

CHAPTER 2 :- Cell : The Unit of Life.

Good morning students

This lesson is of class 8 for the subject of Biology.
Topic - Structure of Cell which is covered in
Ch. 2 Cell : The Unit of Life starting on Page no 7
of your text book titled - Concise Biology - Selina
Publications and is being submitted to you on
11.11.2024 This voice is of Nidhi Rana.

So, dear children, please open your book at
Page No 11 and pay attention as I am going
to explain you the structure of a cell.

Cells, whether of a plant or animal, consists of
3 main regions -

- i Cell membrane or plasma membrane - which is an
extremely thin outer boundary of cytoplasm
- ii Cytoplasm - a transparent, fluid jelly like
substance inside cell membrane
- iii Nucleus - present in the centre of the cell and
is chief controlling centre of the cell.

Children the cytoplasm of a cell contains a number
of tiny structures or organs called cell organelles.
These cell organelles have definite shape, structure
and these cell organelles perform
specific functions of a cell.

Let us now describe and discuss these
cell organelles in detail one by one.

Children you may please look at Fig 2.7 showing
a generalised structure of a cell, as I discuss the
cell organelles with you

i Cell membrane or Plasma membrane

- 1) Every cell is surrounded by a cell membrane that forms the outer covering of a cell.
- 2) Cell membrane is a living structure made up of lipoproteins i.e. lipids and proteins
- 3) Cell membrane has fine pores through which selective substances may enter or leave the cell. Thus, the cell membrane is selectively permeable or in other words we can say it allows only certain substances to pass through it while it prevents certain other substances to pass through.

ii Cell wall

- 1) Plant cells have a cell wall surrounding the cell membrane. Cell wall is lacking in animal cells.
- 2) Cell wall is made up of cellulose
- 3) Cell wall gives shape and rigidity to the cell.
- 4) Cell wall is freely permeable allowing every kind of substances to pass through it, thus allowing substances to enter and leave the cell without any hindrance.

iii Cytoplasm

Cytoplasm occupies the major part of the cell within the cell membrane. It is a living component of a cell, consisting of transparent semifluid granular substance. Water is the main component of cytoplasm, in addition proteins, fats, carbohydrates and inorganic

substances may be present. Various chemical reactions take place in the cytoplasm.

As mentioned earlier a number of cell organelles are present in the cytoplasm. like mitochondria, endoplasmic reticulum, plastids etc.

Now before learning about the details of these organelles let us recapitulate quickly what we have learnt by means of a short test.

I will ask you a few questions, you may pause the audio for 3 minutes to write down their answers in your notebook. Questions are as follows

Q.1 Name the small part of a cell that performs specific functions in a cell.

Q.2 Name one cell organelle present in Plant cell but absent in animal cell.

Q.3 State one difference between cell wall and cell membrane.

You may now pause the audio for 3 minutes

3 minutes break is over. Welcome back children

First listen to the answers of the question being asked to you

A1 'Organelle' is the small part of a cell that performs specific functions in a cell.

A2 'Cell wall' is present in Plant cell but absent in animal cell

A3 Cell wall is non living and freely permeable. Cell membrane is living and semi permeable.

1 Now let us continue further with the discussion of cell organelles embedded in the cytoplasm.

1. Endoplasmic Reticulum Children you may please repeat after me E-NDO-PLAS-M-IC R-E-T-I-C-U-L-U-M

1) Endoplasmic Reticulum is an irregular network of double membranes distributed over the entire cytoplasm in a cell.

2) At its outer end, endoplasmic reticulum is connected with the cell membrane and at its inner end it is connected with the nuclear membrane.

Children you may please look at the Fig 2.7 showing a generalised animal / plant cell and carefully look at the structure and position of Endoplasmic reticulum. You may also observe the two types of endoplasmic reticulum being labelled in the diagram as -

Rough Endoplasmic Reticulum and
Smooth Endoplasmic Reticulum

3) Endoplasmic reticulum appears rough when small granules called 'ribosomes' are attached to it and hence it is called Rough Endoplasmic reticulum.

Endoplasmic reticulum without Ribosomes is called smooth endoplasmic reticulum.

Function of Endoplasmic reticulum - It forms the supporting framework of the cell and also serve as a pathway for distribution of materials from one

part of cell to the other.

2. Ribosomes are tiny granules (rich in RNA and proteins) scattered freely in the cytoplasm or attached to the membranes of endoplasmic reticulum. function - Ribosomes are the sites of protein synthesis. RNA i.e. Ribonucleic Acid present in them help in protein synthesis

3. Mitochondria All of you may repeat after me M-I-T-O-C-H-O-N-D-R-I-A are rod shaped structures surrounded by a double membrane. The outer membrane is smooth and the inner one is folded into a large number of finger like structures called cristae. Cristae increase the surface area of the inner membrane, thereby providing more area for the metabolic reactions to take place. Function - Mitochondria contains enzymes for catalysing biochemical reactions involved in respiration and energy is produced in the process. For this reason, mitochondria are called the 'power house of the cell'. This energy is stored in the form of an energy rich compound ATP Adenosine Triphosphate and used in various life activities. Mitochondria contain DNA which can replicate.

4. Golgi Apparatus consists of smooth, flattened membrane bound double walled sac like structures called cisternae

Cisternae are usually placed one above the other in parallel rows. Golgi apparatus is frequently surrounded by vesicles of different shapes. In plants, Golgi apparatus is present in the form of subunits i.e. smaller and more scattered groups of cisternae and vesicles, hence is called dictyosomes in plants.

function - Golgi apparatus and dictyosomes are concerned with secretions of the cell including enzymes, hormones etc. and their packaging and transport to different sites within the cell.

