



Chapter-8

Cell – Structures and Functions

Notes:

Cell

Cell is the basic structural and functional unit of life.

Bricks are the basic structural unit of buildings. Buildings, irrespective of its designs, shapes and sizes are made of bricks. Similarly, all organisms are made of cells. Similar cells group together to form tissue and perform a definite function. A group of tissues forms an organ. Similarly, many organs are grouped together to form an organism. Therefore, cell is called the basic structural unit of life.

A cell can perform all the activities of life such as nutrition, digestion, respiration, excretion, etc. Therefore, cell is called the functional unit of life.

Discovery of cell

Robert Hooke discovered cell in 1665 while observing thin slice of cork under a microscope. He also coined the term 'cell'.

Number of cells

- The number of cells in an organism may be one or it may run into billions and trillions.
- Organisms can be classified into two groups based on the number of cells they are made of. They are:-
 1. Unicellular organisms
 2. Multicellular organisms
- Organisms that are made of only one cell are called **unicellular organisms**. Example: *Amoeba*, *Paramecium*, etc.
- Organisms that are made of more than one cell are called **multicellular organisms**. Example: humans, trees, animals, etc.

Shape of cells

The shape of the cells are related to their specific functions they perform.

- Generally, cells are round, spherical or elongated, e.g., R.B.C.s of humans.
- Some are long and pointed at both ends, e.g., muscle cells.
- Some are branched, e.g., nerve cell or neuron.
- Some are irregular in shape, e.g., *Amoeba*, W.B.C.s of humans.

- The shape of the cells is provided by the plasma membrane in the animal cells. Whereas, in plant cells there is an additional covering over the plasma membrane called **cell wall**. It provides shape and rigidity to the cells.

Amoeba

It is an unicellular organism. It does not have a definite shape. Its shape keeps on changing due to the production of finger like projections called pseudopodia. Pseudopodia help in capturing of food and in locomotion.

Nerve cell

Nerve cells receive and transfer messages, thereby helping to control and coordinate the working of different parts of the body. Therefore, they are long and branched.

Size of the cell

- Most of cells are microscopic in size.
- The size of the cells is given in Micrometre or Micron. 1micrometre/micron = 1millionth of a metre.
- The smallest cell is 0.1-0.5 micrometre in bacteria.
- The largest cell is the egg of an ostrich measuring 170mmX130mm.
- The size of the cell has no relation with the size of the body of the organism.
- The size of the cell is related to its function. E.g., nerve cells both in the elephant and rat are long and branched.

Structure of the cell

The basic components of the cell are cell membrane, cytoplasm and nucleus.

Cell membrane

- It is the outermost boundary layer that separates the cell from its surrounding medium in the animal cell. However, it is surrounded by cell wall in the plant cells.
- It gives shape to the animal cell.
- It is porous and allows the movement of substances both inward and outward of the cell.

Cytoplasm

- It is the jelly like substance present between the cell membrane and the nucleus.
- Various cell organelles like mitochondria, plastids, Golgi bodies, ribosomes, vacuoles, etc. are present in the cytoplasm.

Nucleus

- It is spherical in shape and located in the centre of the cell.
- It is separated from the cytoplasm by nuclear membrane.
- It acts as a control centre of all the activities of the cell.
- The nuclear membrane is porous and allows the movement of materials between the cytoplasm and inside of the nucleus.
- There is a small spherical body inside the nucleus called nucleolus.
- Nucleus also contains thread like structures called chromosomes.
- Chromosomes carry genes and help in the transfer of characters from the parents to the offspring.
- Chromosomes can be seen only when the cell divides.

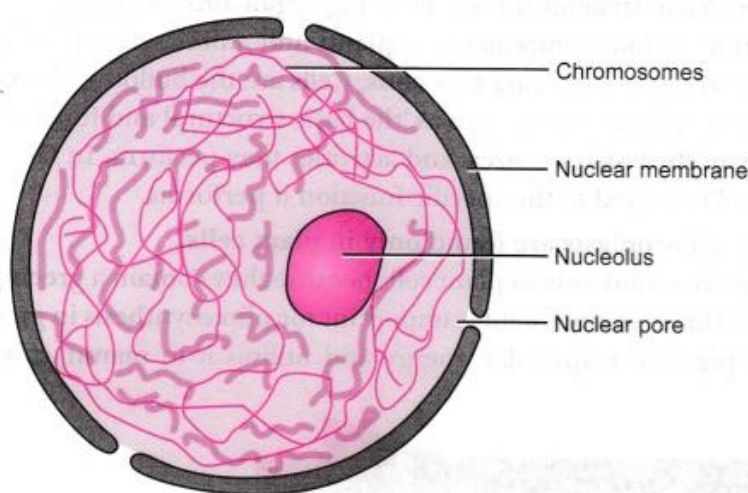


Fig: Nucleus

Genes

Genes is the unit of inheritance present on the chromosomes of the living organisms. It controls the transfer of a hereditary characteristic from parents to offspring.

Protoplasm

- The entire content of the living cell is known as protoplasm.
- It includes cytoplasm and the nucleus.
- It is called the living component of the cell.

Cell organelles

The membrane bound structures found in the cytoplasm of the cell are called cell organelles. E.g. Golgi Bodies, mitochondria, plastids, endoplasmic reticulum, ribosomes, vacuoles, etc.

Vacuole

- Vacuoles are membrane bound structures found in the cytoplasm.

- They look like blank structures when observed under the microscope.
- In mature plant cell vacuole is single and big. Whereas, in animal cells vacuoles are small and many.

Plastids

- Plastids are membrane bound cell organelles found in the plant cells.
- They are observed as coloured bodies under the microscope.
- They are of three types: leucoplasts-colourless plastids, chromoplasts- yellow or reddish coloured plastids and chloroplasts- green coloured plastids.
- **Chloroplasts** are green coloured plastids containing the green pigment called chlorophyll. They give green colour to the leaves. Chlorophyll helps in photosynthesis.

Types of cell

There are two types of cell depending upon the nature of the nucleus. They are:-

1. Prokaryotic cells
2. Eukaryotic cells

The cells in which the nuclear material is not surrounded by nuclear membrane are called prokaryotic cells. The organisms which are made of prokaryotic cells are called **prokaryotes** (pro: primitive; karyon: nucleus). Examples: bacteria and blue green algae.

The cells having well organized nucleus with a nuclear membrane are called eukaryotic cells. The organism which are made of eukaryotic cells are called **eukaryotes** (eu:true; karyon: nucleus). All organisms other than bacteria and blue green algae are eukaryotes.

Comparison of plant and animal cells

Sl. No.	Part	Plant Cell	Animal Cell
1	Cell membrane	Present	Present
2	Cell wall	Present	Absent
3	Nucleus	Present	Present
4	Nuclear membrane	Present	Present
5	Cytoplasm	Present	Present
6	Plastids	Present	Absent
7	Vacuole	Single and big	Small and many