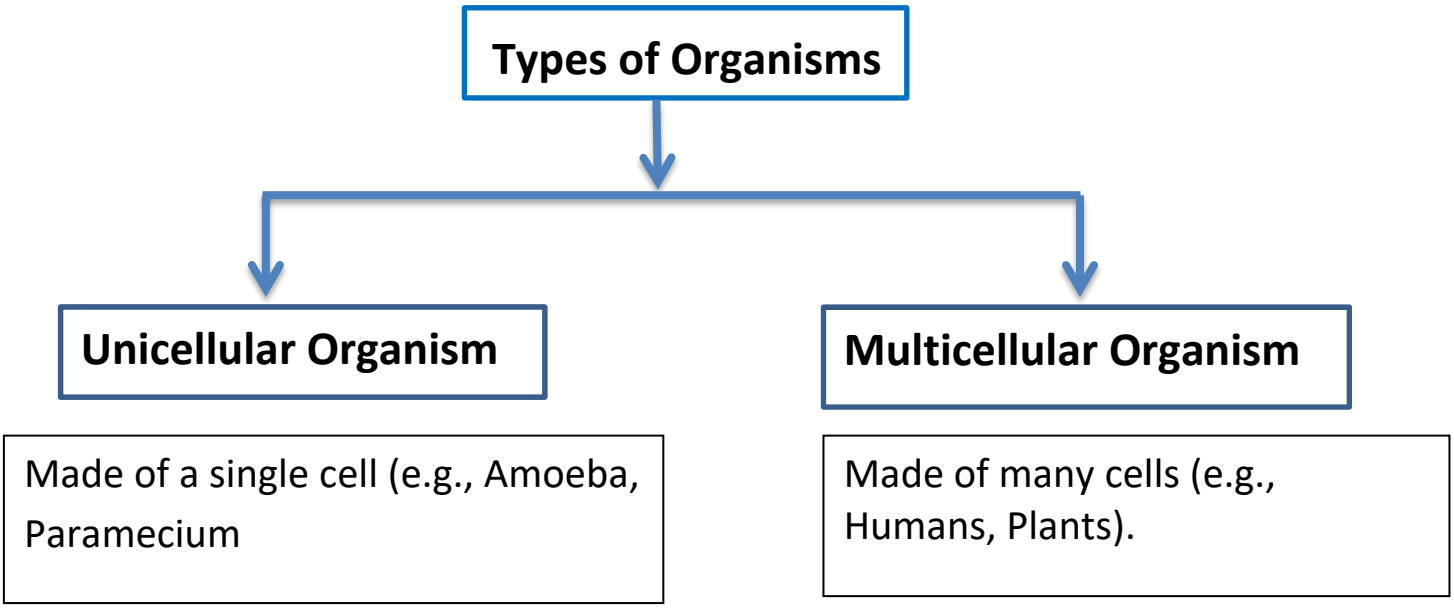
CLASS 10 ICSE

BIOLOGY

CHAPTER 1 - Cell Structure

Introduction to Cell

- The cell is the **basic structural and functional unit of life**.
- Discovered by **Robert Hooke** in 1665 using a compound microscope.
- **Cell theory** (by Schneider and Schwann):
  - All living organisms are composed of cells.
  - The cell is the basic unit of life.
  - All cells arise from pre-existing cells (added by Rudolf Virchow).



Types of Cells

1. **Prokaryotic Cells**: No true nucleus or membrane-bound organelles. (e.g., Bacteria)
2. **Eukaryotic Cells**: Have a true nucleus and membrane-bound organelles. (e.g., Plant and Animal cells)

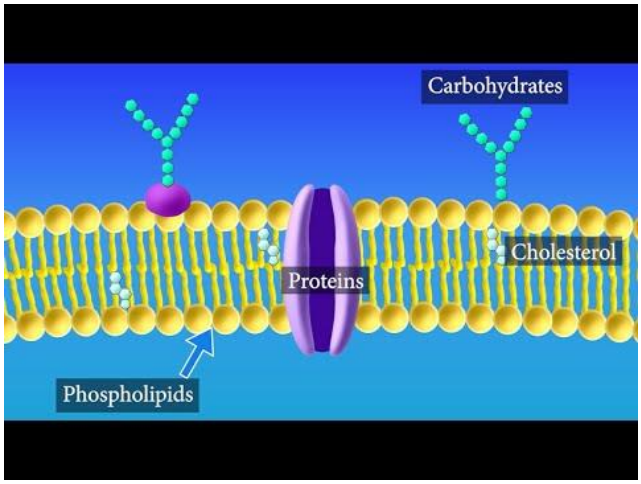
Differences between Plant and Animal Cells

Feature	Plant Cell	Animal Cell
Cell wall	Present (cellulose)	Absent
Shape	Fixed, rectangular	Irregular or round
Vacuoles	Large central vacuole	Small, temporary vacuoles
Plastids	Present (chloroplasts, etc.)	Absent
Centrosome	Absent	Present with centrioles

Structure of a Generalized Cell

A. Cell Membrane (Plasma Membrane)

- Semi-permeable membrane made of **lipids and proteins**.
- Controls movement of substances in and out of the cell.
- Provides shape and protection.



