

CHM 425
CYTOLOGY FOR CHEMIST
PART III

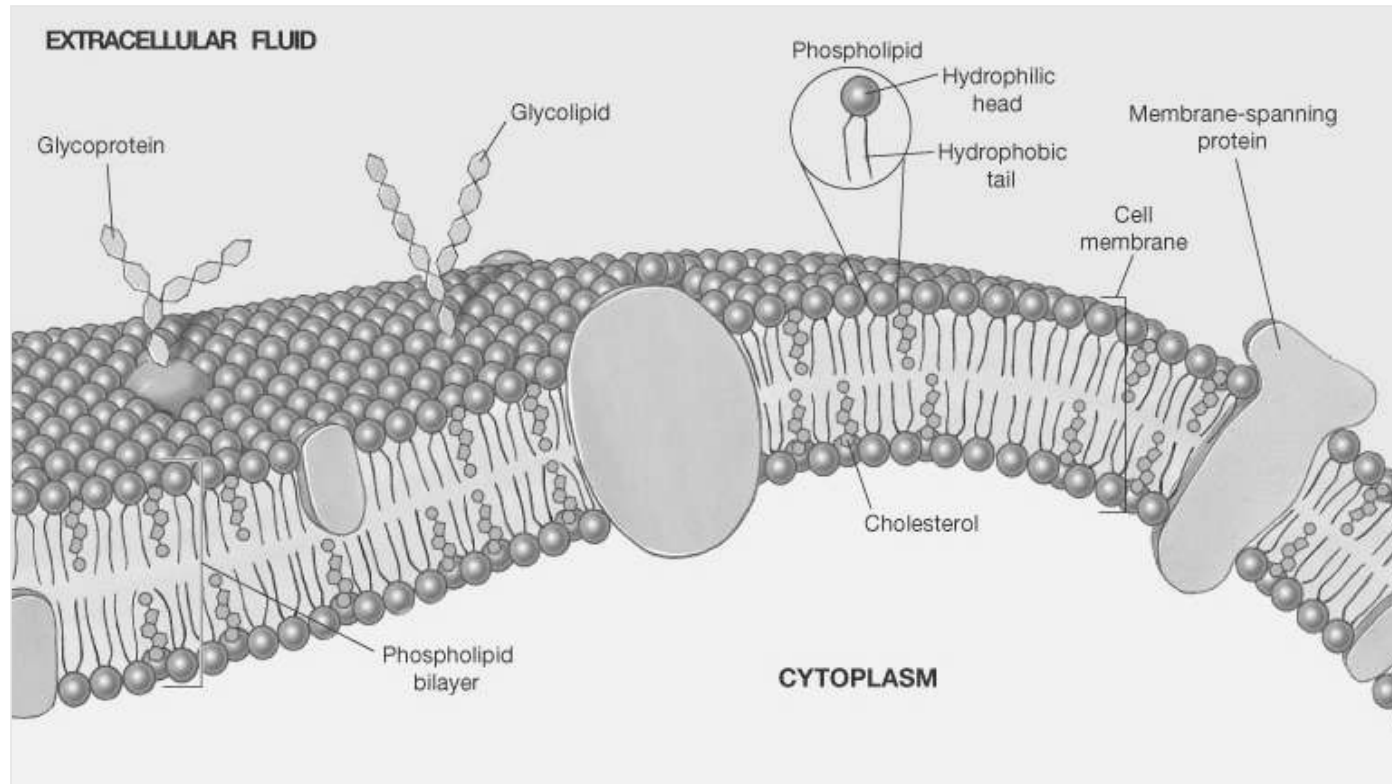
Cell Membrane

It consists of protein and glycolipids between two layers of phospholipid layers according to the liquid-mosaic membrane model. The most important feature is that it is selectively permeable.

