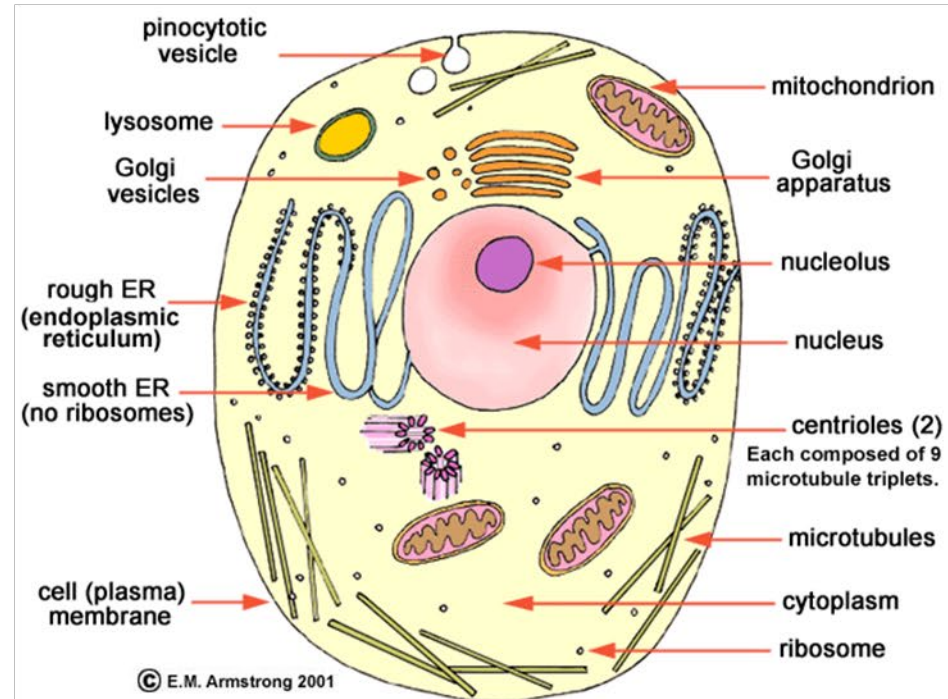
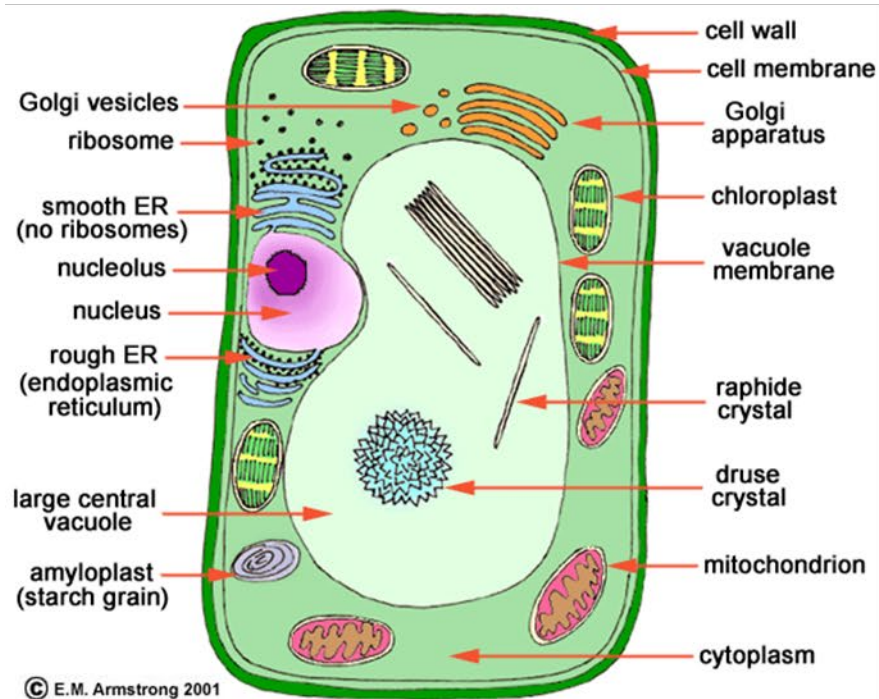
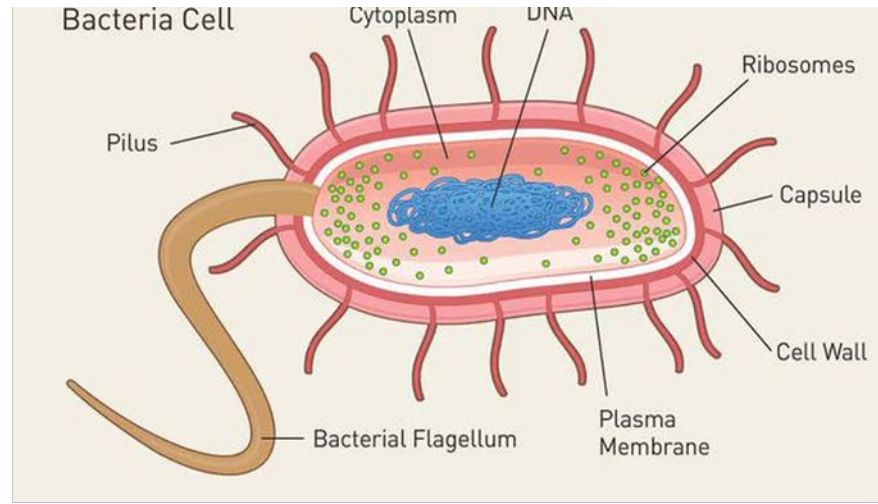
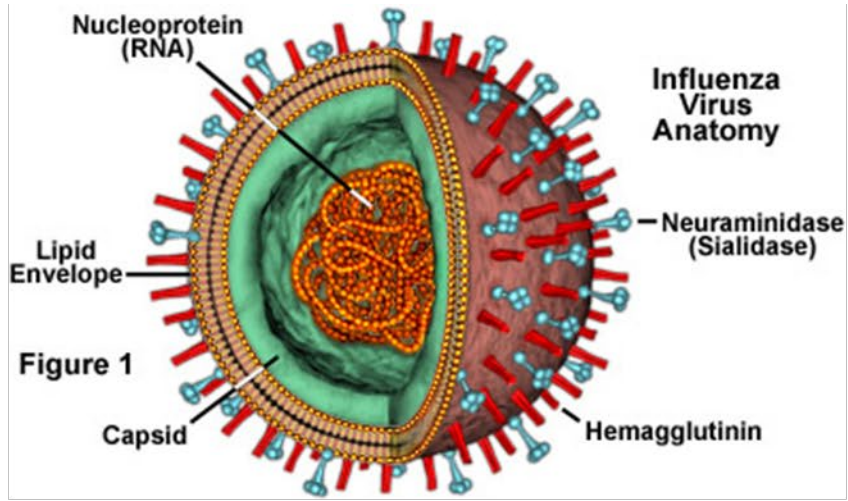


