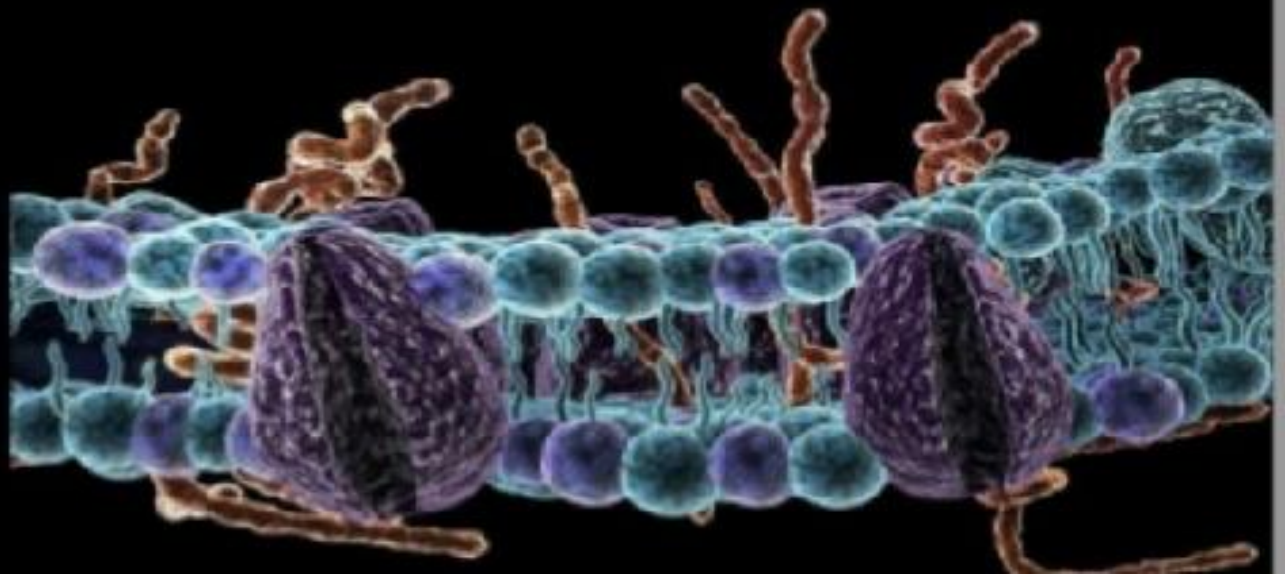
# BIOMEMBRANE

By

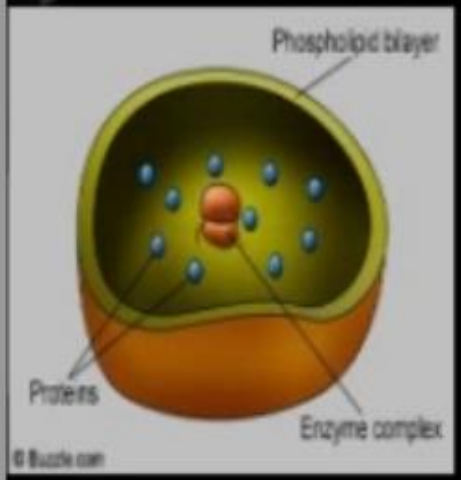
Dr. Angsuman Chanda

# DEFINITION

- Biological membranes are thin, flexible surfaces separating cells and cell compartments from their environments