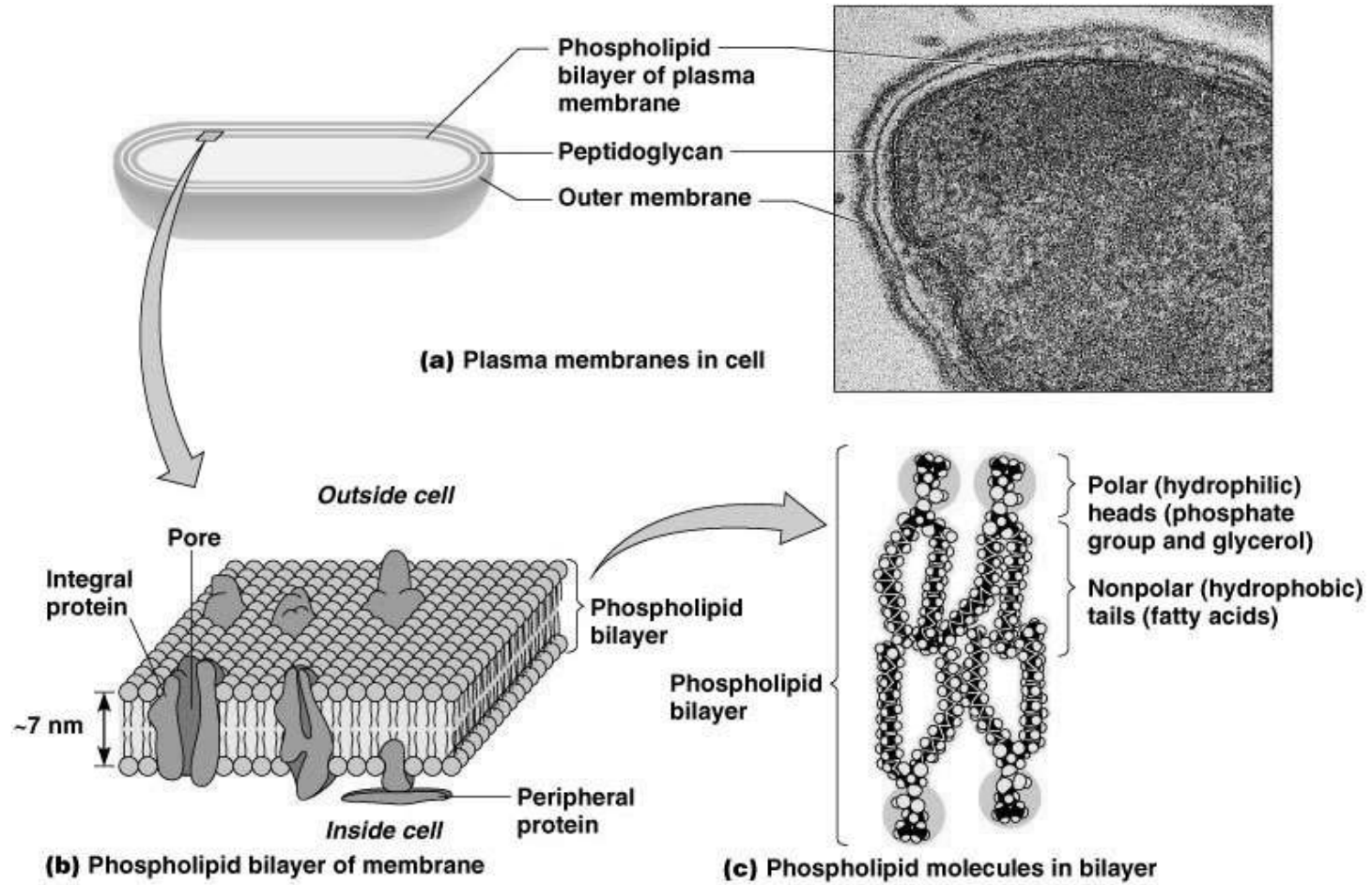
Through the cell membrane;