MSc I Sem – Life Sciences

Course – Cell Biology



Cell Wall Architecture



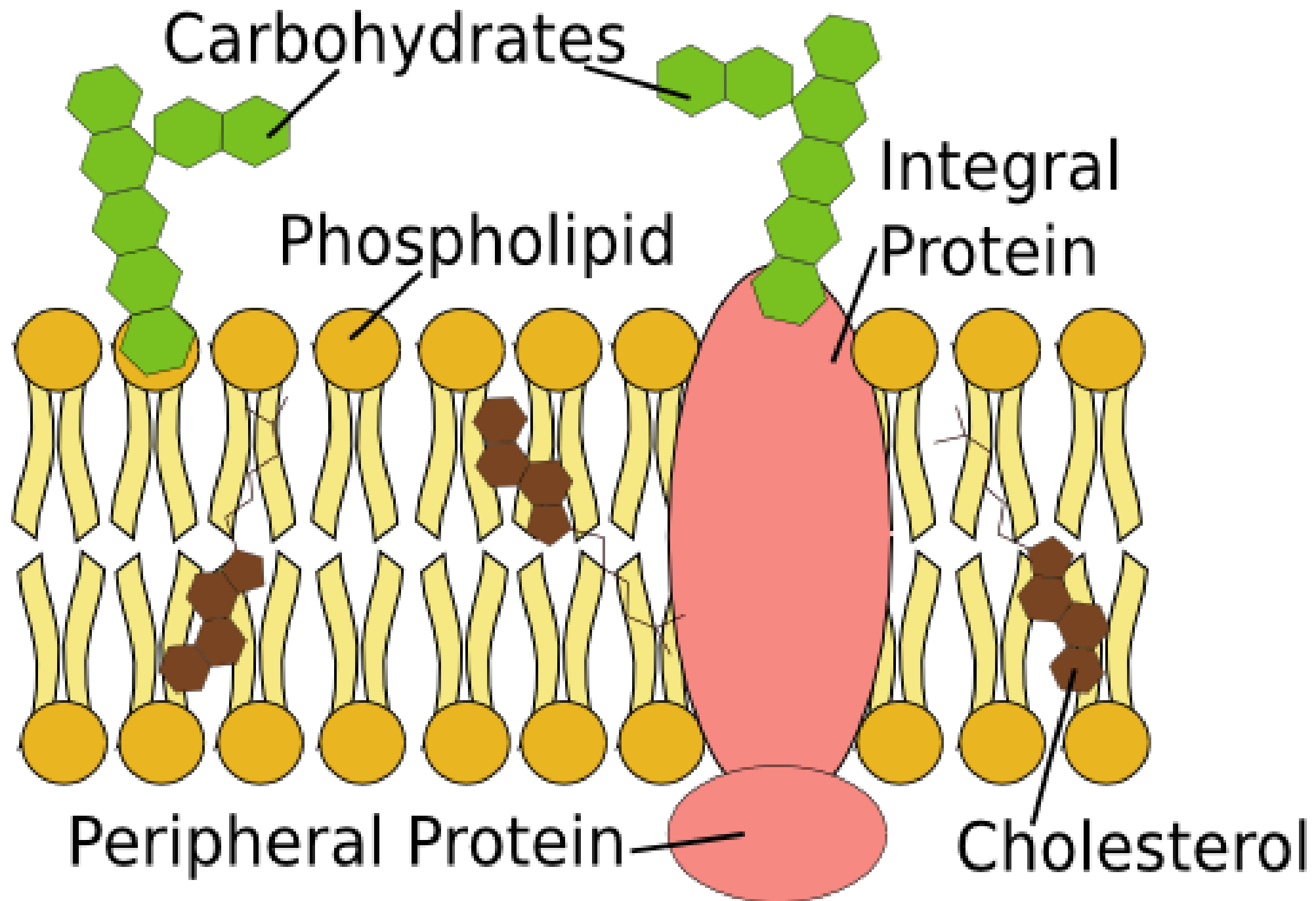
The cell membrane is also known as the plasma membrane or cytoplasmic membrane. It is a biological membrane that separates the interior of all cells from the outside environment. The cell membrane is selectively permeable to ions and organic molecules and controls the movement of substances in and out of cells. The basic function of the cell membrane is to protect the cell from its surroundings. It consists of the phospholipid bilayer with embedded proteins so its also called as “lipid bilayer plasma membrane”. Cell membranes are involved in a variety of cellular processes such as cell adhesion, ion conductivity and cell signalling and serve as the attachment surface for several extracellular structures.

Structure of Plasma Mambrane: Fluid mosaic model

The model was given by S. J. **Singer** and G. L. **Nicolson** in 1972. Biological membranes can be considered as a two-dimensional liquid in which lipid and protein molecules diffuse more or less easily. Although the lipid bilayers that form the basis of the membranes do indeed form two-dimensional liquids by themselves, the plasma membrane also contains a large quantity of proteins, which provide more structure.