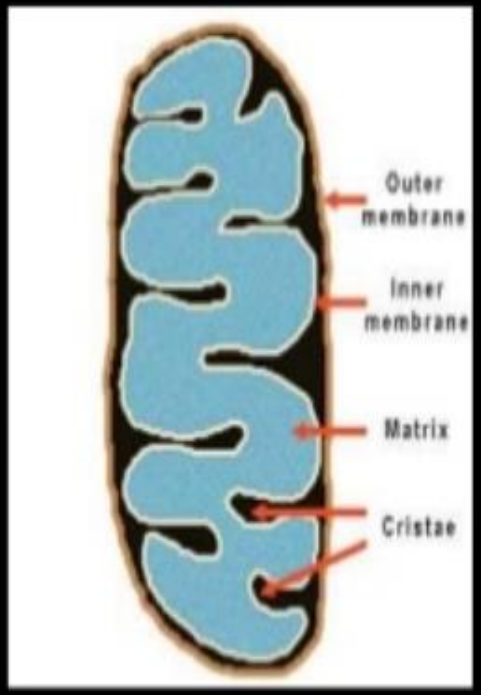


# ORGANELLES CONTAINING MEMBERANE

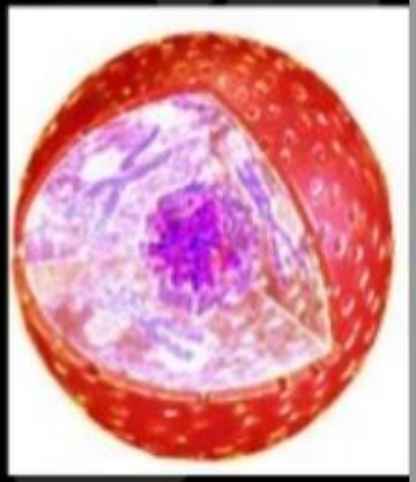



Lysosomes

Golgi bodies

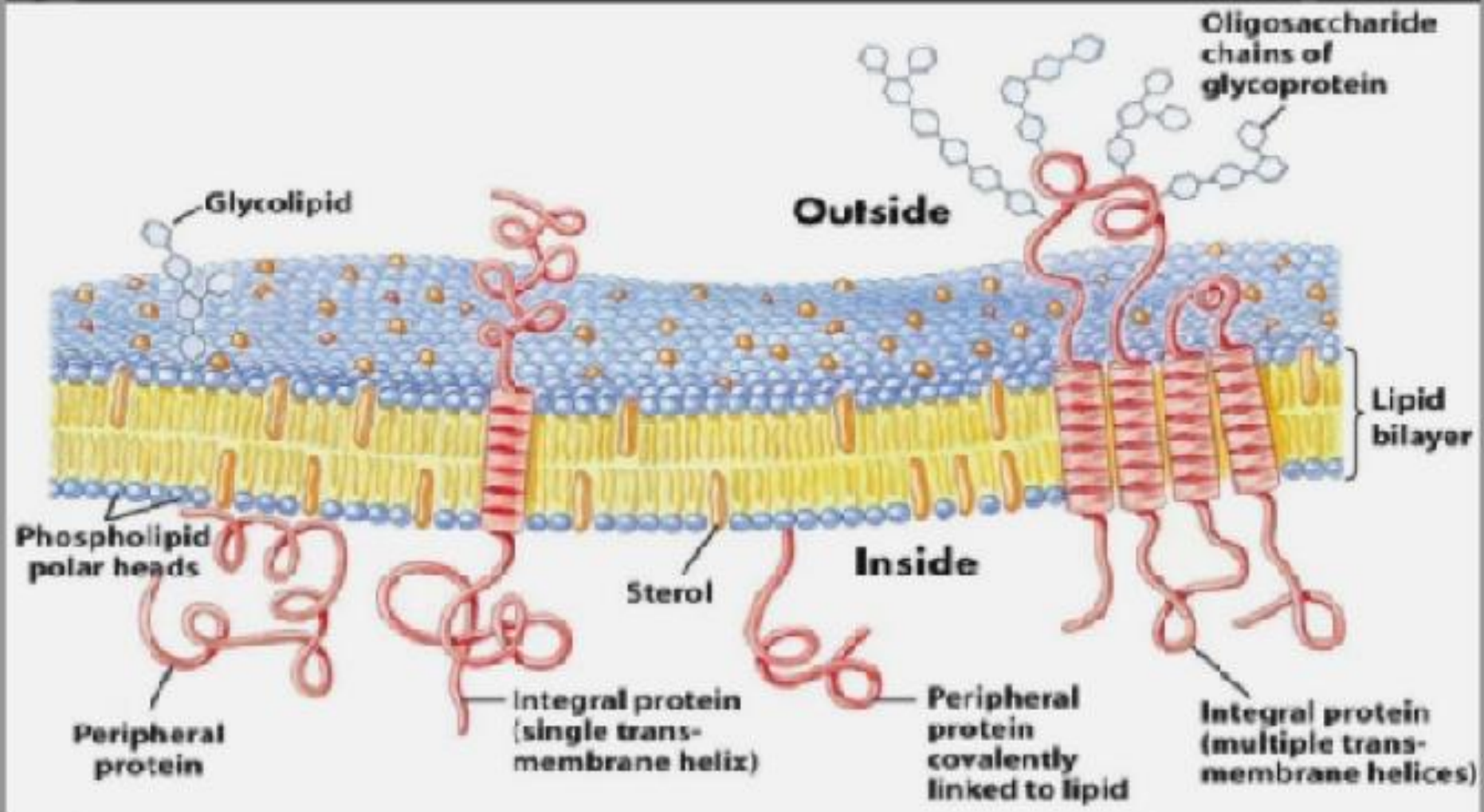



Mitochondria



Nucleus

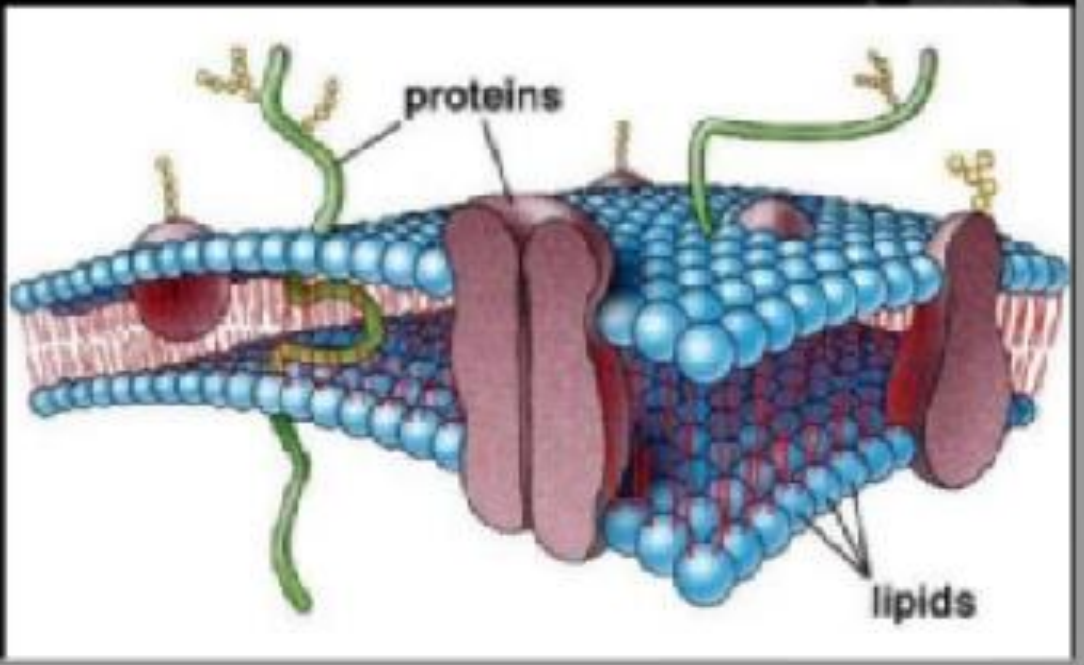
# FLUID MOSAIC MODEL



# COMPONENTS

Components of membrane are:

