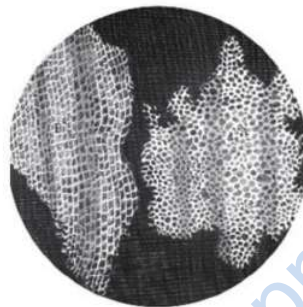


Chapter 8

Cell - Structure and Functions

Discovery of the Cell



Cork Cell observed by Robert Hooke

- The cells were first observed by English scientist Robert Hooke in 1665.
- He studied a piece of cork under the microscope and term it as a "Cell".
- In Latin cells mean "little room". The cells are very small and cannot be seen with a naked eye.
- Microscope with a greater magnifying power is used to study cells.

The Cell

- The cell is the structural and functional unit of life.
- There is a large number and variety of organisms around us.
- All of them have different shapes and sizes.
- All these living organisms are made from cells. So, the cells are the basic unit of life.

- Like a house, which is made up of many bricks and we can say that the basic unit of a house or a wall is the brick.
- In the same way, living organisms are made up of cells. Thus, the cells are the building blocks of plants and animals.

Variation of Cells in Organisms

◆ Number of cells in organisms:

- Unicellular organisms: The organisms which are made up of only one cell are called unicellular organisms. Example: Amoeba, paramecium, euglena, chlamydomonas and bacteria.
- Multicellular organisms: The organisms which are made up of many cells are called multicellular organisms. Examples: Most of the plants, animals, and human beings.

* Note: A human body has trillions (1 trillion = 1000 billion) of cells that vary in different shapes and sizes.

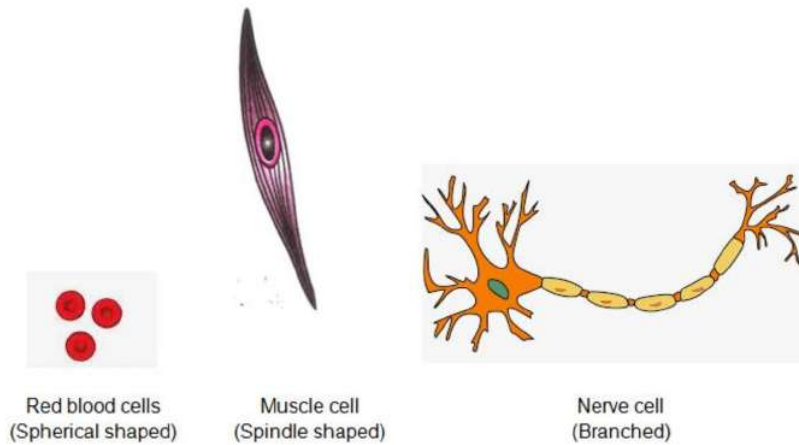
◆ Shape of Cells:

Amoeba is a single-celled organism with an irregular shape that keeps on changing. The projection protruding out of its body is called pseudopodia. It helps in movement and capturing food. The pseudopodia appear and disappear as amoeba feeds or moves.

⇒ Spherical Shape - Cells are generally round or spherical in shape. Ex: RBC

⇒ Spindle shaped - Some cells are spindle shaped (long and pointed at both ends). Ex: Muscle cells.

⇒ Branched - Some cells are branched. Ex: Nerve Cell



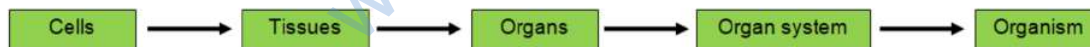
◆ Size of Cells:

The size of cell in living organisms may be as small as millionth of a meter or micrometer. They are only visible under very high magnifying microscope. Bacterial cell is the smallest cell with a length of 0.1 to 0.5 micrometer.

Some cells are big and can be seen easily with a naked eye. Example: Eggs of hens (birds). Each egg of a bird is a single cell. The biggest cell is the ostrich egg which measures about 17 cm long.

Note: In human, blood cells are the smallest and nerve cells are longest.

Cell Structure and Function



⇒ A group of similar cells performing a specific function is called tissue.

⇒ Tissues make up organs. Each organ in our body performs different functions.

⇒ Organs make up organ systems that work together to perform all the functions necessary to maintain life.

Parts of the Cell

◆ Cell Membrane:

Each cell is covered with a thin sheet of skin called a cell membrane or plasma membrane. The functions of the plasma membrane are:

- It provides protection and gives shape to the cell.
- It separates the cells from one another and also from the surrounding medium.
- Plasma membrane has tiny pores on it which allow the movement of substances into the cell or out of the cell.

