

CHAPTER – 5

CELL: THE UNIT OF LIFE

A cell is the common basic structural and functional unit of living beings. Cells are unicellular, like amoeba, paramecium, euglena or multicellular. According to M.J. Schleiden and Theodore Schwann all plants are composed of cells and cell is the basic unit of life.

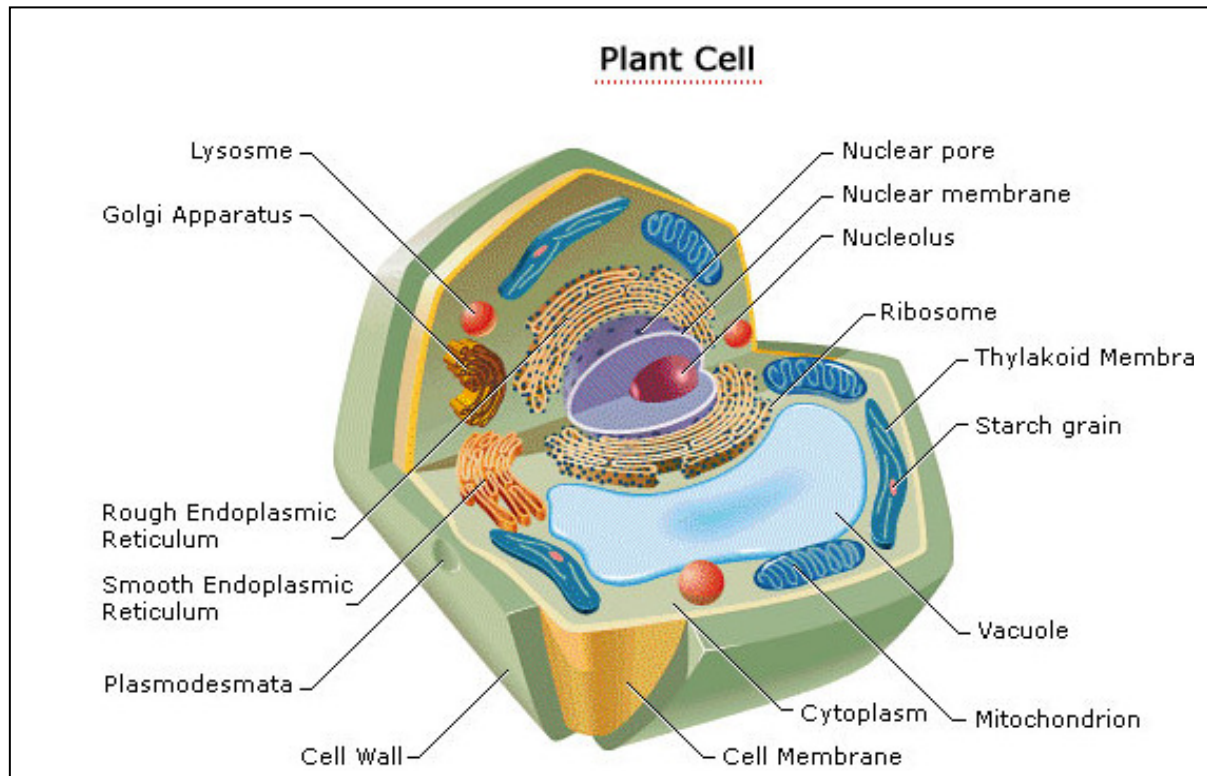
Modern Cell Theory:

All organisms are made up of cells and all vital functions of an organism take place within the cell. Cells originate only through division of cells. Every organism starts its life as a single cell. Small size of cell gives greater surface area, which helps in diffusion of nutrients into the cell, exchange of materials in and out of the cell and also easy repair of damaged cells.

The Shape of a Cell:

This is related to its function. Within a cell, specific functions are performed by different components. The different parts of the cell are the

cell wall (absent in animal cell), plasma membrane, cytoplasm and cell organelles.



Plasma Membrane:

Every cell is bound by a thin covering which separates it from external environment. This is known as plasma membrane. It is a living, very delicate elastic membrane, made up of lipid bilayer with integrated protein molecules and is also referred to as a 'number of protein ice-berg floating in the sea of lipids'.

The organisation of plasma membrane is not fixed and therefore it is flexible. It helps in the entry of useful molecules like water, salt and oxygen, it helps in protecting enzymes and proteins in the cell, it allows waste and other secretion like carbon dioxide to leave the cell and maintains constant internal environment.

