

9th Class

➤ The Cell

- ❖ **Introduction to Cells:** Cells are the basic structural and functional units of life. All living organisms are composed of one or more cells. Cells can vary greatly in size, shape, and function.
- ❖ **Cell Theory:** The cell theory is a fundamental concept in biology that states

- All living organisms are composed of cells.
- The cell is the basic unit of structure and function in living organisms.
- All cells arise from pre-existing cells.

❖ **Types of Cells:** There are two main types of cells:

- **Prokaryotic Cells:** These cells lack a true nucleus and membrane-bound organelles. They are simpler in structure and are found in organisms like bacteria and archaea.
- **Eukaryotic Cells:** These cells have a true nucleus and membrane-bound organelles. They are more complex and are found in organisms like plants, animals, fungi, and protists.

❖ **Cell Structure:**

1. **Cell Membrane:** The outer boundary of the cell that regulates the passage of substances in and out of the cell.
2. **Nucleus:** The control center of the cell that contains genetic material (DNA) and regulates cell activities.
3. **Cytoplasm:** The jelly-like substance within the cell that contains organelles and where many cellular processes occur.
4. **Organelles:** Specialized structures within the cell that perform specific functions. Examples include:
 - **Mitochondria:** Powerhouses of the cell involved in energy production (ATP synthesis).
 - **Endoplasmic Reticulum (ER):** Involved in protein and lipid synthesis.
 - **Golgi Apparatus:** Modifies, sorts, and packages proteins for secretion or transport.

- **Lysosomes:** Vesicles containing digestive enzymes for breaking down waste materials.
- **Chloroplasts (in plant cells):** Site of photosynthesis, where light energy is converted into chemical energy (glucose).
- **Vacuoles (in plant cells):** Storage sacs for water, nutrients, and waste products.

❖ **Cell Division:**

- **Mitosis:** The process by which eukaryotic cells divide to produce two identical daughter cells. It is essential for growth, repair, and asexual reproduction.
- **Meiosis:** The process by which specialized cells called gametes (sperm and egg cells) are produced. It involves two rounds of cell division and results in cells with half the number of chromosomes as the parent cell.

Conclusion: Understanding the structure and function of cells is crucial in biology as it provides insights into the mechanisms of life processes and the basis of various diseases and treatments. The study of cells forms the foundation of modern biology and has numerous applications in medicine, biotechnology, and other fields.