- Proteins
- lipids
- Carbohydrates



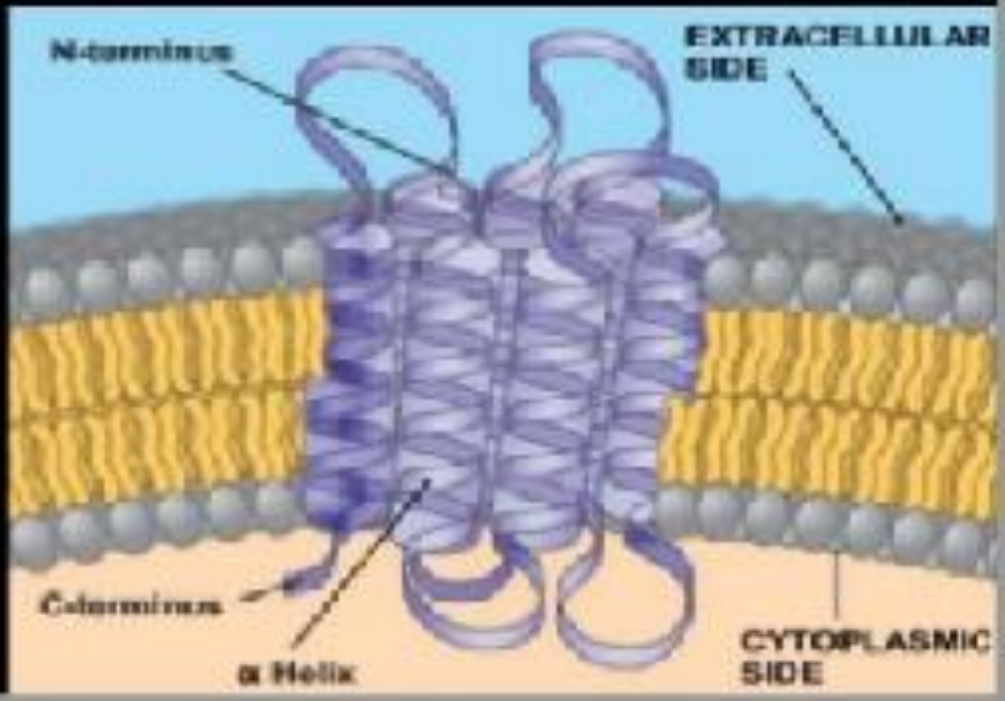
# PROTEINS

Two basic types of membrane proteins:

- Integral (Intrinsic) proteins
- Peripheral (extrinsic) proteins

# INTEGRAL (INTRINSIC) PROTEINS

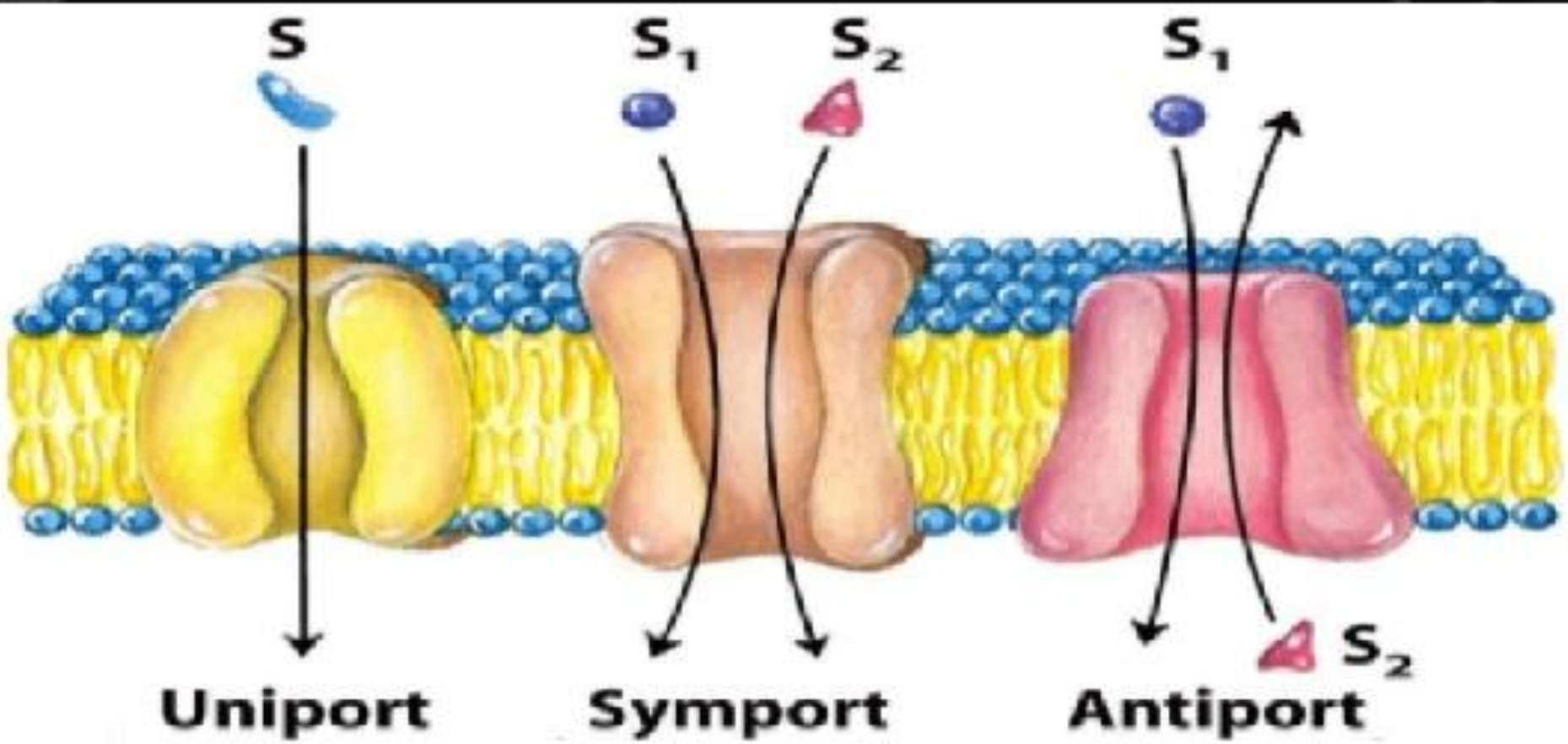
- They are embedded in hydrophobic core of lipid bilayer
- For example : Transmembrane proteins are exposed on both sides of the membrane