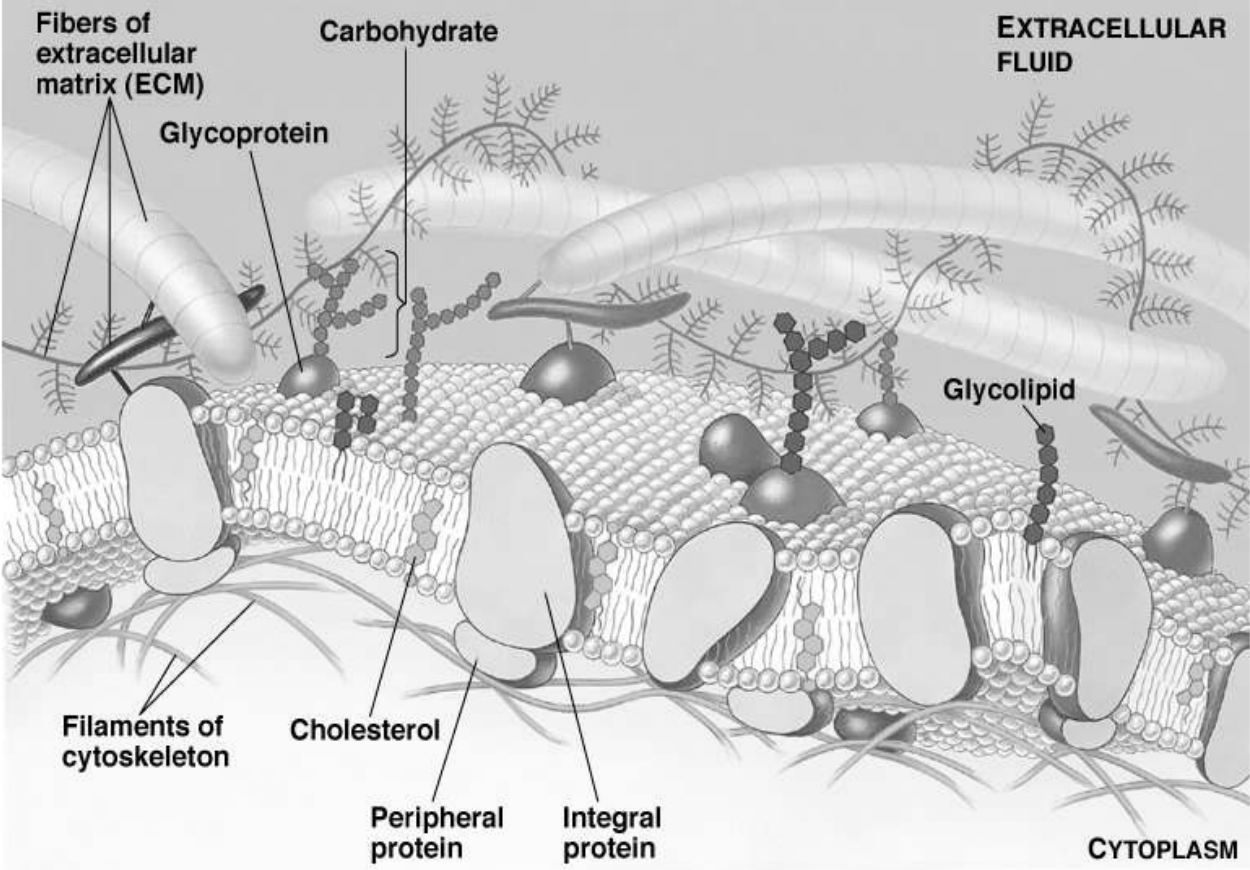
- * Small molecules relative to large molecules
- * Fat solvents (alcohol, acetone ...) and fat soluble substances (vitamins A, D, E, K) compared to water soluble,
- * Neutral atoms pass more easily than ions

