THE FUNDAMENTAL UNIT OF LIFE

SCIENTIA SUMMARY SCIENTIA

- All living organisms are made of cells. **Marcello Malpighi,** proposed that plants are made of tiny structural units called **'Utricles'**. **Robert Hooke** observed many tiny, hollow, room- like structures in a thin slice of cork through a compound microscope and called them cells.
- **Leeuwenhoek,** in 1674, with the improved microscope, discovered free-living cells in pond water for the first time.
- **Robert Brown** in 1831 discovered the nucleus in the cell. **Purkinje** in 1839 coined the term 'protoplasm'.
- **Schleiden** in 1838 and **Schwann** in 1839 proposed the cell theory that all plants and animals are composed of cells.
- **Rudolf Virchow** in 1855 further expanded the cell theory by saying **omnis cellula-e-cellula,** which means all cells arise from pre-existing cells.
- Cell is derived from the Latin word **"cellula"** which means "a little room".
- **Compound microscope** consists of a stage where the specimen is placed under an objective piece. The light reflected from the mirror passes onto the object. From the eye piece, a magnified image of the specimen is seen.
- The **microscopic examination of a plant cell** includes peeling off the thin layer using forceps.Spread the peel, put a drop of water and saffranin solution to it. Small chamber-like structures called cells can be observed.
- **Unicellular organisms** have single cells. While, **multicellular organisms** have multiple cells. All cells work as a team for the body through **division of labour.**
- In **Amoeba,** a single cell is responsible for movement, intake of food, exchange of gases and excretion.
- **Prokaryotes** do not have a nuclear membrane and membrane bound organelles. **Eukaryotes** have a membrane bound nucleus and organelles.
- **Structure of bacteria** consists of cell wall, plasma membrane and cytoplasm. **Flagella** are responsible for motility. The **nucleoid** is a circular DNA molecule that regulates all the functions of the cell.
- **Difference between Prokaryotic and Eukaryotic organisms** includes prokaryotic DNA is not bounded by a nuclear membrane, while eukaryotic DNA is bounded by a nuclear membrane.
- **Cell wall** is the outermost, non-living and rigid layer, seen in a plant cell.
- **Plasma membrane** is selectively permeable.
- **Diffusion** is spontaneous movement of gases from a region of high concentration to a region of low concentration.

- **Osmosis** is diffusion of solvent molecules through a semi-permeable membrane from a region of low concentration to high concentration.
- If the medium surrounding the cell has a higher water concentration than the cell, called **hypotonic solution**, the cell gains water by osmosis and swells. If the medium has the same water concentration as the cell called **isotonic solution**, there is no net movement of water through the membrane and the cell stays the same size. If the medium has a lower concentration of water than the cell called **hypertonic solution**, the cell loses water by osmosis and then shrinks.
- **Plasmolysis** is the shrinking of the cell away from the cell wall. **Nucleus** is the control centre of the cell.
- **Cytoplasm** is the fluid living content between the plasma membrane and the nucleus.
- **Protoplasm** is the nucleus along with the cytoplasm that makes up the living content of the cell.
- **Cytosol** is the liquid part of the cytoplasm other than the organelles.
- **Endoplasmic reticulum** is the protein synthesizing site of the cell.
- **Ribosomes** are small granules that synthesize proteins.
- **Golgi apparatus** is the site for storing and transporting proteins across the cytoplasm.
- **Mitochondria** is the power house of the cell.
- **Lysosomes** are known as suicide bags as these enzymes destroy injured or old organelles and foreign substances like bacteria.
- **Vacuoles are** storage units in cells**.**
- **Chromoplasts** are colored plastids and **leucoplasts** are colorless plastids.
- **Difference between Plant cell and animal cell** includes size, vacuole, cell wall and chloroplasts.