FUNCTION:

- Anchorage
- Transport

# THREE GENERAL CLASSES OF TRANSPORT SYSTEMS

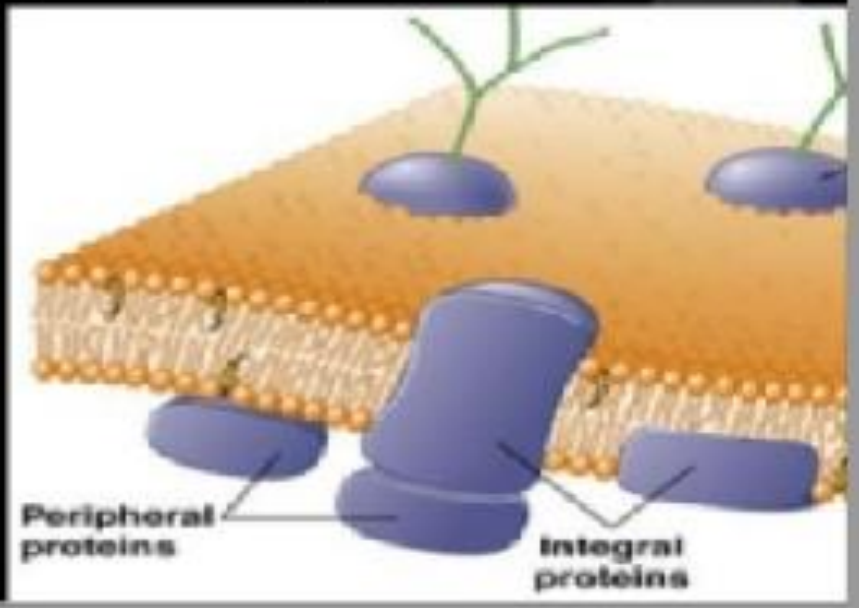


# PERIPHERAL (EXTRINSIC) PROTEINS

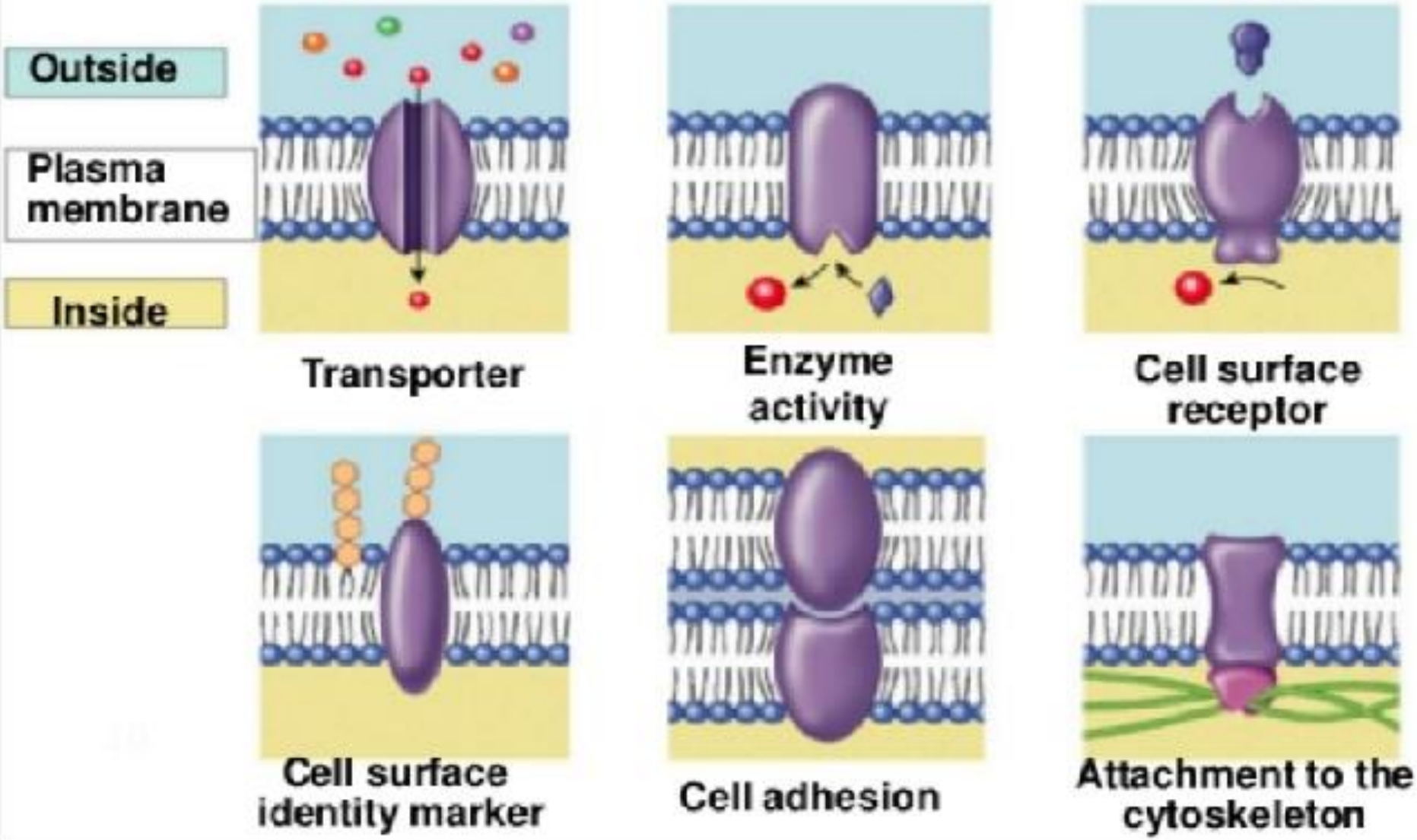
- Peripheral membrane proteins are proteins that adhere outside the biological membrane
- These molecules attach to integral membrane proteins, or penetrate the peripheral regions of the lipid bilayer

