Class Notes

Class: IX	Subject: Biology
Topic: Ch. 5 The fundamental unit of life.	Prepared by: Bharati Mandal

The Fundamental Unit of Life: Cell
Cell is the structural and functional unit of life.
Cell is termed as the structural unit of life as it provides structure to our body.
Cell is considered as the functional unit of life as all the functions of the body take place at cell level.

Discovery of cell:

- Cell was discovered by Robert Hooke in 1665.
- Robert Brown in 1831 discovered the nucleus in the cell.
- Anton Van Leuwenhoek discovered protozoa and bacteria.
- Schleiden and Schwann (1838-39) proposed cell theory.

Cell Theory:
Schleiden and Schwann together produced the cell theory. This theory, however, did not explain how new cells are formed.Rudolf Virchow in 1855 first contributed that cells divide and that new cells were formed from pre- existing cells (*Omnis cellula- e cellula*). He altered the hypothesis of Schleiden and Schwann to give cell theory a final and concluding form.

Cell theory states that:

→ All living organisms are composed of cells.

→ Cell is the fundamental unit of life.

→ All new cells come from pre-existing cells.

Types of Organisms on the Basis of Number of Cells
There are two kinds of organisms on the basis of cells:
(i) Unicellular Organisms: The organisms that are made up of single cell and may constitute a whole organism, are named as unicellular organisms.For example: Amoeba, Paramecium, bacteria, etc.

(ii) Multicellular Organisms: The organisms which are composed of a collection of cells that assume function in a coordinated manner, with different cells specialized to perform particular tasks in the body, are named as multicellular organisms.For example: Plants, human beings, animals, etc.

Shape and Size of Cells
→ Cells vary in shape and size. They may be oval, spherical, rectangular, spindle shaped, or totally irregular like the nerve

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cell.

→ The size of cell also varies in different organisms. Most of the cells are microscopic in size like red blood cells (RBC) while some cells are fairly large like nerve cells.

Types of Cells

The cells can be categorized in two types:

1. Prokaryotic Cell 2. Eukaryotic Cell

1. Prokaryotic cell

Prokaryotic cells are cells in which true nucleus is absent. They are primitive and incomplete cells. Prokaryotes are always unicellular organisms. For example, archaebacteria, bacteria, blue green algae are all prokaryotes.

2. Eukaryotic Cell

Eukaryobc cells are the cells in which true nucleus is present. They are advanced and complete cells. Eukaryotes include all living organisms (both unicellular and multicellular organisms) except bactera and blue green algae.

Difference Between Prokaryotic and Eukaryotic Cells:

S. No.	Prokaryotic cell	Eukaryotic cell
1.	Size of cell is generally small (1-10 mm).	Size of cell is generally large (5-100 mm).
2.	Nucleus is absent.	Nucleus is present.
3.	It contains single chromosome.	It contains more than one chromosome.

Structure of Cell

Cell is generally composed of three basic components:

1.Cell wall and cell membrane

2. Nucleus

3. Cytoplasm

1. Plasma/Cell membrane: This is the outermost covering of the cell that separates the contents of the cell from its external environment.It is thin,flexible,living and selectively permeable in nature.

This membrane is composed of a phospholipid bilayer implanted with proteins.

The description of the structure of plasma membrane can be carried out through the **fluid mosaic model** (proposed in 1972 by Garth L. Nicolson and S.J. Singer) as a mosaic of cholesterol, carbohydrates, proteins and phospholipids.

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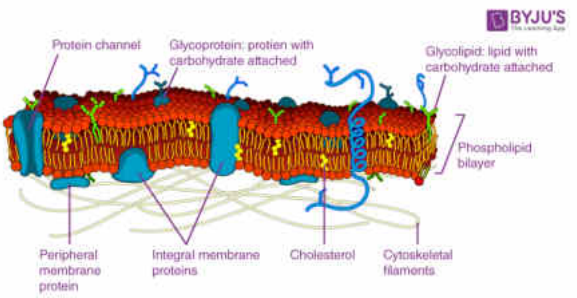
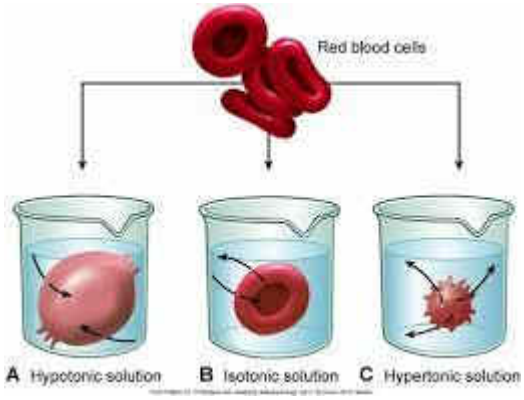


Some substances like CO_2 or O_2 gases can move across the cell membrane by a process called **diffusion**. The movement of water molecules (liquid) through such a selectively permeable membrane is called **osmosis**. Osmosis is the passage of water from a region of high water concentration through a semi-permeable membrane to a region of low water concentration.

If the medium surrounding the cell has a higher water concentration than the cell, the cell will gain water by osmosis. Such a solution is known as a hypotonic solution.
If the medium has exactly the same water concentration as the cell, there will be no net movement of water across the cell membrane. Such a solution is known as an isotonic solution.
If the medium has a lower water concentration then the cell will lose water by osmosis. Such a solution is known as a hypertonic solution.



The flexibility of cell membrane also enables the cell to engulf in food and other material from its external environment. Such process is known as endocytosis. It is observed in Amoeba.

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