two daughter cell. Both Mother and Daughter cell have same number of chromosomes.



Meiosis : When a cell divides by meiosis it produces four new cells . In this type of cell division the daughter have half number of chromosomes from mother cell.

Important Definitions :

Endocytosis : Due to the flexibility of plasma membrane cell can also engulf food and other substances which is known as endocytosis , amoeba also consume food through this process.
plasmolysis : When a living plant cell loses water through osmosis there is shrinkage or contraction of the contents of the cell away from the cell wall. This phenomenon is known as plasmolysis.

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Important Definitions :

Cell theory : Cell theorystates that living things are composed of one or more cells, that the cell is the basic unit of life, and that cells arise from existing cells.

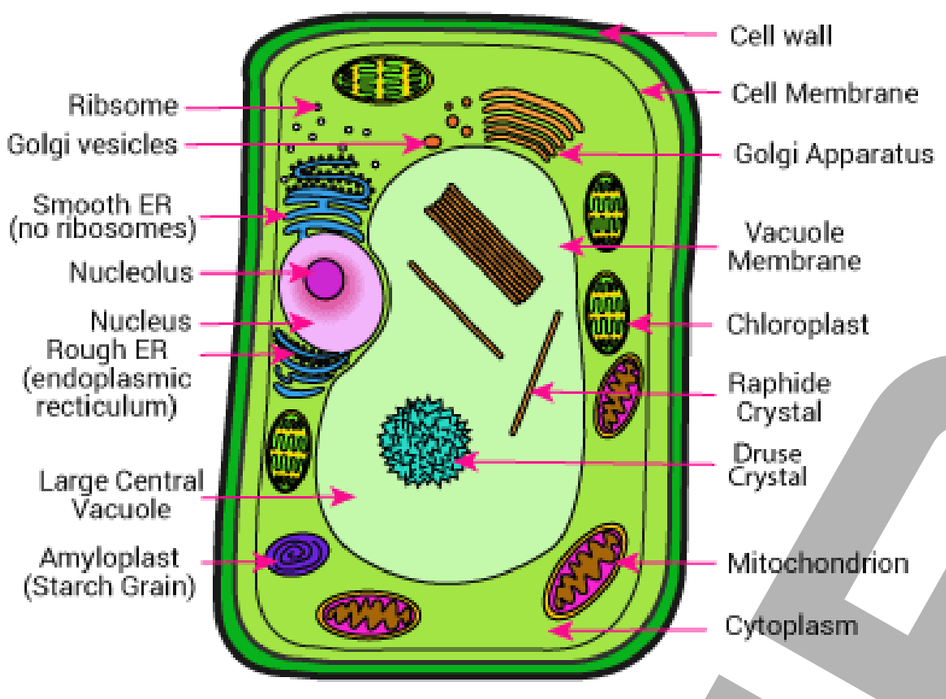
Protoplasm : Nucleus + Cytoplasm (of same cell) .

Nucleoid : Poorly defined nucleus due to absence of nuclear membrane.

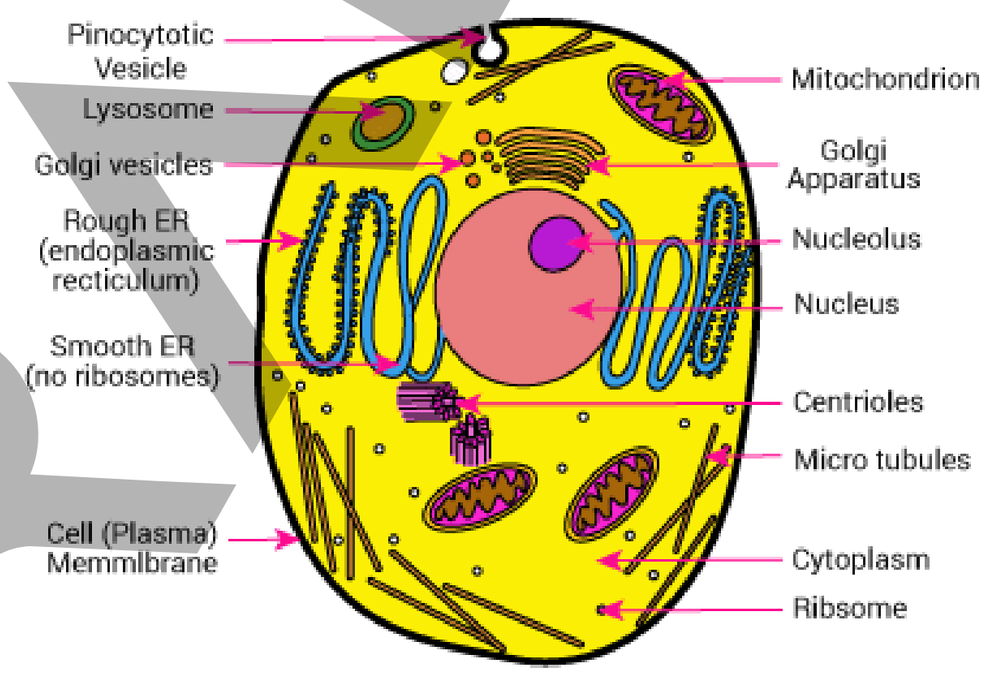
Cisterns : cisterns are flattened plate like structures that make up the golgi body. They are stacked upon each other.

ATP : It stands for adenosine triphosphate .It is the energy currency of cell , mitochondria supplies it to cell .

Diagram of Plant and Animal Cell



Plant Cell



Animal Cell