**FUNCTION:**

- Cell-to-cell interaction
- Cell signaling



# MANY FUNCTIONS OF MEMBRANE PROTEINS



# LIPIDS

- Lipids in membranes are Amphipathic
- Orientation of Amphipathic compounds (Lipids) in aqueous solution is to prevent Hydrophobic region coming into contact with water molecules

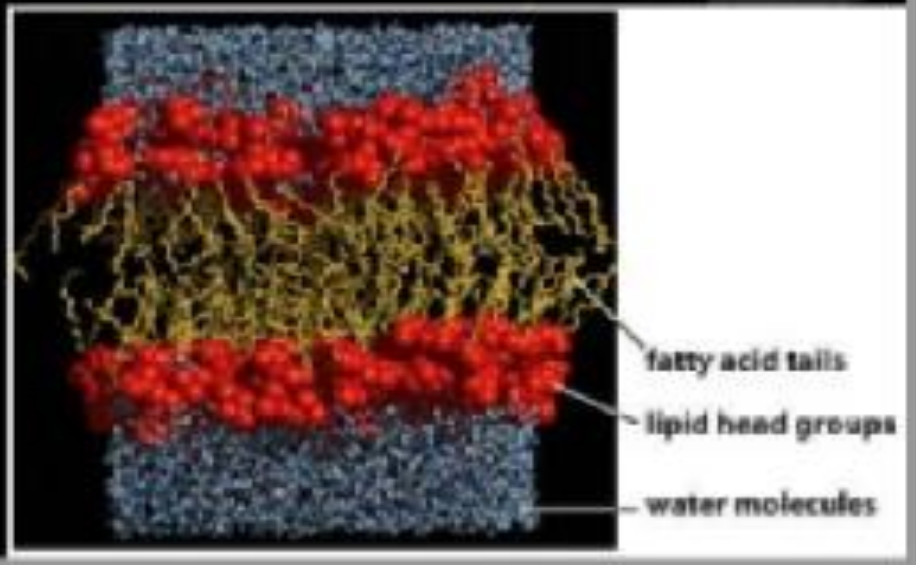
**Major lipids in biological membranes are:**

- Phospholipids
- Glycolipids
- Cholesterol

# PHOSPHOLIPIDS

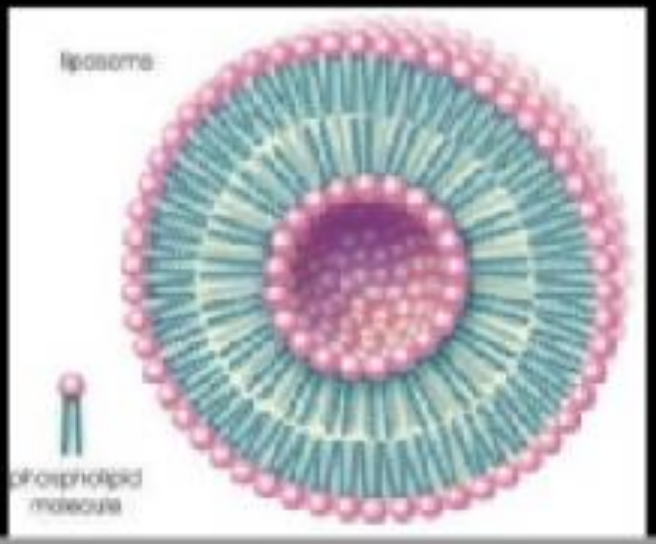
Phospholipid is made up of:

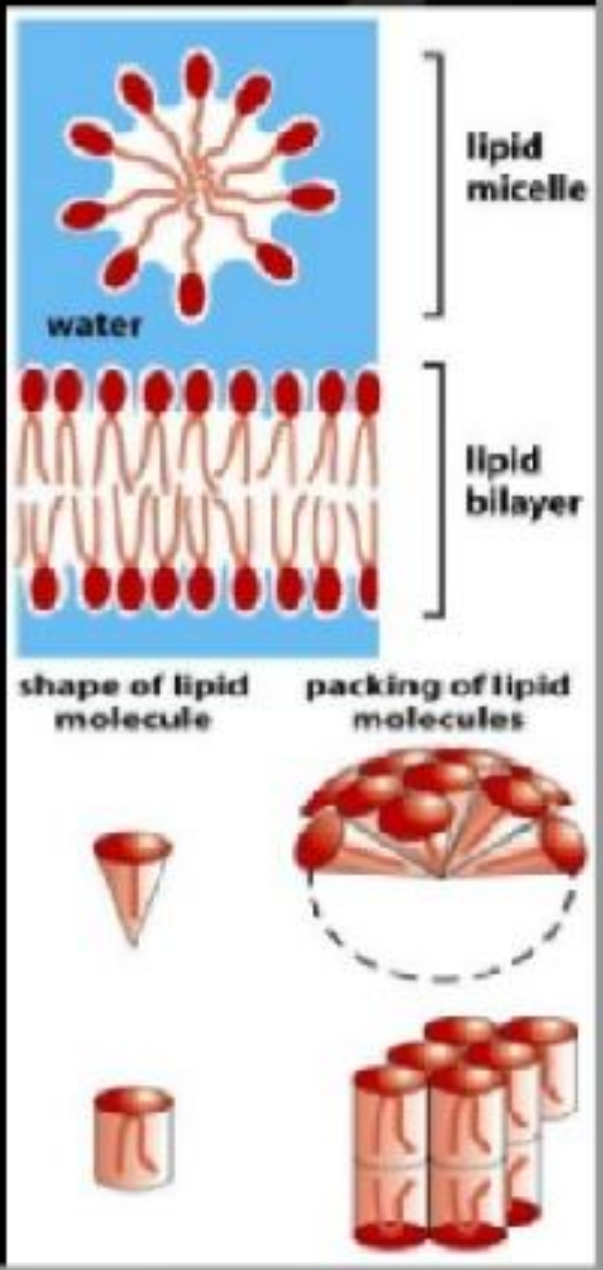
- Two Non-polar (Hydrophobic) fatty acid chains: Tails
- One polar (Hydrophilic) group: Head