5. Lysosomes are small, spherical bodies surrounded by single walled membrane. They contain powerful enzymes capable of breaking down or digesting the foreign substances around them. Lysosomes digest the food during unfavourable conditions when food is unavailable to the cell. Also, many damaged cells are rapidly destroyed or dissolved by their own lysosomes, thus serving as an intracellular digestive system, hence these are also called the "suicide bags".

Now it's the break time children. Answer the following questions during the break.

Q1. Name the following cell organelles -

- i) Organelle which is the site of protein synthesis
- ii) Organelle which is called the Power house of cell.
- iii) Organelle which is called the suicidal bag.

You may pause the audio for 3 minutes now and write down the answers of the questions asked to you in your notebooks.

Break is over. First listen to the correct answers.

A1 Ribosomes are the site of protein synthesis

A2 Mitochondria are called the Power house of the cell

A3 Lysosomes are called the suicidal bags.

Now let us resume with the discussion of cell organelles. Next organelle is -

6. Centrosome and centrioles. These are present in animal cell only. Centrosome is a small structure situated close to the nucleus. It is the area in which short bundles of microfilaments, called the centrioles, are arranged at right angles to each other. function During cell division the centrioles develop a number of radiating threads or rays - called spindle fibres. thus, they initiate and regulate cell division.

7. Plastids are present only in Plant cell.

and are the largest cytoplasmic organelle ... readily visible under a light microscope.

On the basis of pigments present in plastids plastids are of 3 types -

i. Leucoplast - Leucoplasts are colourless plastids. They have no pigments. They store starch. For eg - Cells of potato have lots of leucoplasts in them.

ii. Chromoplasts. These are variously coloured plastids - yellow, orange, red etc. They are mostly present in petals of flowers, and in fruits. Colouring pigments associated with plastids

are - xanthophyll i.e. yellow in colour and Carotene i.e. orange-red in colour.

There are certain other colouring pigments which are not associated with plastids rather they remain dissolved in the cell sap and give red purple and blue colour to different plant parts especially in fruits and vegetables. An example of such pigments are the anthocyanins.

Chloroplasts are green coloured plastids containing green pigment called chlorophyll. Chloroplasts are abundant in plant parts exposed to light. For eg. leaves contain numerous chloroplasts.

function - Chloroplasts trap the solar energy which is used to manufacture food by the plants during photosynthesis. Thus chloroplasts are the sites of photosynthesis and are helping the plants to prepare their food.

Now we will discuss some non-living substances or cell inclusions -

Cell inclusions - As a result of cell metabolism, a number of non-living substances are present in the cytoplasm like

- i. Granules : are small particles present in cytoplasm which include reserved food materials like starch, glycogen, fats etc.
2. Vacuoles - are certain clear spaces in cytoplasm filled with water and various substances in solution.

In plant cells vacuoles are quite large and few in number and contain a liquid inside them called the cell sap. Vacuoles are surrounded by a single membrane called tonoplast. In animal cells vacuoles are smaller in size and less prominent.

Now children let us talk about the most prominent part of the cell i.e. the Nucleus.

Nucleus is the most important part of the cell as -

- 1) It regulates and coordinates various life processes of the cell
- 2) It plays an important role in cell division.
- 3) It contains hereditary factors or genes that carry the genetic characteristics from parents to offsprings.

Nucleus is a small spherical mass located in the centre of the cell. A nucleus shows following components -

- i) Nuclear membrane that separates the nucleus from cytoplasm. Nuclear membrane is perforated by several nuclear pores which allow exchange of materials between nucleus and cytoplasm
- ii) Nucleoplasm - is present within the nuclear membrane. It is a fluid in which chromatin and nucleoli are suspended.
- iii) Nucleoli are spherical bodies present inside the nucleus. Usually one nucleolus is present in the nucleus. Some cells have more than

one nucleolus or nucleoli. The number of nucleoli in a cell is fixed. Nucleolus participates in protein synthesis.

- iv) Chromatin fibres - In the nucleoplasm there are certain network of threads which form the chromatin fibres. Chromatin material mainly consists of DNA (i.e. deoxyribonucleic acid). During cell division chromatin fibres become distinctly visible into rod like bodies called the chromosomes. Thus chromosomes are made up of chromatin fibres which are composed of hereditary units called the genes and genes are further made up of DNA. The size, shape and number of chromosomes is variable in different organisms. The chromosome number is constant for a particular species. You may see the chromosome numbers of some common animals and plants given on Page 14 of your text book. Further, it is the genes not the number of chromosomes that determine the characteristics of a species. For eg. lion, tiger and house cat all have 38 chromosomes but they look different due to different genes located on their chromosomes.

function. Chromosomes carry genetic characters from parents to the offsprings. Somebody must have told you that you look like your father or mother, this is because you have inherited genes from your parents.

Children depending upon the presence or absence of nuclear membrane, cells are of two types -

Prokaryotic Cells in which nuclear membrane is absent are called prokaryotic cells. They have nuclear material called chromatin fibres which occur freely in the central region of the cytoplasm called nucleoid. Eg. in bacteria.

Eukaryotic cells in which double nuclear membrane is present. We say that a true nucleus is present in eukaryotic cells. For eg. Plant and animal cells.

Children now let us conclude our discussion here. Hope you all have understood the structure and functions of various cell organelles. Now I will give you some home assignment questions. All students are required to answer these home assignment questions in their notebooks.

Home assignment questions are as follows -

- Q1 Read and Learn Table 2.1 which summarizes the various cell organelles, their characteristics and functions. Draw the Table in your notebook.
- Q2 Draw a well labelled diagram of -
 - (i) A Plant Cell (Fig 2.7B)
 - (ii) A animal cell (Fig 2.7A)in your notebooks
- Q3 Draw a well labelled diagram of structure of Nucleus [Fig 2.8A]