◆ Cytoplasm:

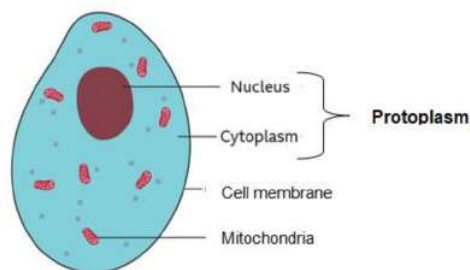
The jelly-like structure present between the cell membrane and nucleus is called cytoplasm. The cytoplasm contains smaller components called organelles. Some examples of cell organelles are mitochondria, Golgi bodies, ribosomes, endoplasmic reticulum, etc.

◆ Nucleus:

The nucleus is a large, spherical organelle present in all the cells (in the center of a cell). It is an important component of the living cell. The nucleus is separated from the cytoplasm by a membrane called a nuclear membrane. Like plasma membrane, the nuclear membrane is also porous and allows the movements of substances between the cytoplasm and inside the nucleus.

◆ Protoplasm:

The entire component of a cell is called protoplasm. The protoplasm includes cytoplasm, nucleus, and other cell organelles. It is called the living substance of the cell.



◆ Gene:

The nucleus contains thread-like structures called chromosomes. Chromosomes carry genes and transfer the heredity characters from parents to the offspring. So, the gene is a unit of inheritance in living organisms. In addition to chromosomes, the nucleus contains a small spherical body called the nucleolus. The nucleus controls all the activities of the cell.

◆ Cell Wall:

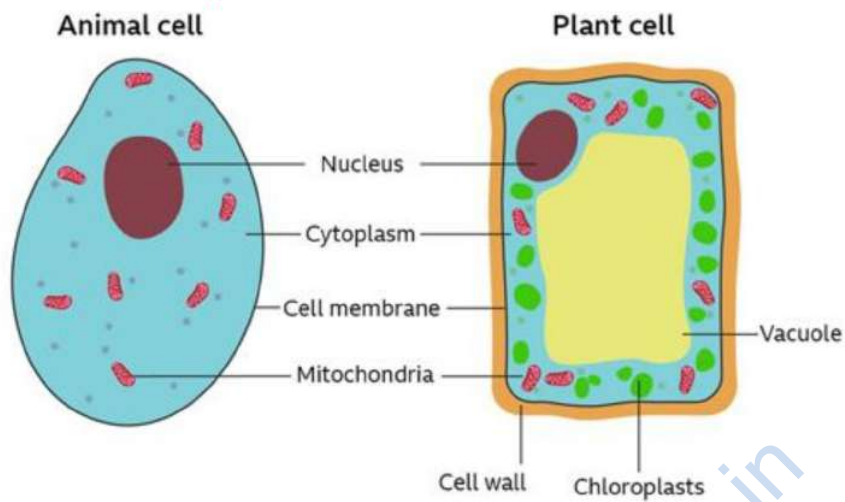
In plant cells, the cell membrane has an additional thick covering over it called a cell wall. This additional layer provides rigidity and protection to the plant cell.

◆ Chloroplast:

There are small colored bodies present in the cytoplasm called plastids which contain a green pigment called chlorophyll (which help in photosynthesis). The green-colored plastids present in the plant cell are called a chloroplast. Due to the presence of chloroplast, the leaves are green in color. The red color of tomatoes is due to the presence of red coloured plastids in their cells.

Prokaryotic cell	Eukaryotic cell
Size of a cell is generally small (1 – 10 μm).	Size of a cell is generally large (5 – 100 μm).
Nucleus is absent. Nucleoid is present which is not surrounded by the nuclear membrane.	Nucleus is absent. Nucleoid is present which is not surrounded by the nuclear membrane.
It contains a single chromosome.	It contains more than one chromosome.
Membrane bound cell organelles are absent.	Membrane bound cell organelles (mitochondria, endoplasmic reticulum, Golgi bodies, lysosomes, etc.) are present.
Cell division takes place by the process of fission or budding.	Cell division takes place by mitosis and meiosis.

Comparison of Plant and Animal Cells



Animal Cell	Plant Cell
Animal cells are small in size.	Plant cells are generally larger than animal cells.
Animal cells are enclosed by the plasma membrane. The cell wall is absent.	In addition to plasma membrane plant cell is surrounded by a rigid cell wall of cellulose.
Plastids are absent.	Plastids are present in plant cells.
In animal cells vacuoles are small, many and temporary.	In plant cells vacuoles are large, fewer and permanent.
Animals cells have a single Golgi apparatus near the nuclear envelope.	Plant cells have many Golgi apparatus scattered in the cytoplasm.
Animal cells have centrosome and centrioles.	Plant cells lack centrosome and centrioles.