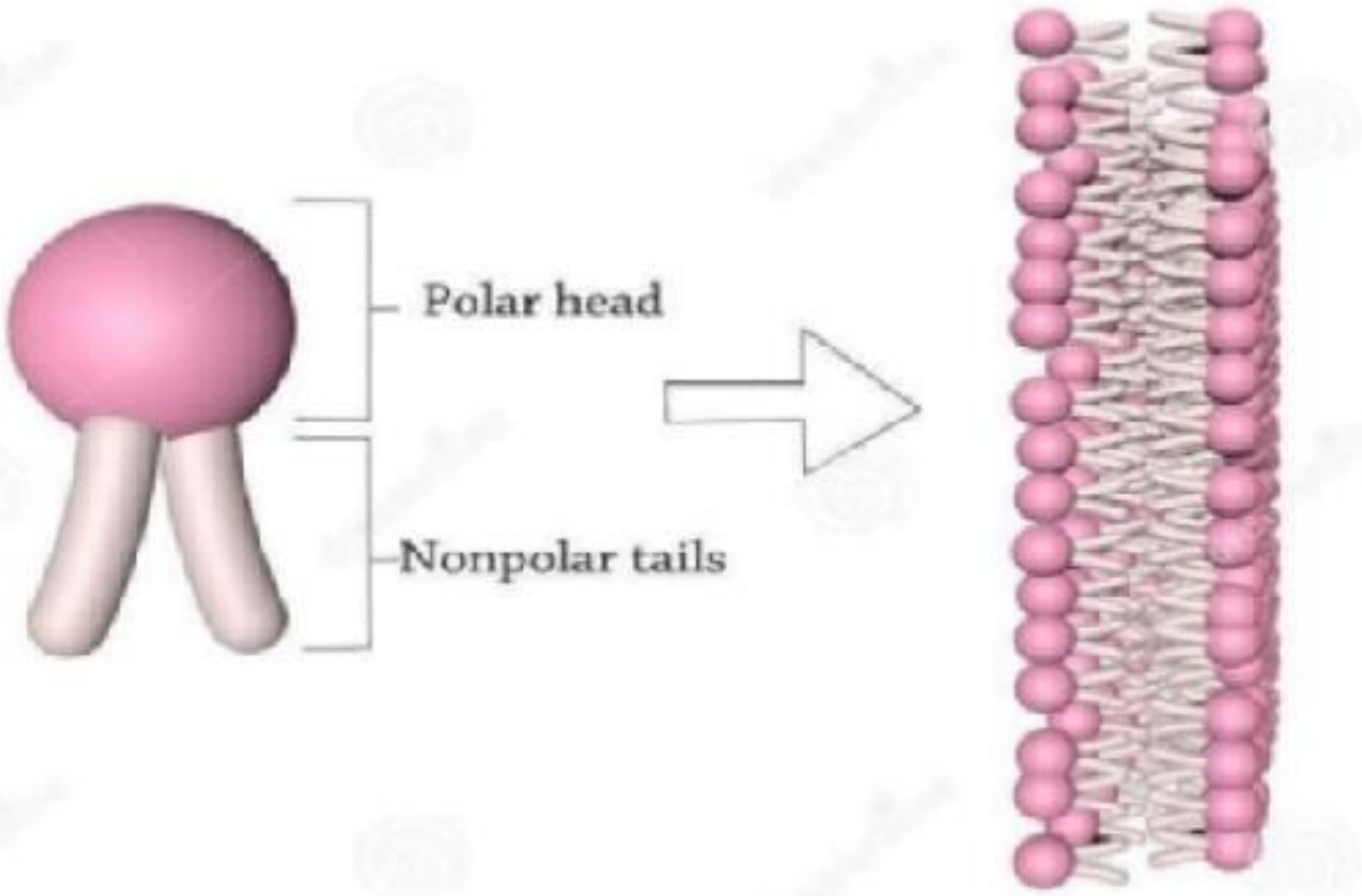
# PHOSPHOLIPIDS

- Phospholipid molecules are orientated to form:
- micelle
- lipid bilayer
- liposome