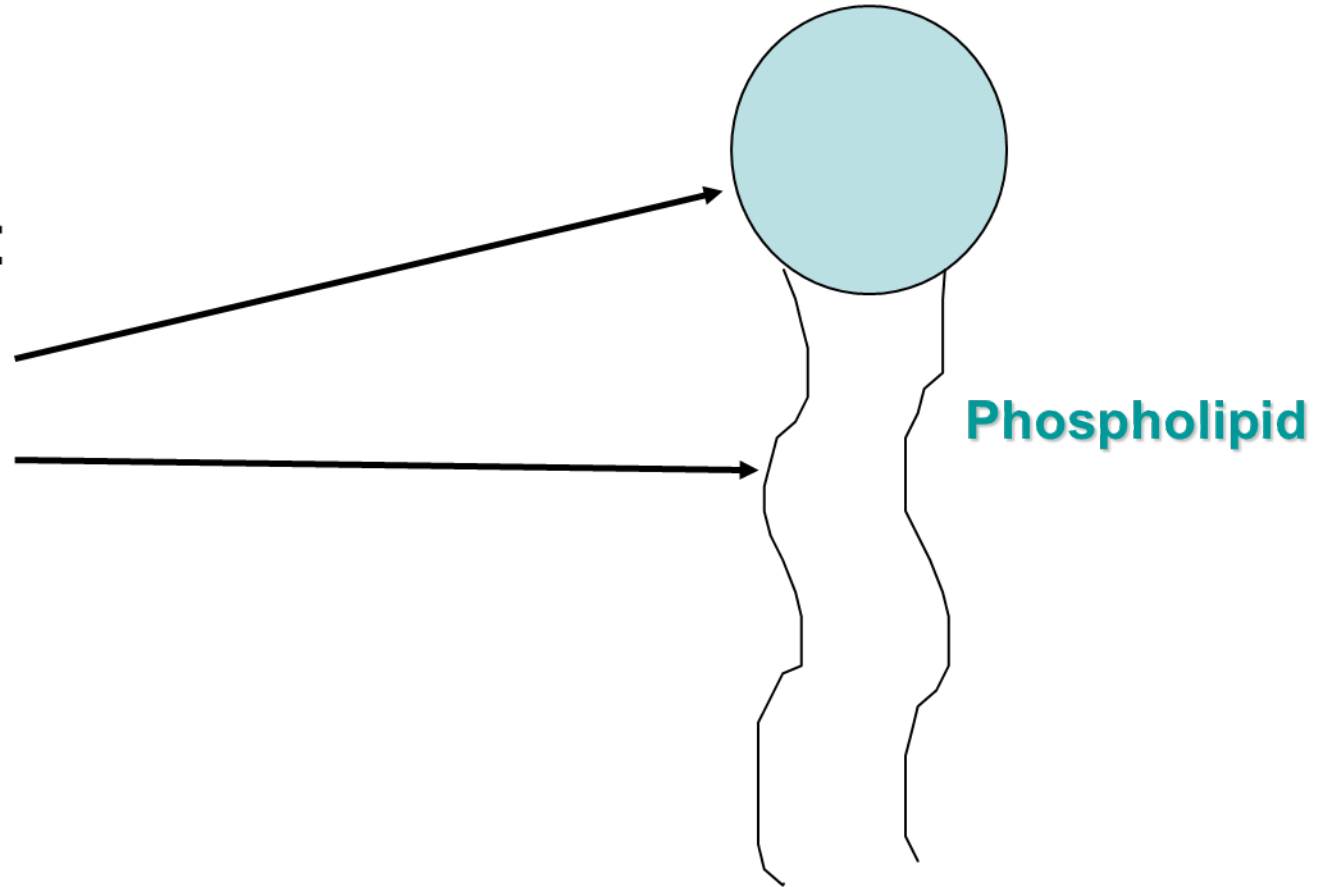
Outline

- Phospholipid Bilayer
- Fluid Mosaic Model
- Membrane Proteins
- Diffusion
- Facilitated Diffusion
- Osmosis
- Bulk Transport
- Active Transport

