

## Plasma Membrane (Cell Membrane)

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### 1. Definition

- The **plasma membrane** is a **thin, living, selectively permeable membrane** that surrounds the cytoplasm of the cell.
- It separates the **internal cellular environment** from the external environment.

### 2. Occurrence

- Present in **all living cells** (prokaryotic and eukaryotic).
- In plant cells, it lies **inside the cell wall**.

### 3. Chemical Composition

- **Lipids** ( $\approx$ 40–50%)
  - Mainly **phospholipids**
  - Arranged in a **bilayer**
- **Proteins** ( $\approx$ 50–60%)
  - Structural and functional roles
- **Carbohydrates** (small amount)
  - Present as **glycoproteins** and **glycolipids**
  - Form **glycocalyx** (cell recognition)

### 4. Structure: Fluid Mosaic Model

- Phospholipid bilayer with:
  - **Hydrophilic heads** facing outward
  - **Hydrophobic tails** facing inward
- Proteins embedded in lipid bilayer like a **mosaic**
- Membrane is **fluid**, not rigid

#### Types of Membrane Proteins

- **Integral (intrinsic) proteins**
  - Embedded deeply

- Act as channels or carriers
- **Peripheral (extrinsic) proteins**
  - Loosely attached
  - Structural or enzymatic role

## 5. Thickness

- About **7–10 nm**
- Visible under **electron microscope**

## 6. Functions of Plasma Membrane

### (a) Selective Permeability

- Allows some substances to pass while restricting others

### (b) Transport of Materials

- **Passive transport**
  - Diffusion
  - Facilitated diffusion
  - Osmosis
- **Active transport**
  - Requires energy (ATP)
  - Against concentration gradient

### (c) Bulk Transport

- **Endocytosis**
  - Phagocytosis (solids)
  - Pinocytosis (liquids)
- **Exocytosis**
  - Removal of substances from cell

### (d) Cell Recognition and Adhesion

- Glycoproteins act as receptors
- Helps in cell-to-cell communication

### (e) Protection

- Maintains internal environment
- Provides mechanical boundary

## 7. Special Modifications

- **Microvilli** – increase surface area for absorption (intestinal cells)
- **Desmosomes** – cell adhesion
- **Gap junctions** – communication between cells

## 8. Comparison: Plasma Membrane vs Cell Wall

Feature	Plasma Membrane	Cell Wall
Nature	Living	Non-living
Permeability	Selectively permeable	Freely permeable
Occurrence	All cells	Plants, fungi, bacteria
Composition	Lipids & proteins	Cellulose / chitin / peptidoglycan

## 9. Importance of Plasma Membrane

- Maintains **cell integrity**
- Controls exchange of materials
- Essential for survival of the cell
- Plays role in **signaling and immunity**