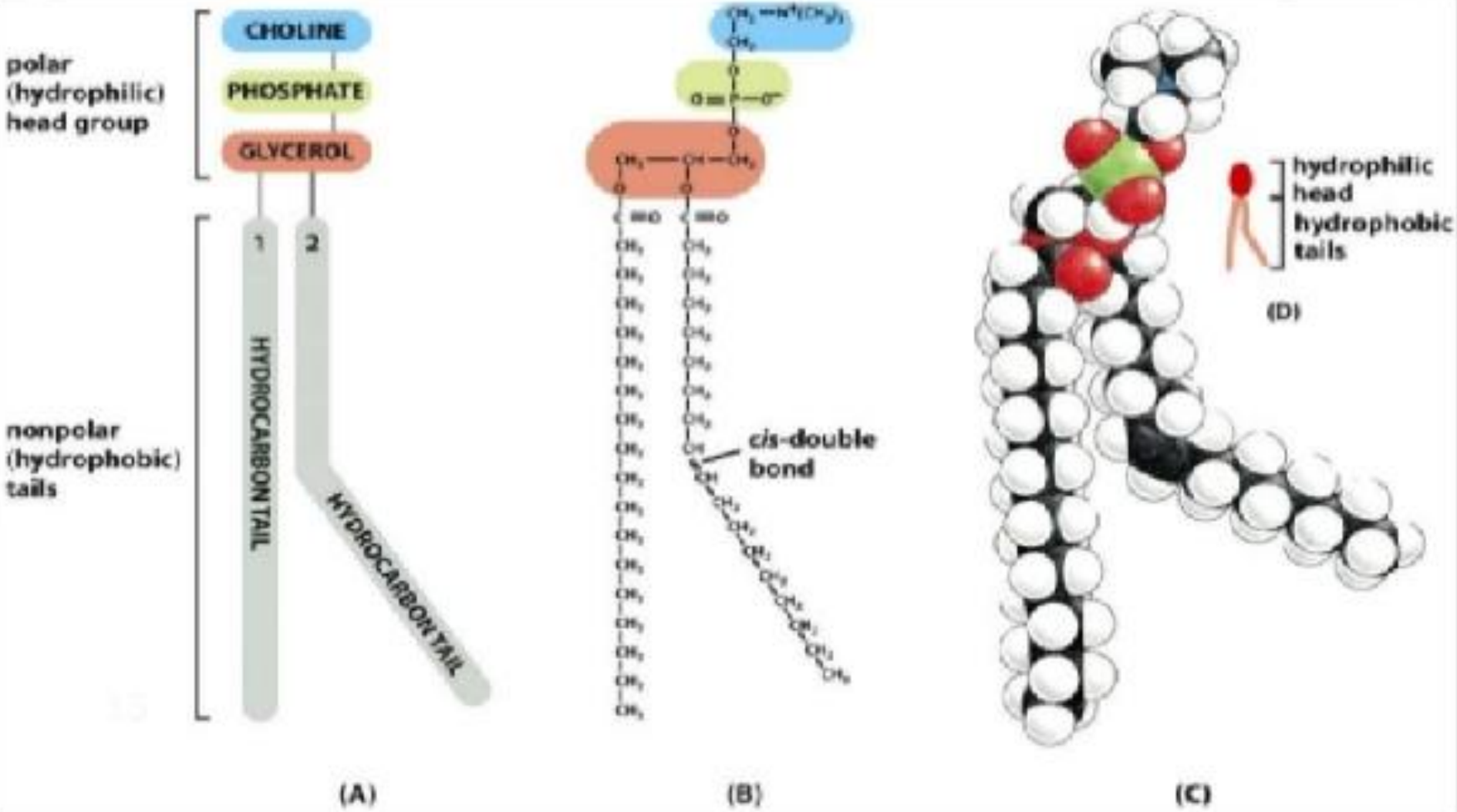


# PHOSPHOLIPID



# CHEMICAL NATURE OF PHOSPHOLIPIDS

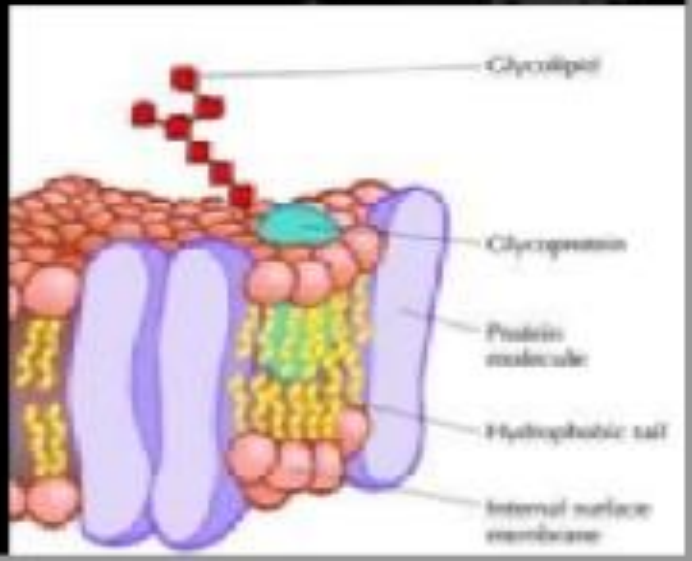


# GLYCOLIPIDS

- Glycolipids are lipids that form part of the plasma membrane
- They have a short carbohydrate chain covalently attached and this is exposed on the outer surface of the cell

**Function:**

- Communicative or cellular recognition

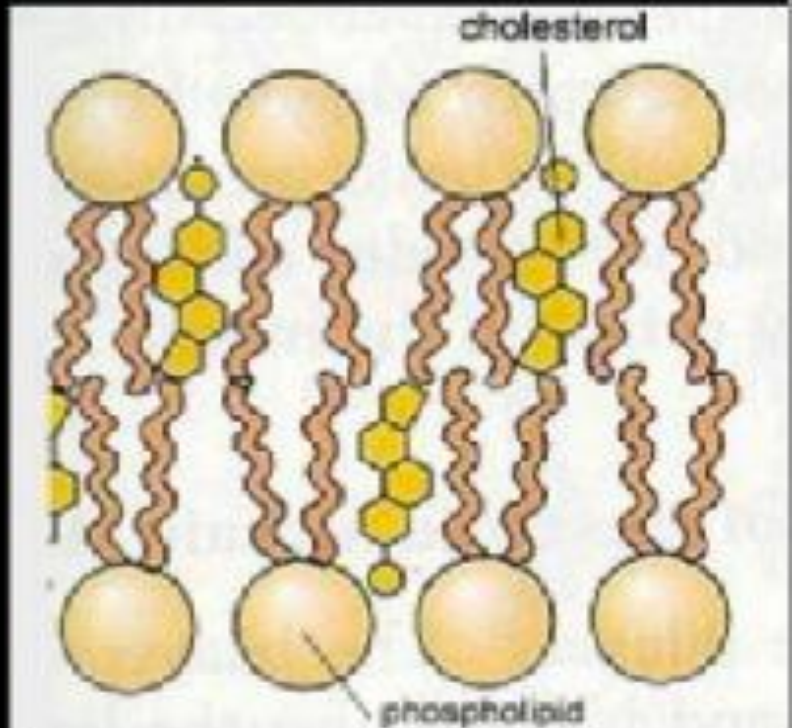


# CHOLESTEROL

- It is a steroid that is amphipathic in nature

**Function:**

- Provide stability
- Maintain the fluidity
- Bilayer stronger
- Bilayer flexible