Cell membrane

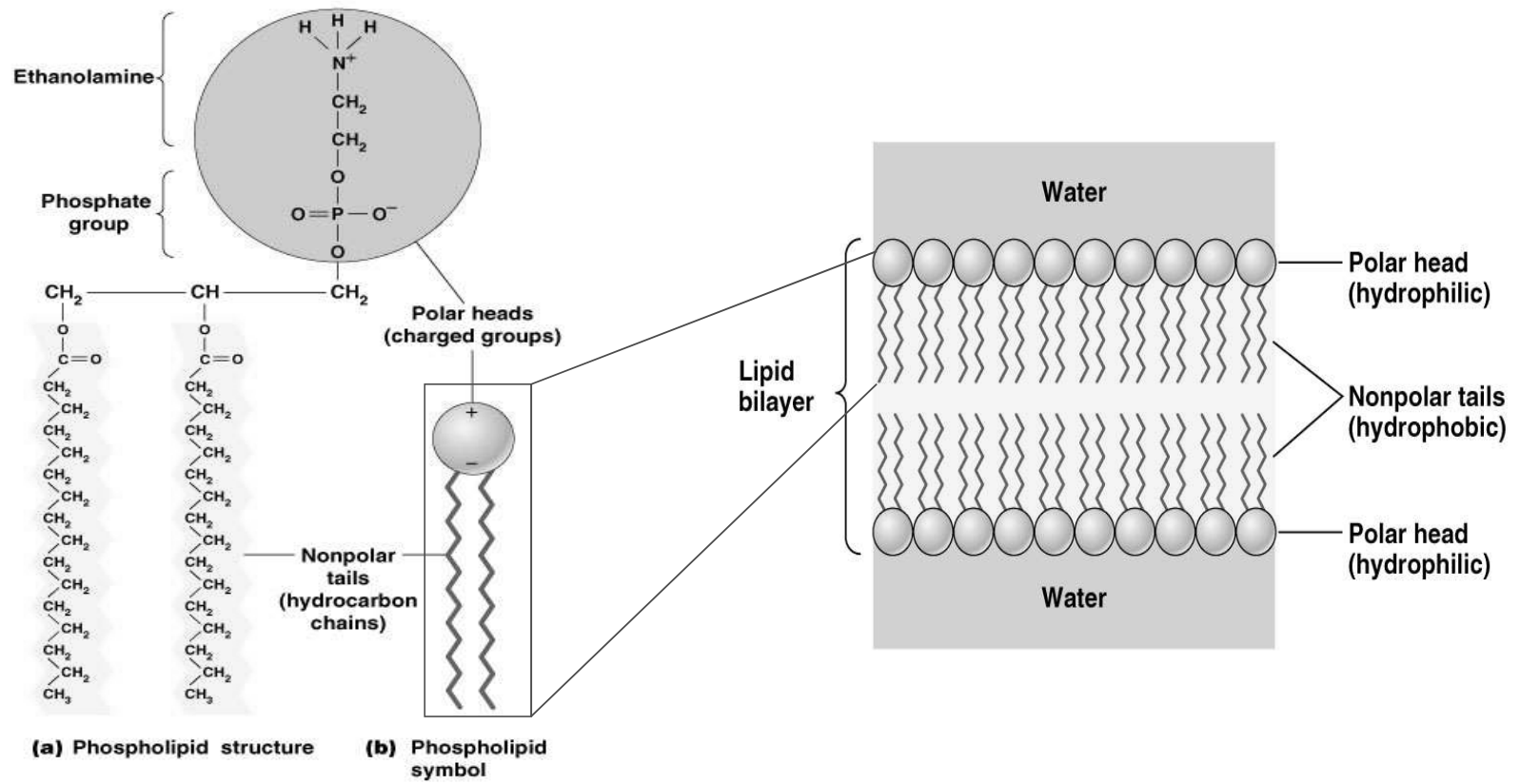


Hücre Zarı





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Peripheral (extrinsic) proteins: they are loosely attached to the membrane surface and can be easily extracted.

They bind to other proteins or polar head groups in membrane lipids by electrostatic interactions or H bonds.

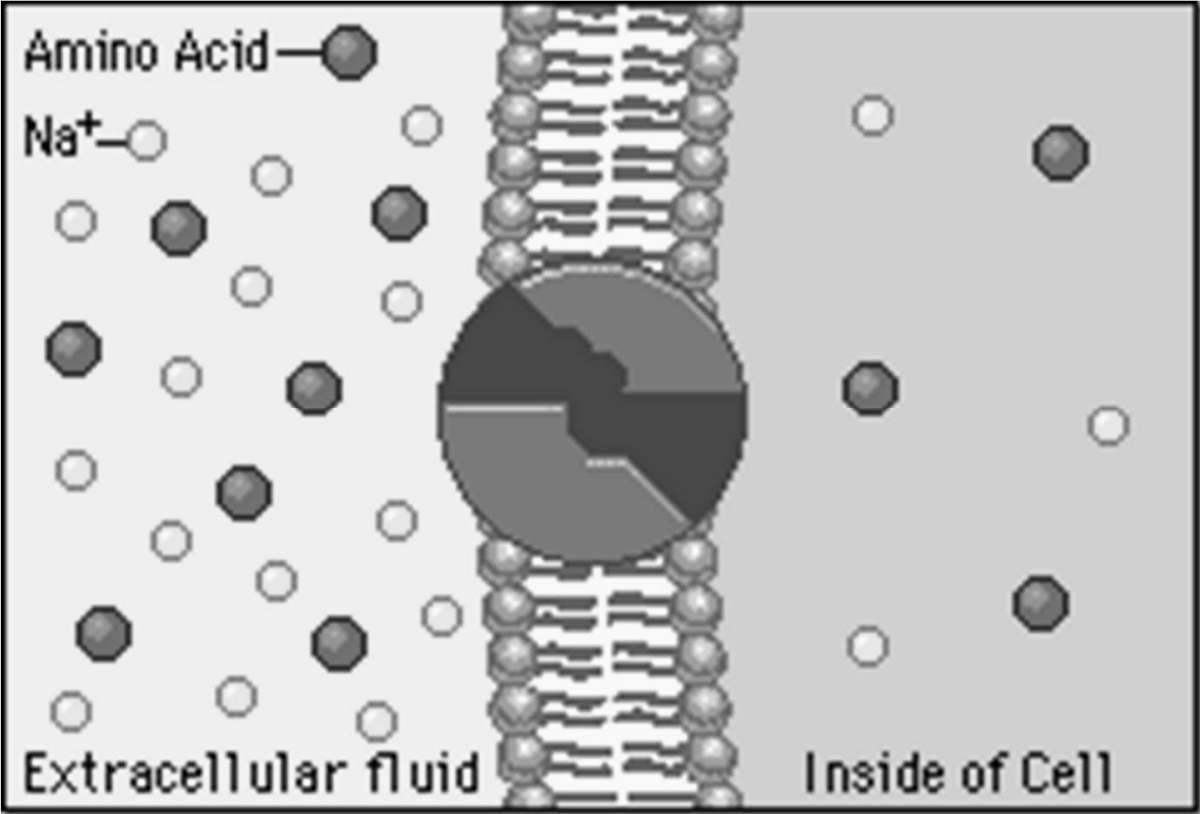
Integral (intrinsic) proteins: (70% majority) embedded in the lipid layer.