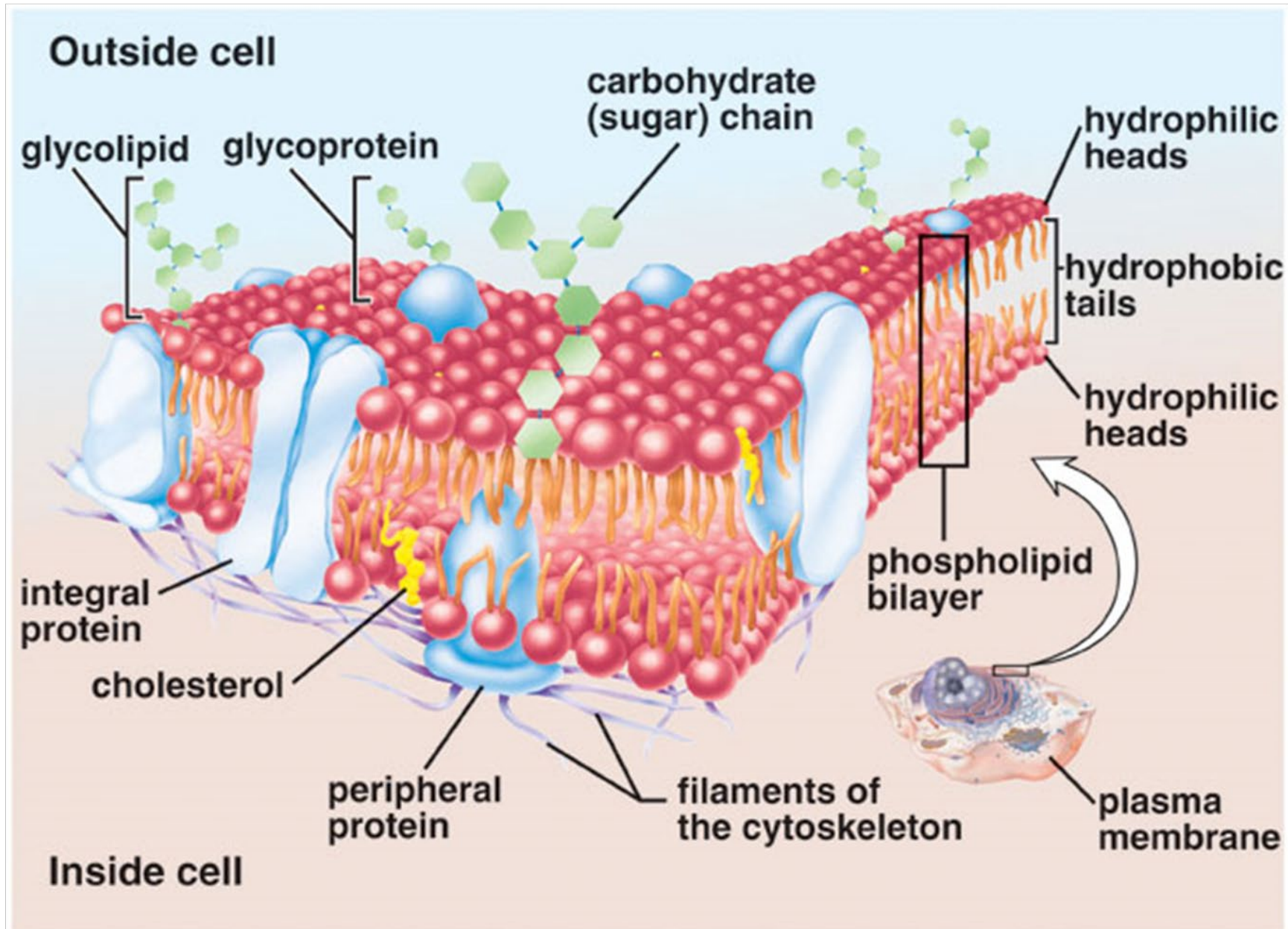


Plasma Membrane

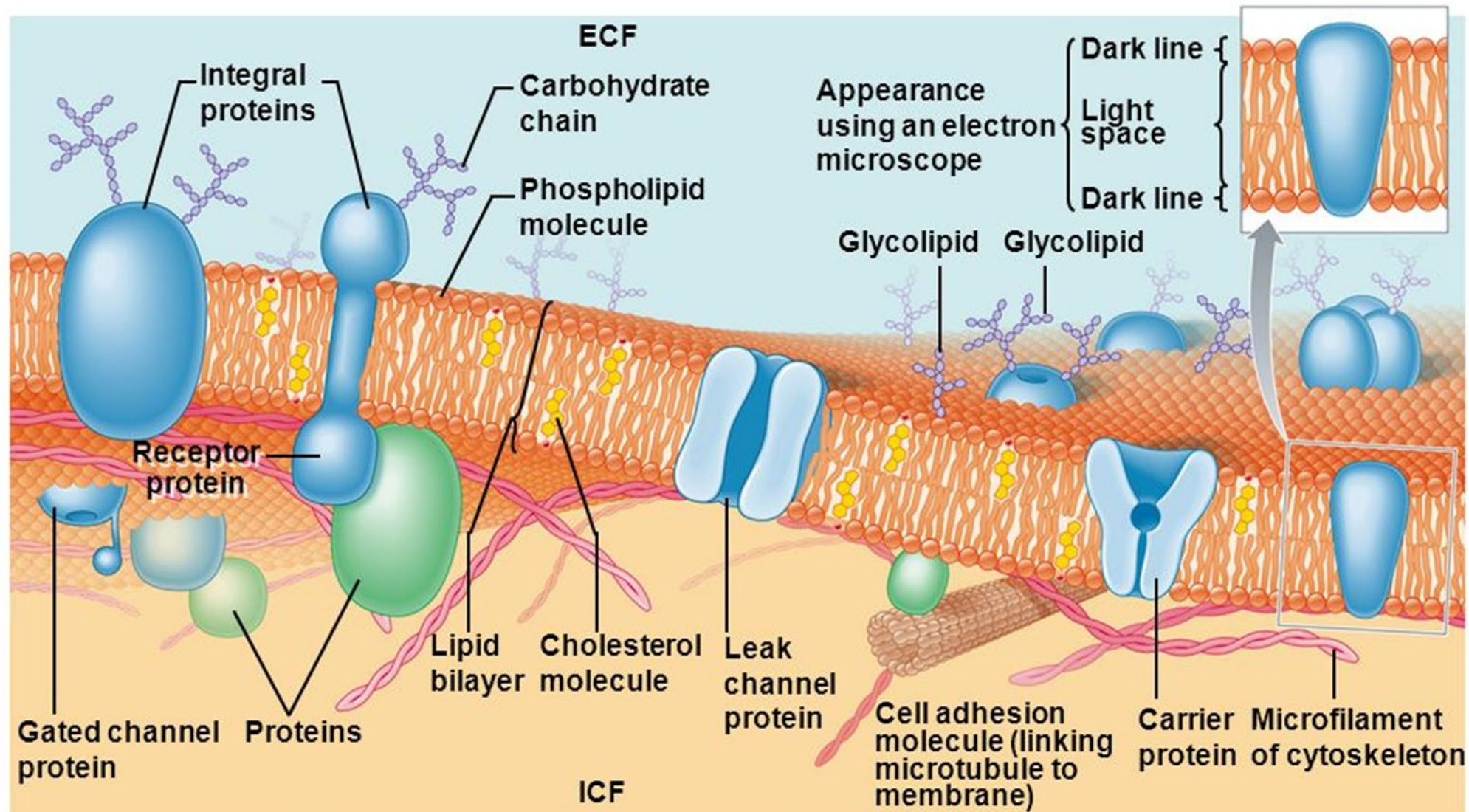
- Boundary that separates the **living cell** from it's **non-living** surroundings.
- **Phospholipid bilayer**
- **Amphipathic** - having both:
 - hydrophilic heads**
 - hydrophobic tails**
- ~8 nm thick
- PM is a dynamic structure



Fluid-Mosaic Model



Plasma Membrane Structure



- Channels
- Carrier molecules
- Docking marker acceptors
- Membrane bound enzymes

