THE FUNDAMENTAL UNIT OF LIFE: CELL

Class -IX **Subject – Science**

Module 2/3

All cells have three common features

1) Plasma Membrane or Cell Membrane

2) Cytoplasm

3) Nucleus

1. Plasma Membrane or Cell Membrane :

This is the covering of the cell that separates the contents of the cell moms external environment. Plasma membrane is a living, thin, delicate, elastic, selectively permeable membrane made up of proteins and lipids and is present in both plant and animal cells.

Functions of Plasma Membrane

(i) It gives definite shape to the cell.

(ii) It separates the contents of a cell from its surrounding medium

(iii) It provides mechanical barrier for the protection of the internal contents of the cell.

(iv) It is a selectively permeable membrane.

(v) It regulates the movement of ions in and out of the cell.

Diffusion : It is the spontaneous movement of a substance from a region of high concentration to a region of low concentration.

Osmosis: It is the passage of water from a region of high water concentration through a semi-permeable membrane to a region of low water concentration

Hypotonic Solution: If the medium surrounding the cell has a higher water concentration than the cell, ie., if the solution is very dilute, the cell will gain water by osmosis. Such a dilute solution is called hypotonic solution.

Isotonic Solution: If the medium surrounding a cell has exactly the same water concentration as the cell, there will be no net movement of water across the cell membrane. Such a solution is known as an isotonic solution.

Hypertonic Solution : If the surrounding medium has a lower concentration of water than the cell, i.e., if it is a very concentrated solution, the cell will lose water by osmosis. Such a solution is called hypertonic solution

Endocytosis : The flexibility of the cell membrane enables the cell to engulf in food and other material from its external environment. Such processes are known as endocytosis,

Example : Amoeba acquires its food through such processes.

Diffusion	**Osmosis**
It takes place in any medium	Osmosis occur only in liquid medium
It is the movt of substance from the area of its higher concentration to arae of its lower concentration	It is the movt of water from its high concentration to its low concentration.
The diffusing molecules can solid, liquid or gas.	It involves movement of solvent molecules only.
It does not requite a semi permeable environment.	It requires semi permeable membrane.

Protoplasm : Purkinje in 1839 coined the term protoplasm' for the living fluid substance of the cell. It is a viscous, colourless. transparent material and a life giving substance of a cell. Protoplasm is commonly called the physical basis of life.

Cell wall

Plant cells have a rigid outer protective covering called the cell wall which lies outside the plasma membrane. The cell wall is non-living, freely permeable and mainly composed of cellulose.

Functions of Cell wall:

i) It provides structural strength to the plant cells.

(ii) It permits the cells of plants, fungi and bacteria to withstand very dilute (hypotonic) external media without bursting.

(iii) It gives a definite shape to the cells.

(iv) Because of cell walls, plant cells can withstand much greater changes in the surrounding medium

animal cells.

(v) Cell wall protects the cells against pathogens and mechanical injury.

Cell wall	**Cell membrane**
It is present in plant cells only	Present in animal and plant cell
Outermost covering of plant cell	Outermost covering of of animal cell
It is present outside the plasma membrane.	It is present outside the cytoplasm
Cell wall is rigid and comparatively thick.	Plasma membrane is flexible and comparatively thin.
It is non living and permeable.	It is living and selectively permeable.
It is made up of cellulose.	It is made up of lipids and proteins.

2.Cytoplasm

It is the fluid content of the cell which occurs between the plasma membrane and the nuclear envelope It contains various cell organelles which perform different functions of the cell.

3. Nucleus

Robert Brown in 1831 discovered the nucleus in the cell. Nucleus is the largest cell structure. It is a spherical or oval prominent structure, usually located in the centre of the cell.

Nucleus has the following important parts:

(a) Nuclear membrane : It is a double layered membrane,which separates nucleus from the cytoplasm. It has pores called nuclear pores which allow the transfer of material from inside the nucleus to the cytoplasm.

(b) Nucleoplasm : It is a homogeneous and granular dense fluid present inside the nucleus, in which chromatin and nucleolus are suspended

(c)Chromatin material : It consists of long, coiled network of thread-like structures. The Structure of a Nucleus material is made up of deoxyribonucleic acid (DNA) which is responsible for storing and transmitting the hereditary information from one generation to the other. It condenses into compact rod-like bodies called chromosomes at the time of cell division.

(d) Nucleolus : It is more or less round structure found inside the nucleus. The nucleolus contains RNA (ribonucleic acid) and proteins. RNA is helpful in protein synthesis in the cytoplasm.

Functions of Nucleus :

(i) The nucleus controls all metabolic activities of the cell.

(ii) It regulates the cell cycle.

(iii) It is concerned with the transmission of hereditary traits from the parent to offspring.

Chromosomes : These are thread-like several structures which are found in the nucleus of plant and animal (eukaryotic) cells. That contains hereditary information in the form of genes. Chromosomes are composed of DNA and protein

Gene: It is the functional unit of a chromosome, responsible for hereditary information or specific trait of an organism.

Nucleoid : The part of a cell of a bacteria having undefined nuclear region containing only nucleie acidi is called a nucleoid.

Prokaryotes : These are cells or organisms which do not have definite nucleus and membrane-bound organelles, in, bacteria and blue-green algae.

Eukaryotes : These are cells or organisms which consist of well-defined nucleus and membrane-bound organelles

Prokaryotic cell	**Eukaryotic cell**
Size of the cell is generally small	Size of the cell is generally large
Nuclear region is poorly defined due to absence of nuclear membrane and known as nucleoid	Nuclear region is well defined and surrounded by a nuclear membrane.
It contains single chromosome	It contains more than one chromosome
Nucleolus is absent	Nucleolus is present
Membrane bound cell organelle absent.	Membrane bound cell oreganelle are present.
Cell division takes place by fission or budding.	Cell division takes place by mitotic or meiotic
Centrioles absent.	Centrioles are present in eukaryotes.
Found in blue green algae, bacteria.	Found in fungi, plant and animal.