There are hydrophobic interactions between the apolar amino acid side chains and the hydrophobic chains of lipids. These can be extracted with detergents such as SDS.

Liposomes: They are used as cell membrane models and material transfer due to their structure similarities.

What cell membrane responsible for

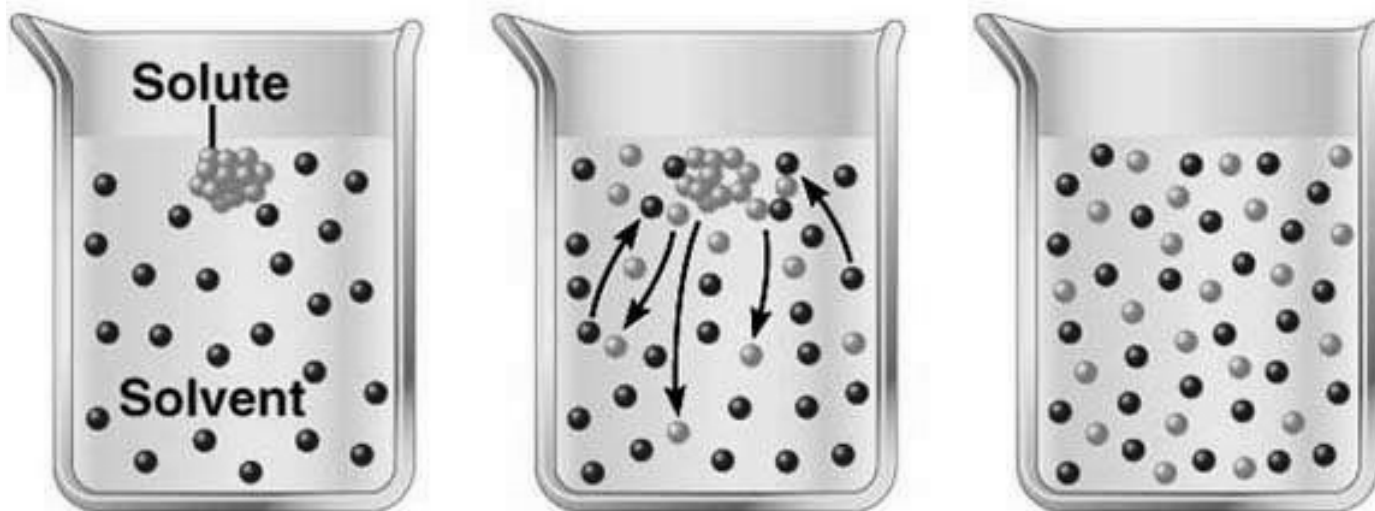
1. It shapes the cell and protects it from external factors.
2. It enables the cell to exchange the substance. It provides selective permeability.
3. It allows cells to recognize each other.
4. It allows the cells to hold together.



Equilibrium is a condition in which the movement in one direction is equal to the movement in another direction