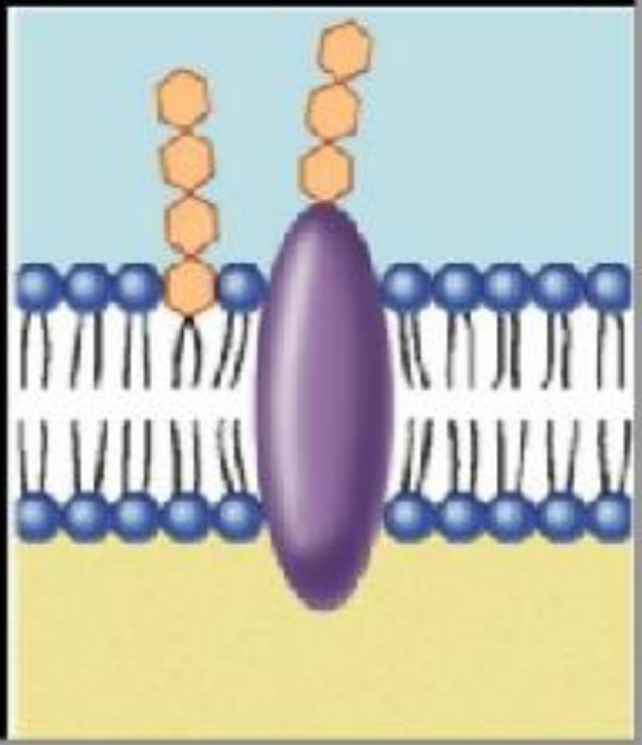
# CARBOHYDRATES

- Carbohydrates covalently linked to proteins (glycoproteins) or lipids (glycolipids) are also a part of cell membranes

**FUNCTION:**

- cell-cell recognition

- Basis for rejection of foreign cells by immune system



# GLYCOCALYX

- Entire surface of cell membrane contain carbohydrate coat called glycocalyx

**Function:**

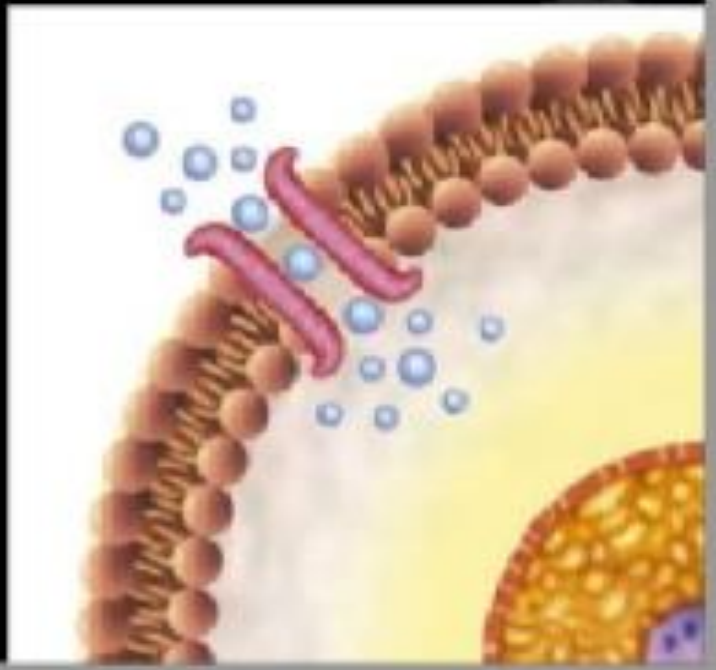
- Provide negative charge to the membrane
- Provide attachment between the cells

# FUNCTION OF CELL MEMBRANE

- The cell membrane is selectively permeable to ions and organic molecules and controls the movement of substances in and out of cells

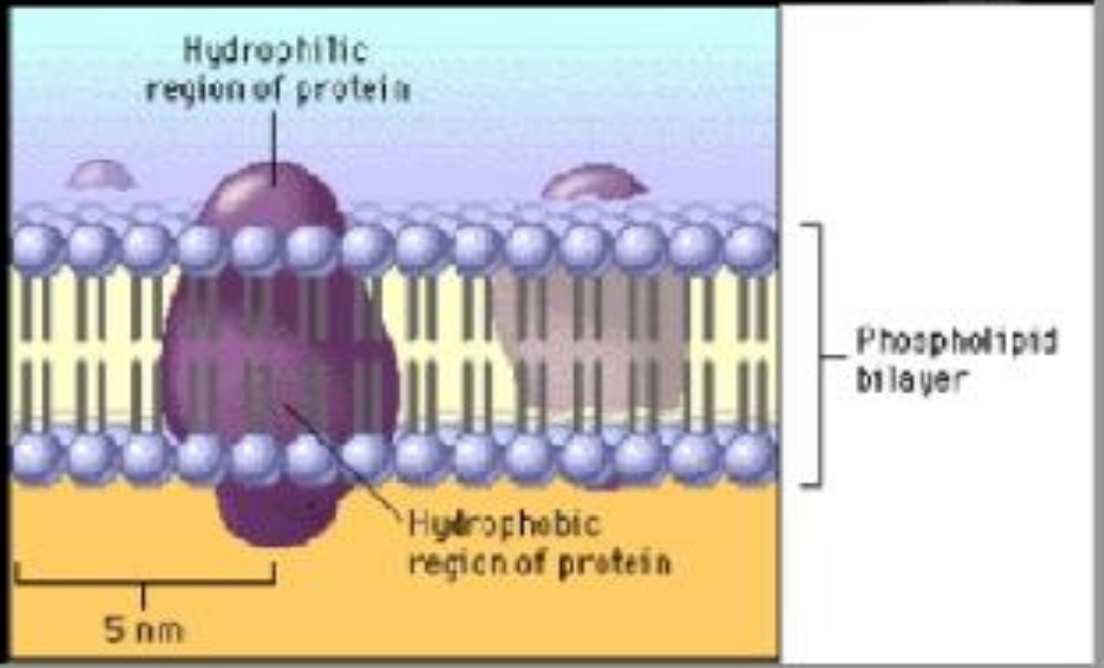
- The basic function of the cell membrane is to protect

  the cell from its surroundings



# IMPORTANT FEATURES

- **Selective permeability**
- **Fluidity**




Thank you