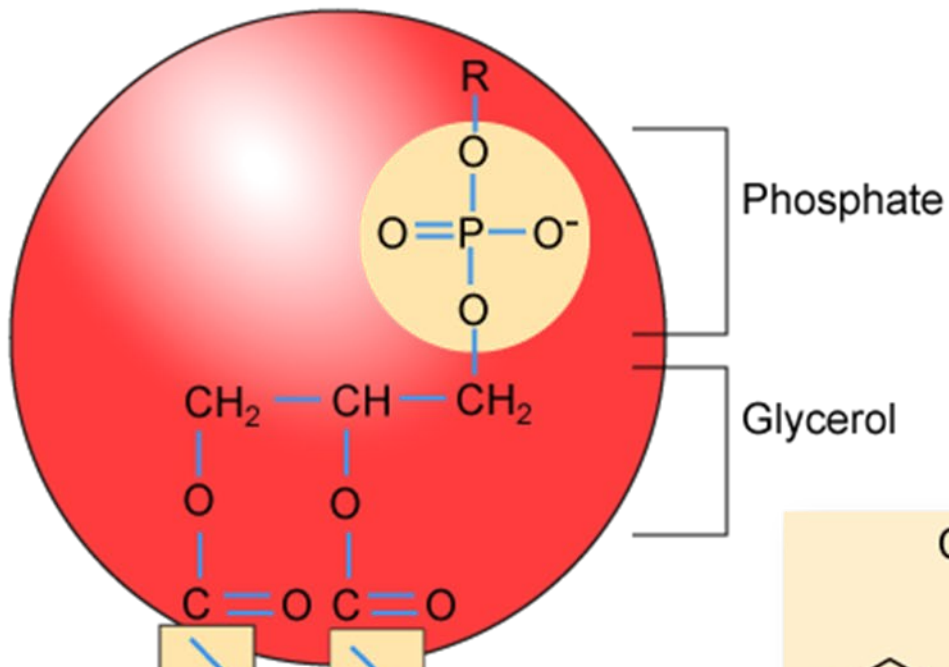
- Receptor sites
- Cell adhesion molecules (CAMs)
 - Integrin, cadherin
- Cell surface markers

FLUID- because individual phospholipids and proteins can move around freely within the layer, like it's a liquid.

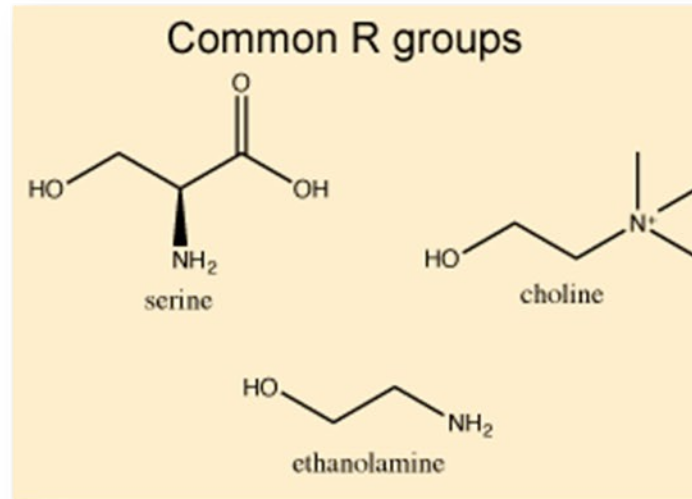
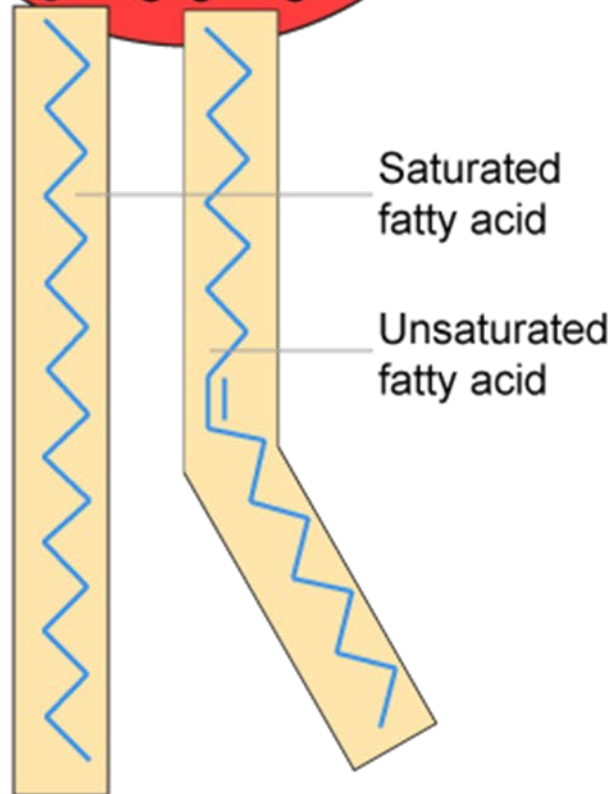
MOSAIC- because of the pattern produced by the scattered protein molecules when the membrane is viewed from top.