Osmosis is the passage of water, from an area of high water concentration through the plasma membrane, to an area of low water concentration. Diffusion also helps in exchange of materials in and out of the cell without spending energy.

Cell Wall:

Plant cells have another rigid and outer covering called cell wall, made up of cellulose, it gives protection to the cells and determines its shape.

Cytoplasm:

The fluid which lies between the plasma membrane and nucleus is called cytoplasm, it is a jelly like substance and is constantly moving. Cellular chemical reactions take place there; it also stores important substances like amino acids, glucose and vitamins.

Cell Organelles:

They are organs of the cells and perform specific functions :

Nucleus:

It is large and spherical and is in the centre of the cell. It not only controls all cellular activities, but also plays an important role in cell division. Chromatin fibres are very thin thread like structures made up of DNA and transfer hereditary information from one generation to another. Genes are the functional augments of the DNA; it controls metabolic activities of the cell.

Endoplasmic Reticulum:

It is a large network of membranes that spread from the nuclear membrane to the plasma membrane. There are two types of endoplasmic reticulum:

- (i) Rough endoplasmic reticulum has particles called ribosomes, which help in protein synthesis.
- (ii) Smooth endoplasmic reticulum, does not contain ribosomes and help in the manufacture of lipids or fat molecules.

Golgi Apparatus:

These are sacs known as cisternae which are filled with enzymes. They are the secretory organs of the cell and they help in the formation of cell wall, plasma membrane and lysosomes.

Lysosomes:

They are one membrane bound sacs and are the cells water disposal system. They remove worn out cellular organelles and are called demolition squads. They are also called suicide bags, because they digest damaged cells.

Mitochondria:

They are known as the power houses of the cell, they produce the ATP energy- rich compound.

Plastids:

They are chromoplasts (coloured plastids) and leucoplasts (white or colourless plastids) . Chloroplast helps in photosynthesis in plants.

Stroma:

It is colourless and contains photosynthetic enzymes DNA, ribosomes and starch granules.

Chromoplast gives colour to plants and fruits.

Vacuoles:

They are storage sacs and they help to maintain osmotic pressure of the cell. They store waste products and food in animal cell and provide turgidity and rigidity to plant cell.

Prokaryotic and Eukaryotic Cells:**Eukaryotic Cells:**

They have a well defined nucleus, and are large in size.

Prokaryotic cell :

They are without membrane bound organelles. They have plasma membrane, cytoplasm and nuclear materials. They are smaller in size.

QUESTIONS

I. Fill in the blanks:

- 1) Mitochondria produce molecules.

II. Name the part of the cell that:

- 1) Are visible during cell division-

III. Write whether True or False. If false correct them by changing one or two words and rewrite.

- 1) Cellulose is a protein.

IV. Write scientific reasons :

- 1) Lysosomes are called suicide bags.

V. Answer the following:

- 1) Where are genes located?

VI. Differentiate between :

- 1) Prokaryotic and Eukaryotic cells.

ANSWERS

I. Fill in the blanks:

- 1) Mitochondria produce **ATP** molecules.

II. Name the part of the cell that:

- 1) Are visible during cell division-

Ans.)

Chromosomes

III. Write whether True or False. If false correct them by changing one or two words and rewrite.

- 1) Cellulose is a protein.

Ans.)

False. (cellulose is a type of carbohydrate)

IV. Write scientific reasons :

- 1) **Lysosomes are called suicide bags.**

Ans.)

Lysosomes are called suicide bags:

- a) They digest the waste. They are one membrane sacs that are filled with digestive enzymes made by Rough Endoplasmic Reticulum. (RER)
- b) When a cell gets old and damaged the lysosomes burst, enabling the enzymes digest their own cells.
Hence they are called as suicide bags.

V. Answer the following:

1) Where are genes located?

Ans.)

- a) Genes are located in the DNA. DNA molecules transfers hereditary information from one generation to another.
- b) Genes are the functional segments of the DNA.
- c) Genes mostly control one or more cell function, but at times a single function is controlled by a set of genes.

VI. Differentiate between :

1) Prokaryotic and Eukaryotic cells.

Ans.)

Prokaryotic and Eukaryotic Cells:

Prokaryotic		Eukaryotic cells	
a)	They are not bound by membranes.	a)	They are bound by membranes.
b)	Their nucleus does not have nuclear membrane.	b)	They have a well defined nucleus.
c)	They have a single chromosome.	c)	They have more than one chromosome.
d)	They are smaller in size ranging from 1-10 μm .	d)	They are larger in size 5 to 100 μm .