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Diffusion

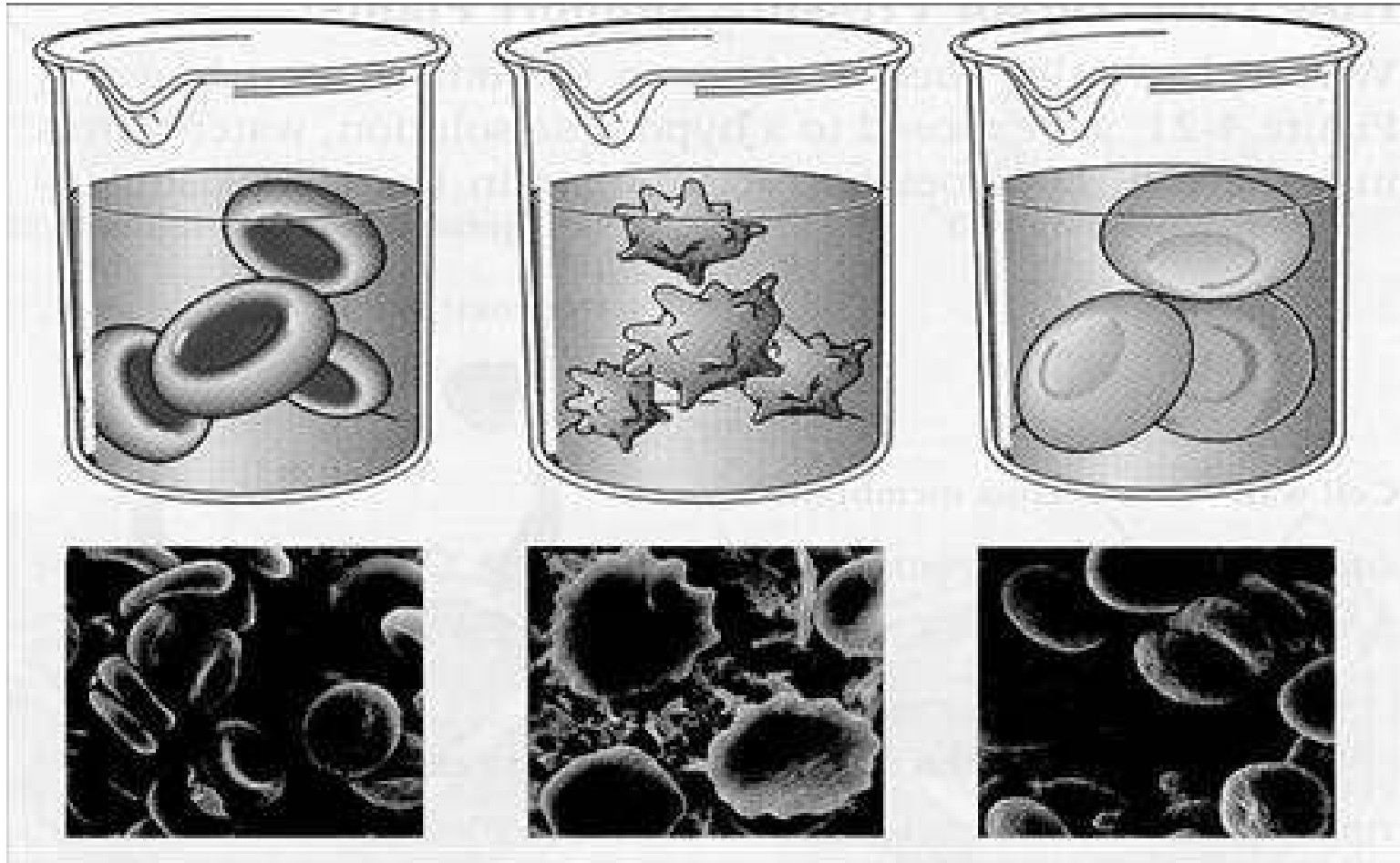


Osmosis

- movement of water through a membrane from a region of higher to lower con.
- Solute - substance being dissolved in a liquid (ex. salt)
- Solvent - substance doing the dissolving (ex. water)
- Permeability - the extent to which a membrane will allow particular sized molecules to pass
- Semi-permeable membrane (selectively permeable)-allows some molecules to pass but not others

- When comparing two solutions there are three possible relationships, We Identify the relationships by determining what would happen if a cell were placed in the solution.
- **Hypertonic**- A solution that causes a cell to **shrink** because of osmosis. Meaning water leaves the cell.
- **Hypotonic**- A solution that causes a cell to **swell** because of osmosis meaning water rushes into the cell.
- **Isotonic**-A solution that causes **no change** in cell size. Meaning there is no movement of water.