Phospholipids

Hydrophilic head

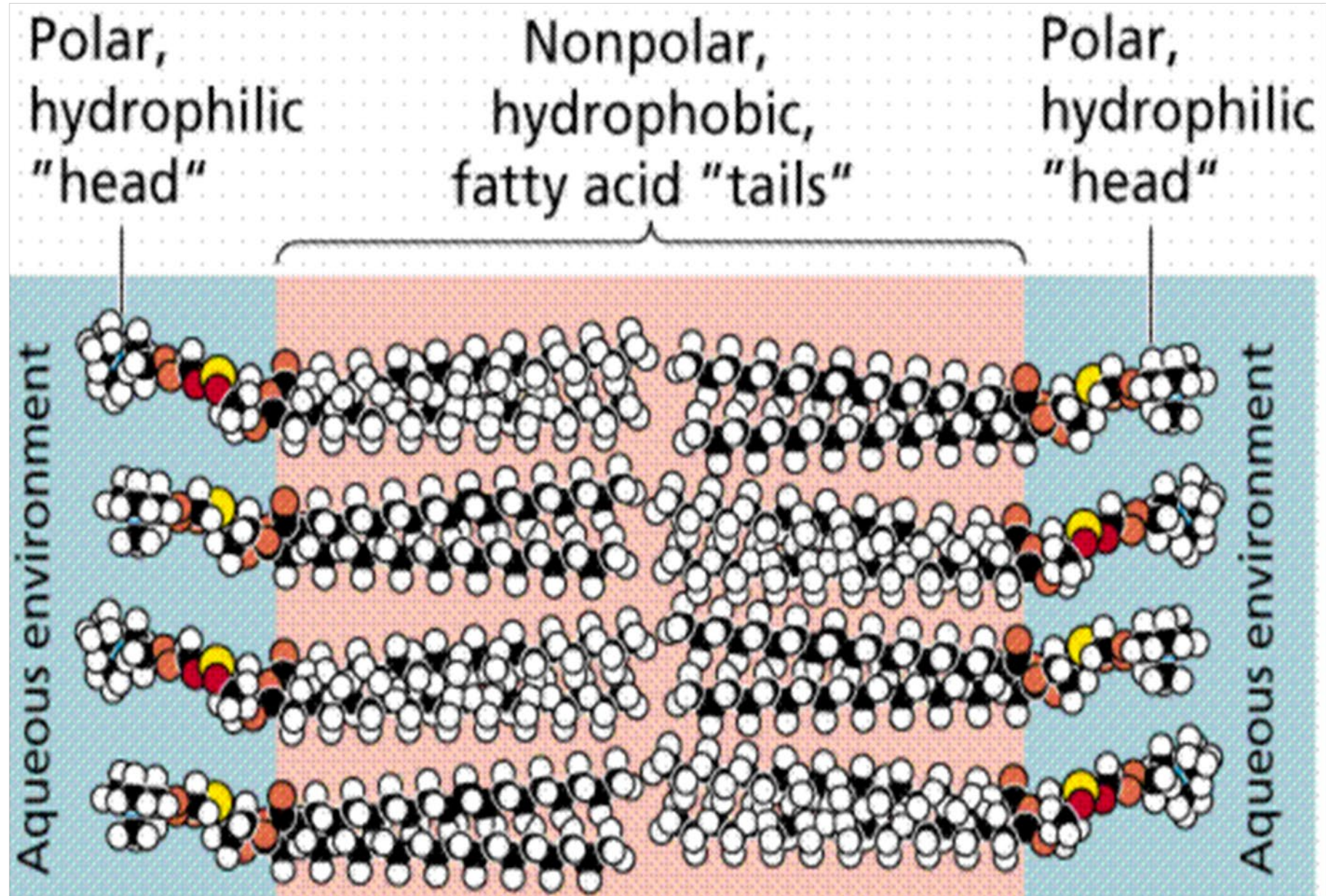


Hydrophobic tails



- Contains 2 fatty acid chains that are nonpolar
- Head is polar & contains a Phosphate group

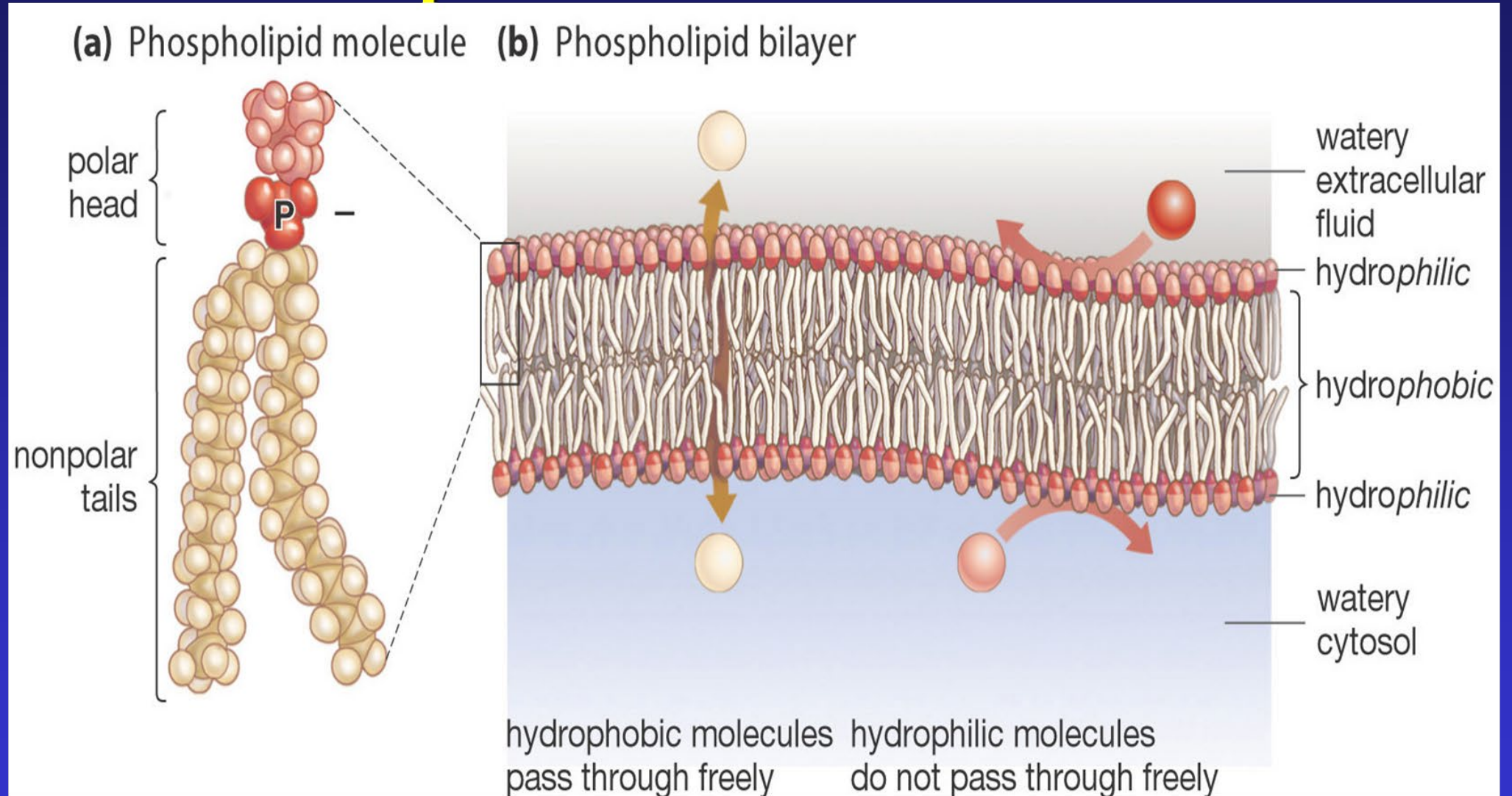
Polar heads are hydrophilic “water loving”
Nonpolar tails are hydrophobic “water fearing”
Makes membrane “Selective” in what crosses