B. Cytoplasm

- Jelly-like fluid inside the cell membrane.
- Site for many metabolic activities.
- Contains cell organelles.

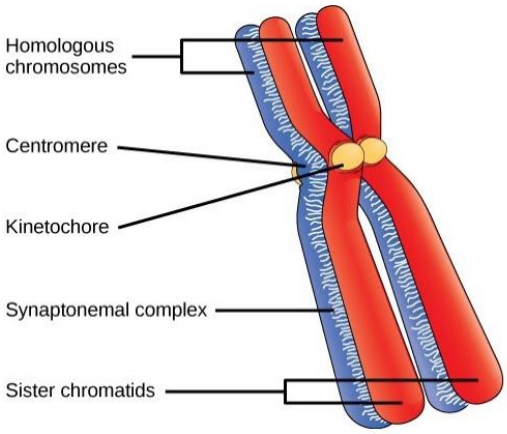
Cell Organelles and Their Functions

Organelle	Structure & Function
Nucleus	Contains **chromatin** (DNA), **nucleolus** (makes RNA), and is surrounded by the **nuclear membrane**. Controls cell activities and is the site of inheritance.
Mitochondria	Known as the **powerhouse of the cell**. Performs **aerobic respiration** to produce energy (ATP). Has inner folds called **cristae**.
Endoplasmic Reticulum (ER)	**Rough ER** has ribosomes; helps in **protein synthesis**. **Smooth ER** helps in **lipid synthesis** and detoxification.
Ribosomes	Small, non-membrane-bound organelles. Site of **protein synthesis**.
Golgi Apparatus	Modifies, packages, and transports proteins. Produces secretory vesicles and forms lysosomes.

Lysosomes	Contains digestive enzymes. Breaks down worn-out organelles or foreign substances (**suicide bags**).
Plastids	Found in plant cells. Includes **chloroplasts** (photosynthesis), **chromoplasts** (coloured pigments), **leucoplasts** (storage).
Vacuoles	Storage sacs. In plants, large central vacuole maintains turgor pressure.
Centrosome	Found in animal cells. Helps in **cell division**. Contains centrioles.

Chromosomes

- Thread-like structures in the nucleus.
- Made of **DNA and proteins**.
- Carry genetic information.
- Appear during **cell division**.