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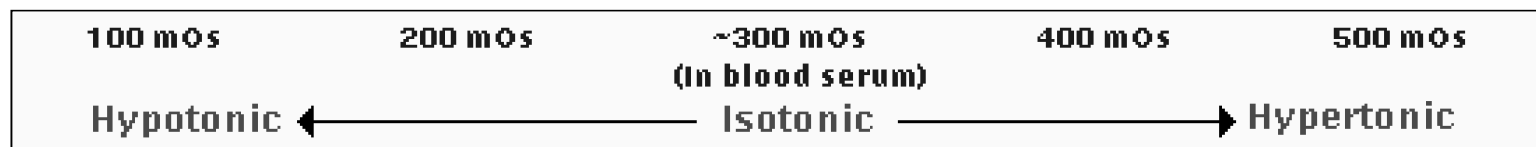
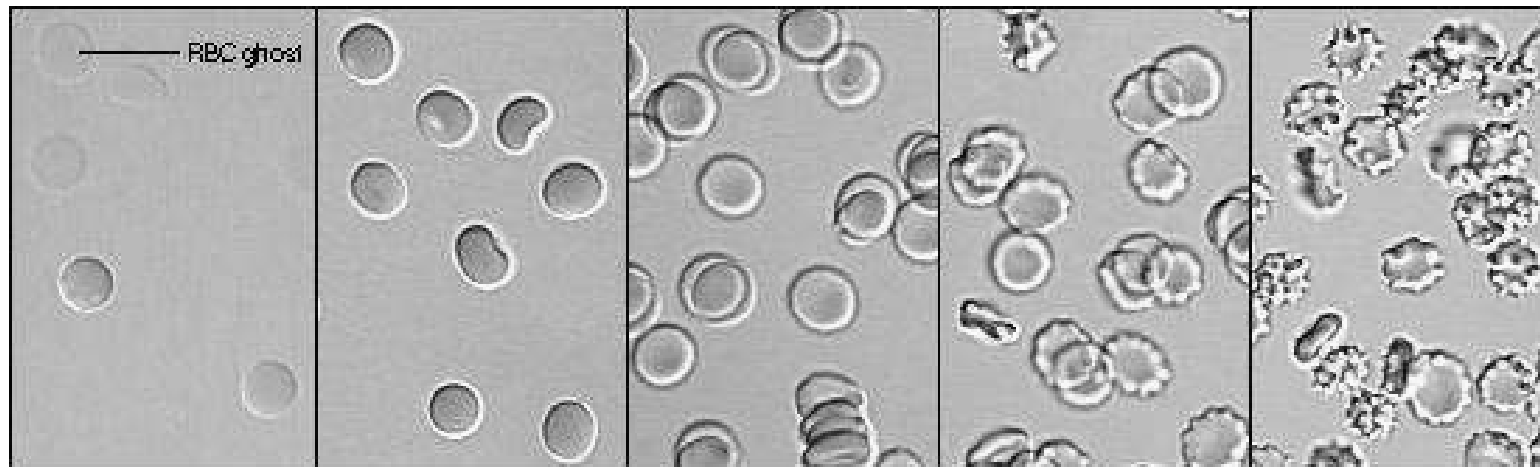


(A)

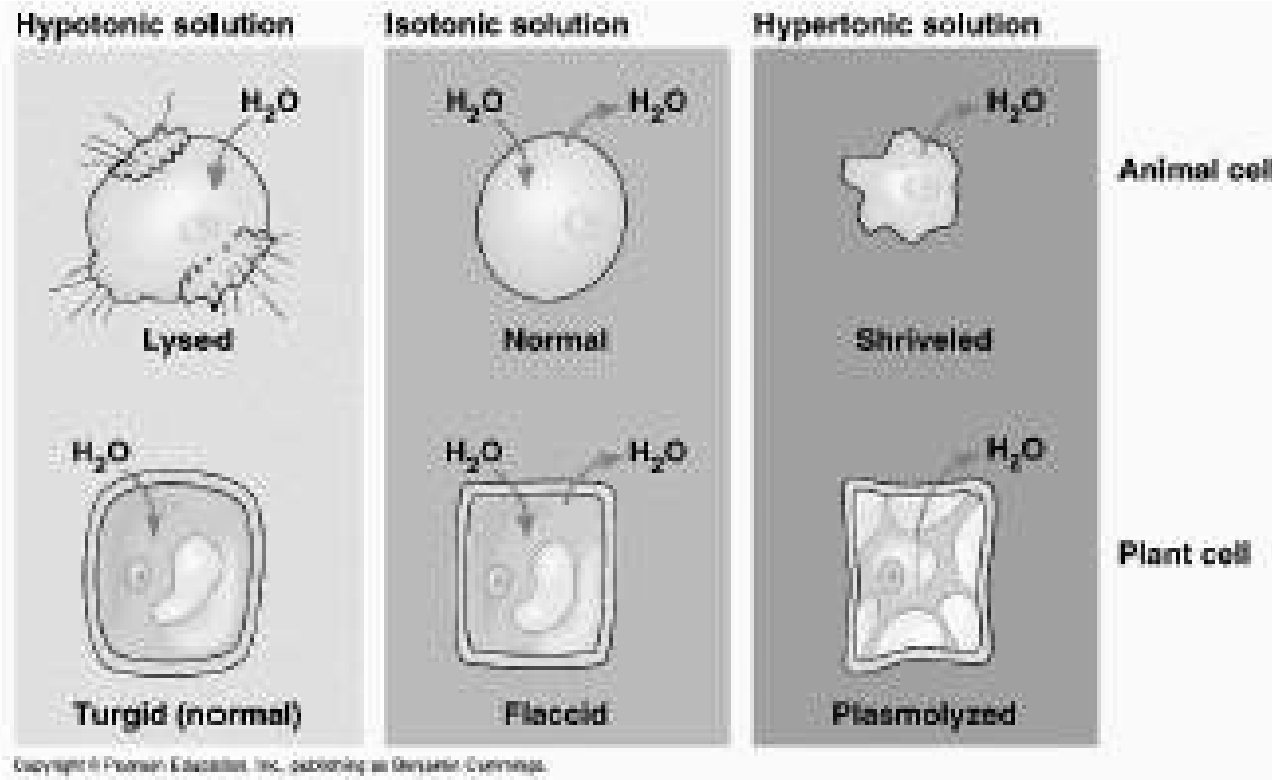
(B)