Membrane Functions

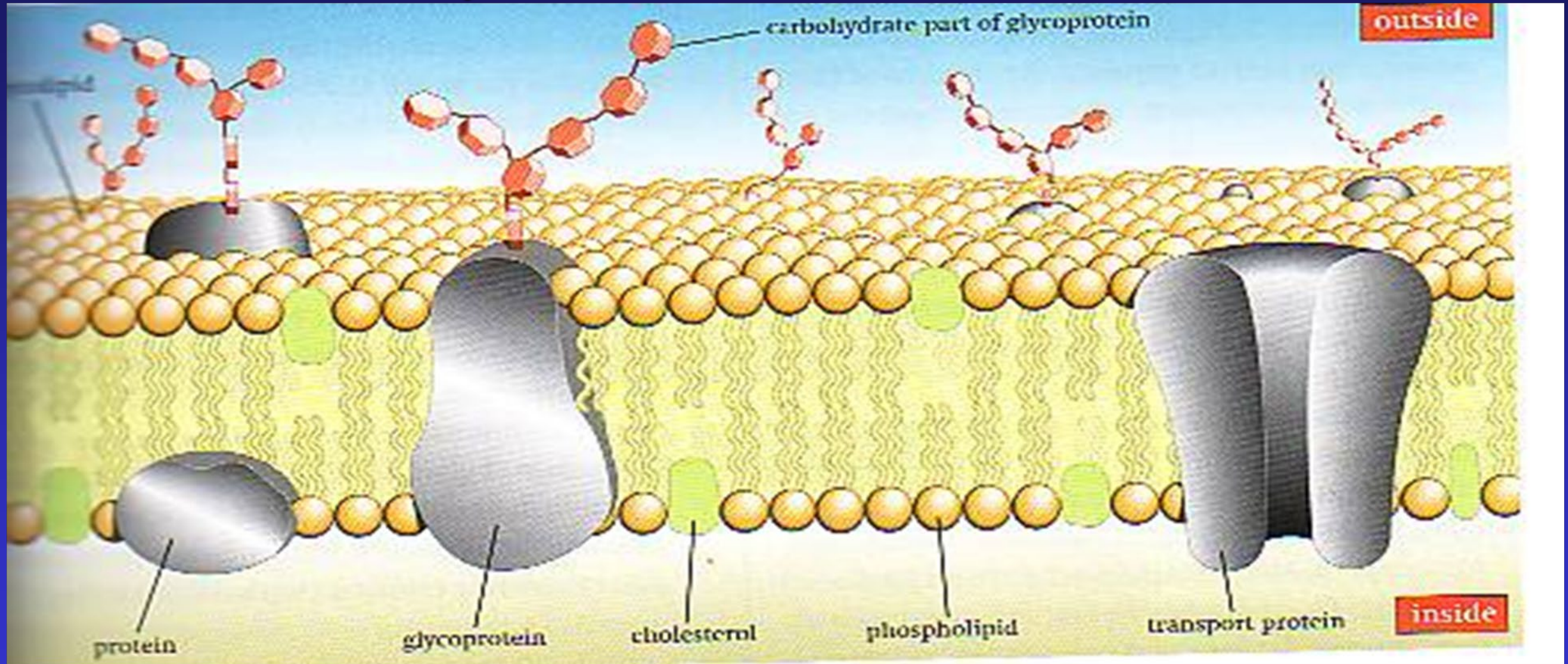
- Protection
- Communication
- Selectively allow substances in
- Respond to environment
- Recognition

