Biology notes for class IX

Chapter:-The Fundamental unit of Life

Introduction:- * Cell is the structural and functional unit of life It is the basic unit of life

* It is discovered by Robert Hook in 1831 in cork slice with the help of primitive microscope
* Leewenhoek (1674), discovered the free living cells in pond water with the improved microscope
* Robert Brown discovered the nucleus in the cell in 1831

The cell theory:-

* The theory that all the plants and animals are composed of cells and the cell is the basic unit of life, was presented by two biologists, Schleiden and Schwann.
* The cell theory was further expanded by Virchow by suggesting that all cells arise from pre-existing cells.

Types of Organisms :-

* On the basis of no. of cells, Organisms are of two types :
  (I) Unicellular Organisms-
  (II) Multicellular Organisms

(I) **Unicellular Organisms** :- These Organisms are single celled which perform all the functions.
Ex- Amoeba, paramecium, bacteria

(II) **Multicellular Organisms** :- Many cells grouped togather to perform different function in the body and also form various body parts. Ex- Fungi, plants, animals.

* The shape and size of cell are diffent according to the kind of function they perform. There is division of labour in cells.
* Each cell has certain kind of cell organelles to perform different types of function like mitochondria for respiration

Types of cells :-

There are two types of cells :-
(I) Prokaryotes
(II) Eukaryotes

Prokaryotes

* cells of organism lacks nuclear membrane.
* Nucleolus is absent.
* Single chromosomes
* Reproduction is always asexual.
* Always unicellular
* membrane bound cell organelles are absent.
* centriole is absent.
* cell division is by binary fission
  Ex- Bacteria, Blue green algae etc.

Eukaryotes

* cells of organism have nuclear membrane
* Nucleolus is present.
* Single or multi chromosomes.
* Reproduction is both sexual and asexual
* often multicellular.
* membrane bound organelles are present like mitochondria.
* centriole is present only in animal cell.
  cell division is by mitosis or meiosis
  Ex- Fungi, plant cell, Animal cell etc.

Difference between Animal cell and plant cell :-

Animal cell	Plant cell
* cell wall is absent	cellwall is present
* Plastids are absent	Plastids are present.
* centrioles are present	centrioles are absent
* Golgi bodies are present	Golgibodies are present
* vacuoles are absent.	vacuoles are present
* If present, they are small.	and large in size.
* centrosome is present with one or two centrioles	centrosome is absent.

Diffusion :-

* The spontaneous movement of a substance from a region of high concentration to the region of low concentration is called diffusion.

* Some substances like carbon dioxide or Oxygen can move across the cell membrane by a process called diffusion. cell also obtains nutrition from the environment.

Osmosis

* The movement of water molecules through selectively permeable membrane along the concentration gradient is called osmosis.
* Plant cell tend to obtain water through osmosis.

Hypotonic Or Hypertonic Or Isotonic Solution

What happened to cell in sugar or salt solution?

Name of the Solution	Condition	Result
Hypotonic Solution	Medium surrounding cell has higher water concentration than cell.	Cell will gain water by osmosis and likely to swell up.
Isotonic Solution	Medium has exactly same water concentration as the cell	water crosses the cell membrane in both direction cell will stay the same size.
Hypertonic Solution	Medium has lower concentration of water than the cell	water crosses the cell in both direct ions, but more wate leaves the cell than enter it

Plasma membrane or cell membrane

* This is the outermost covering of the cell that separates the contents of the cell from its external environment.
* The plasma membrane allows or permits the entry and exit of some materials in and out of the cell.
* It also prevents movement of some other materials. The cell membrane is called selectively permeable membrane

Properties of plasma membrane.

* It is flexible (made up of organic molecules called lipids and proteins)
* Its flexibility enables cell to engulf in food and other from the external environment. This process is called endocytosis. Amoeba acquire food through this process.

Functions of plasma membrane

* It permits the entry and exit of some materials in and out of the cell.
* It prevents movement of some other materials not required for the cell as it acts like selectively permeable membrane.

Cell wall

* Cell wall is another rigid outer covering in addition to the plasma membrane found in plant cell. The cell wall lies outside the plasma-membrane.
* The plant cell wall is mainly composed of cellulose. cellulose is a complex substance which provides structural strength to plants.

Function of cell wall

* Cell walls permits the cells of plants, fungi and bacteria to withstand very dilute (hypotonic) external media without bursting.
* In such media the cells tend to take up water by osmosis. The cell swells, building up pressure against the cell wall. The wall exerts an equal pressure against the swollen cell.
* Because of cell wall, cells can withstand much greater changes in the surrounding mediums than animal cells.