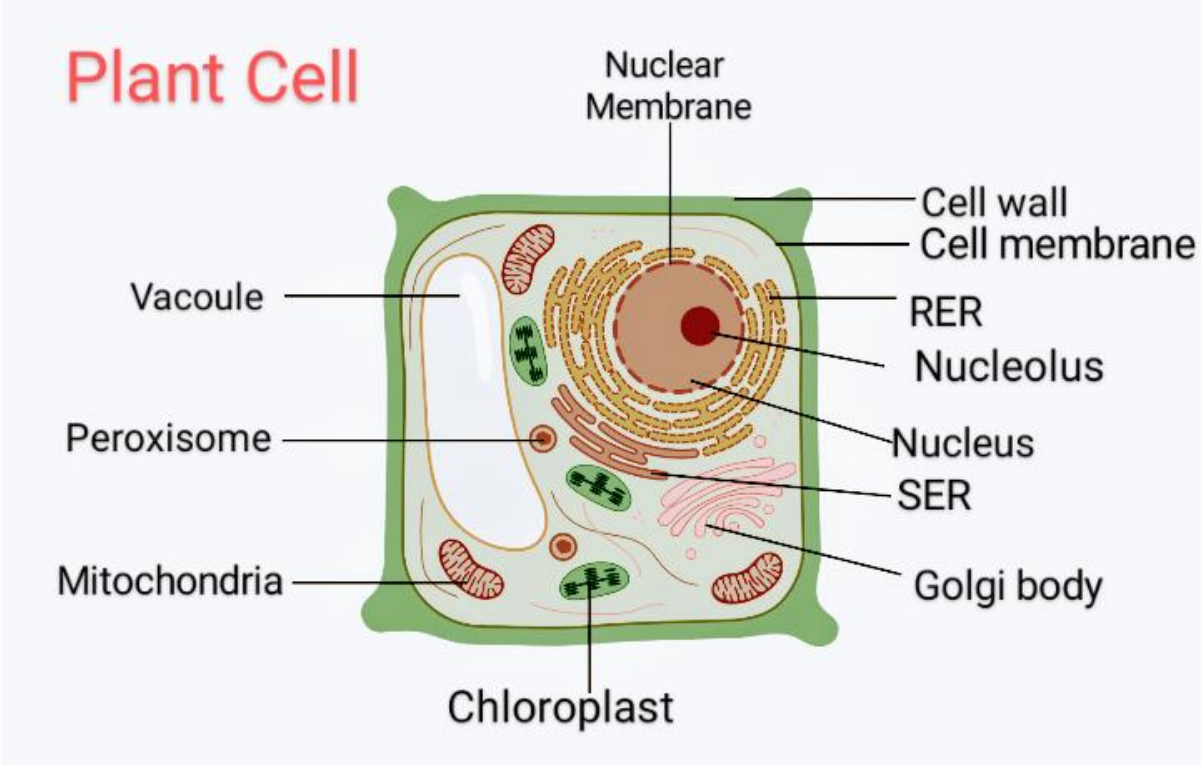


Functions of the Cell

- **Metabolism**: Sum of all chemical reactions.
  - **Anabolism**: Building up (e.g., protein synthesis).
  - **Catabolism**: Breaking down (e.g., respiration).
- **Growth**: Increase in size and number of cells.
- **Reproduction**: Formation of new cells or organisms.
- **Response to stimuli**: Sensitivity to environmental changes.

Comparison Between Prokaryotic and Eukaryotic Cells

Feature	Prokaryotic Cell	Eukaryotic Cell
Nucleus	No true nucleus	True nucleus
Membrane-bound organelles	Absent	Present
Example	Bacteria	Plants, Animals



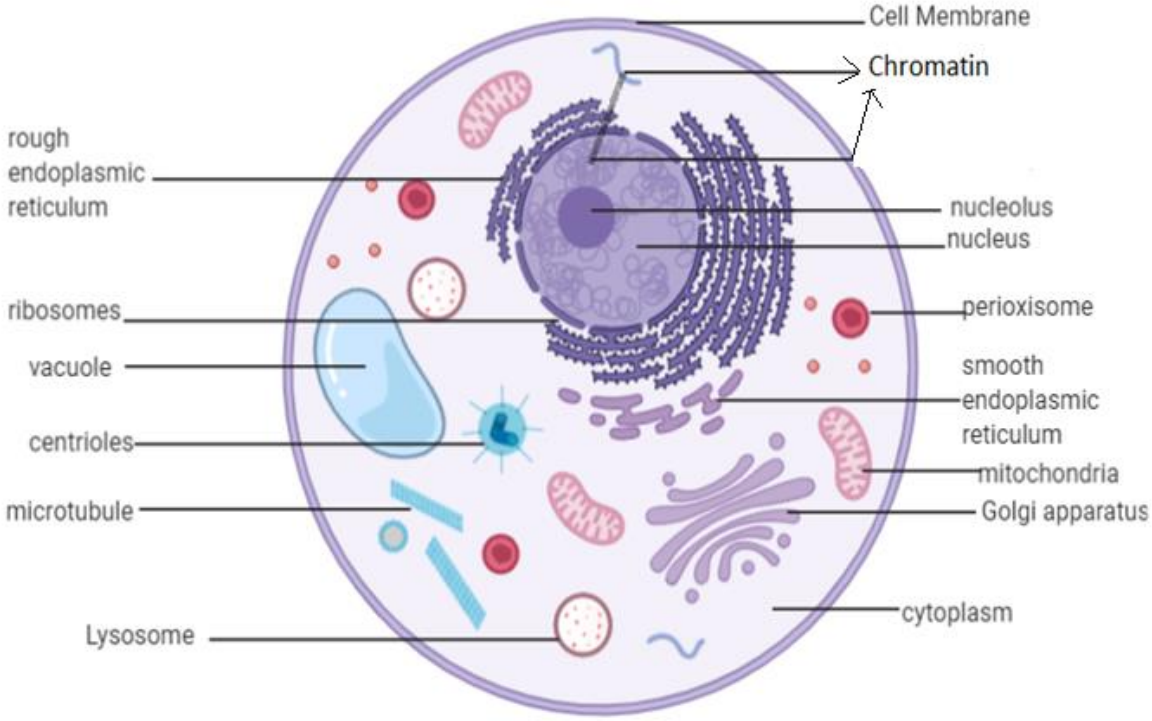


Fig:Animal cell