Semipermeable Membrane



Small non-charged molecules move through easily. Examples: O_2 & CO_2

Semipermeable Membrane

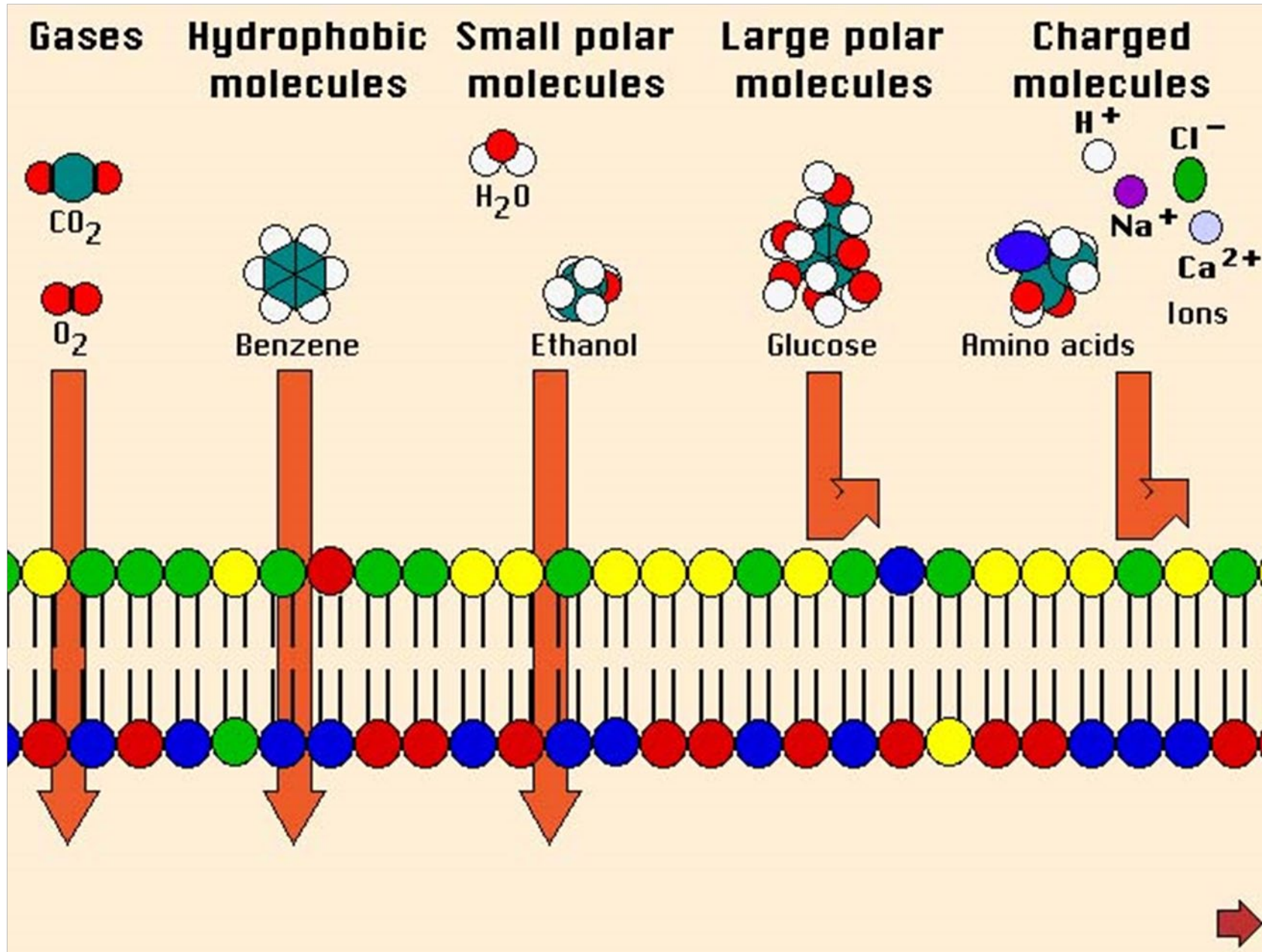


Ions, and large molecules such as **glucose** and **amino acids** do not move through the membrane on their own. **They must use transport proteins**

Proteins—For Function

- Transport
- Receptors
- Enzymes
- Signal Transducers
- Support

Permeability of the Cell Membrane



DIFFUSION

- Diffusion

- the **passive** movement of molecules from a higher to a lower concentration until *equilibrium* is reached.
- Gases move through plasma membranes by diffusion.

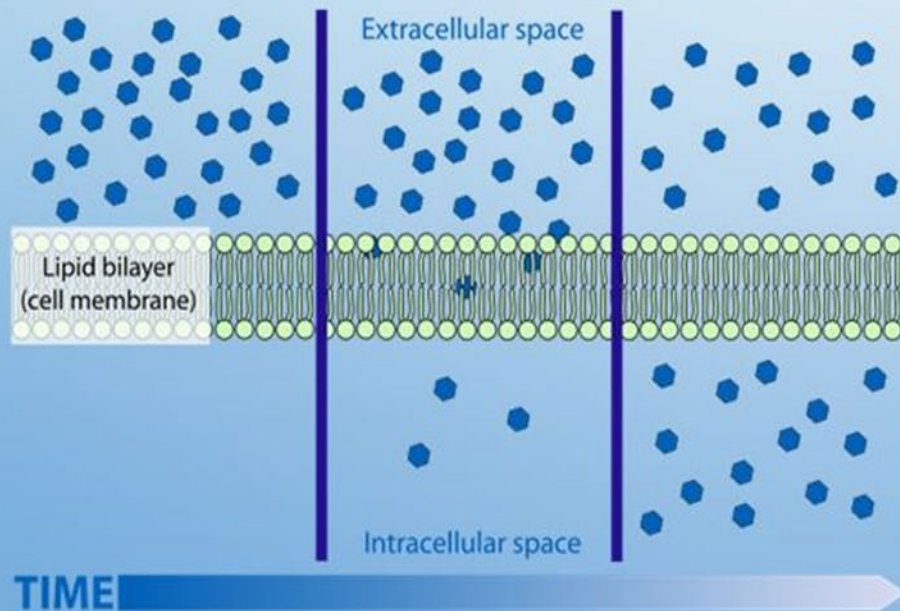
- Osmosis – A special case of diffusion

DIFFUSION AND OSMOSIS

(PASSIVE TRANSPORT)

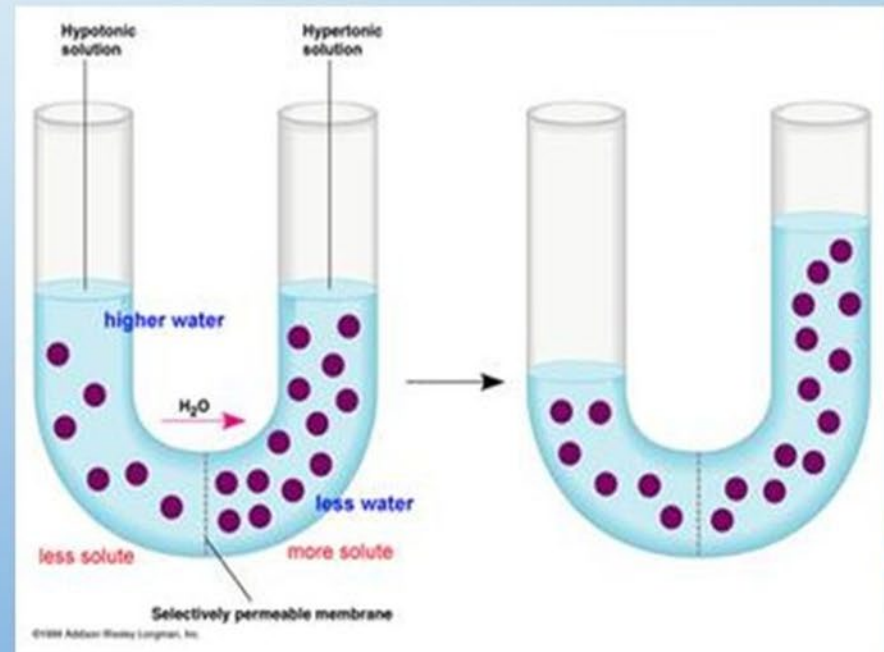
DIFFUSION

- MOVEMENT OF **MOLECULES** FROM HIGH CONCENTRATION TO LOW CONCENTRATION



OSMOSIS

- MOVEMENT OF **WATER** THROUGH A SEMIPERMEABLE MEMBRANE FROM AREAS OF HIGHER TO LOWER CONCENTRATION



| OSMOSIS | DIFFUSION |
|---|---|
| It involves movement of solvent molecules | It involves movement of solute molecules |
| Molecules move from lower concentration of solute to higher concentration of solute | Molecules move from higher concentration of solute to lower concentration of solute |
| It occurs only across a semi-permeable membrane | It does not require semi-permeable membrane |
| Example: Shrinking of Potato slice when kept in concentrated sucrose solution | Example: Spreading of ink when a drop of it is put in a glass of water. |

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