Plasmolysis :-

When a living plant cell loses water through osmosis there is shrinkage or contraction of contents of the cell away from the cell wall. This phenomenon is known as plasmolysis.

Nucleus :-

It is called the brain of the cell as it controls all the activities of cell.

composition of nucleus :-

* The nucleus has a double layered covering called nuclear membrane.
* The nuclear membrane has pores which allow the transfer of material from inside the nucleus to the cytoplasm.
* The nucleus contains chromosomes, which are visible as rod-shaped structures only when the cell is about to divide.

Function of nucleus :-

* The nucleus plays a central role in cellular reproduction. It is the process by which a single cell divides and forms two new cells.

Cytoplasm :-

* The cytoplasm is the fluid contents inside the plasma membrane.

Function of cytoplasm:-

* It helps in exchange of material between cell organelles.
* It acts as store of vital chemicals such as amino acid, glucose, vitamins and iron etc.
* It is the site of certain metabolic pathways such as glycolysis.

Endoplasmic Reticulum (ER)

* The endoplasmic reticulum (ER) is a large network of membrane bound tubes and sheets.
* It looks like long tubules or round or oblong bags (vesicles)

Types of Endoplasmic Reticulum.

(I) Rough endoplasmic reticulum (RER)
(II) Smooth endoplasmic reliculum (SER)

Function of Endoplasmic reticulum.

* RER looks rough under a microscope because it has particles called ribosomes attatched to its surface. The ribosomes, which are present in all active cells, are the sites of protein manufacture.
* SER helps in the manufacture of fat molecules, or lipids.

Golgi Apparatus

* The Golgi apparatus consists of a system of membrane-bound vesicles arranged parallel to each other in stacks called cisterns.
* These membranes often have connection with the membranes of ER and therefor constitute another portion of a complex cellular membrane system.

Function of Golgi body

* Its functions include the storage, modification and packaging of products in vesicles. In some cases, complex sugars may be made from simple sugars in the Golgi apparatus.
* The Golgi apparatus is also involved in the formation of lysosomes

Lysosomes:-

* Lysosomes are a kind of waste disposal system of the cell.
* It helps to keep the cell clean by digesting any foreign materials as well as worn out organelles

Functions of Lysosomes.

* Lysosomes break foreign materials entering the cell, such as bacteria or food as well as old organelles in to small pieces.

* During the disturbance in cellular metabolism such as when the cell gets damaged, lysosomes may burst and the enzymes digest their own cell. Therefore, lysosomes are also known as 'suicide bags' of a cell.

Mitochondria

Mitochondria are known as the powerhouses of the cell.

Structure of mitochondria

* Mitochondria have two membrane coverings.
* The outer membrane is very porous while the inner membrane is deeply folded.
* These folds create a large surface area for ATP-generating chemical reactions.

Functions of mitochondria

* The energy required for various chemical activities needed for life is released by mitochondria in the form of ATP (Adenosine triphosphate) molecules.
* ATP is known as the energy currency of the cell. The body uses energy stored in ATP for making new chemical compound and for mechanical work.

* Mitochondria have their own DNA and ribosomes. Therefore mitochondria are able to make some of their own proteins.

Plastids :-

* Plastids are present only in plant cells.
* There are three types of plastids.
(i) Chromoplasts (coloured plastids)
(ii) Leucoplasts (white or colourless)
(iii) Chloroplasts (contains the green pigment chlorophyll)
also
* Plastids have their own DNA and ribosomes like mitochondria and similar to its structure.

Function of plastids

* Chloroplasts are important for photosynthesis in plants.
* Chloroplasts also contain various yellow or orange pigment in addition to chlorophyll.
* Leucoplasts are primarily organelles in which materials such as starch oil and protein granules are stored.

Vacuoles :-

* Vacuoles are storage sacs for solid or liquid contents

* They are small sized in animal cells while plant cells have very large vacuoles.

Function of vacuoles :-

* The central vacuole of some plant cells may occupy 50-90% of the cell volume.
* The plant cells vacuoles are full of cell sap and provide turgidity and rigidity to the cell.
* In single-celled organisms like Amoeba, the food vacuole contains the food items that the Amoeba has consumed.

NOTE :- * DO your work in register.
* Draw all figures which are related to the topic (If NCERT Science book is available.
* Try to solve all intext questions of same lesson.