(C)

Osmosis



Osmosis



Active Transport-

- the movement of a substance against the concentration gradient. (uphill)
- Active transport requires cell to USE ENERGY
- **Sodium pump** - transports three sodium ions out of the cell and two potassium ions into the cell

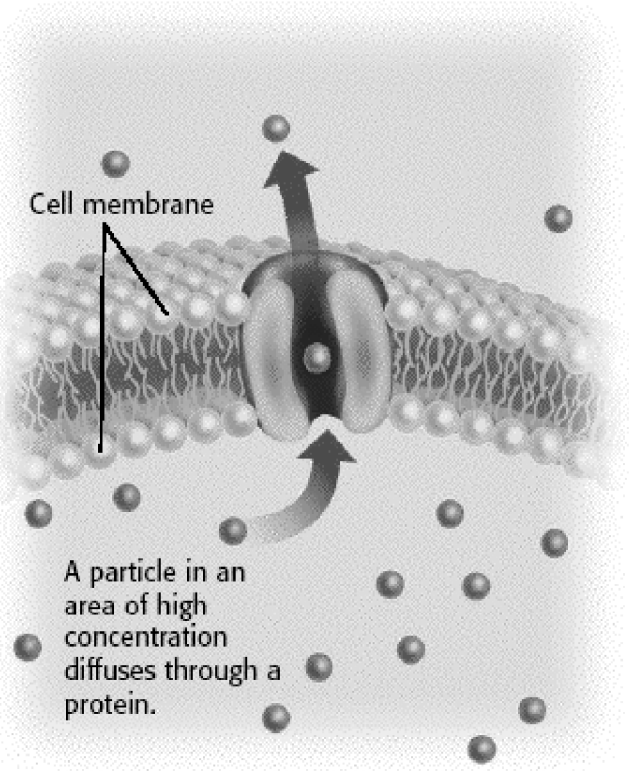
Both are against the concentration gradient

The energy needed to perform this activity is supplied by ATP (adenosine tri-phosphate)

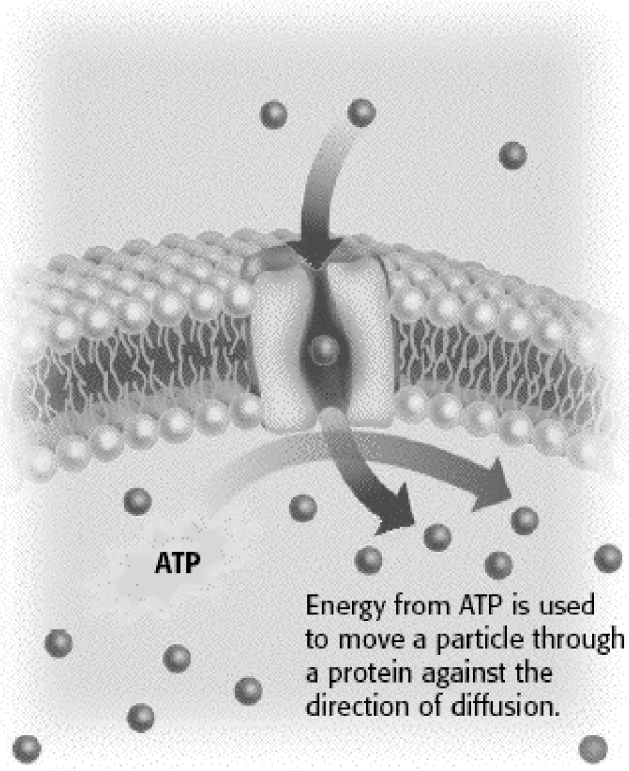
ATP is a unit of energy made by the cell

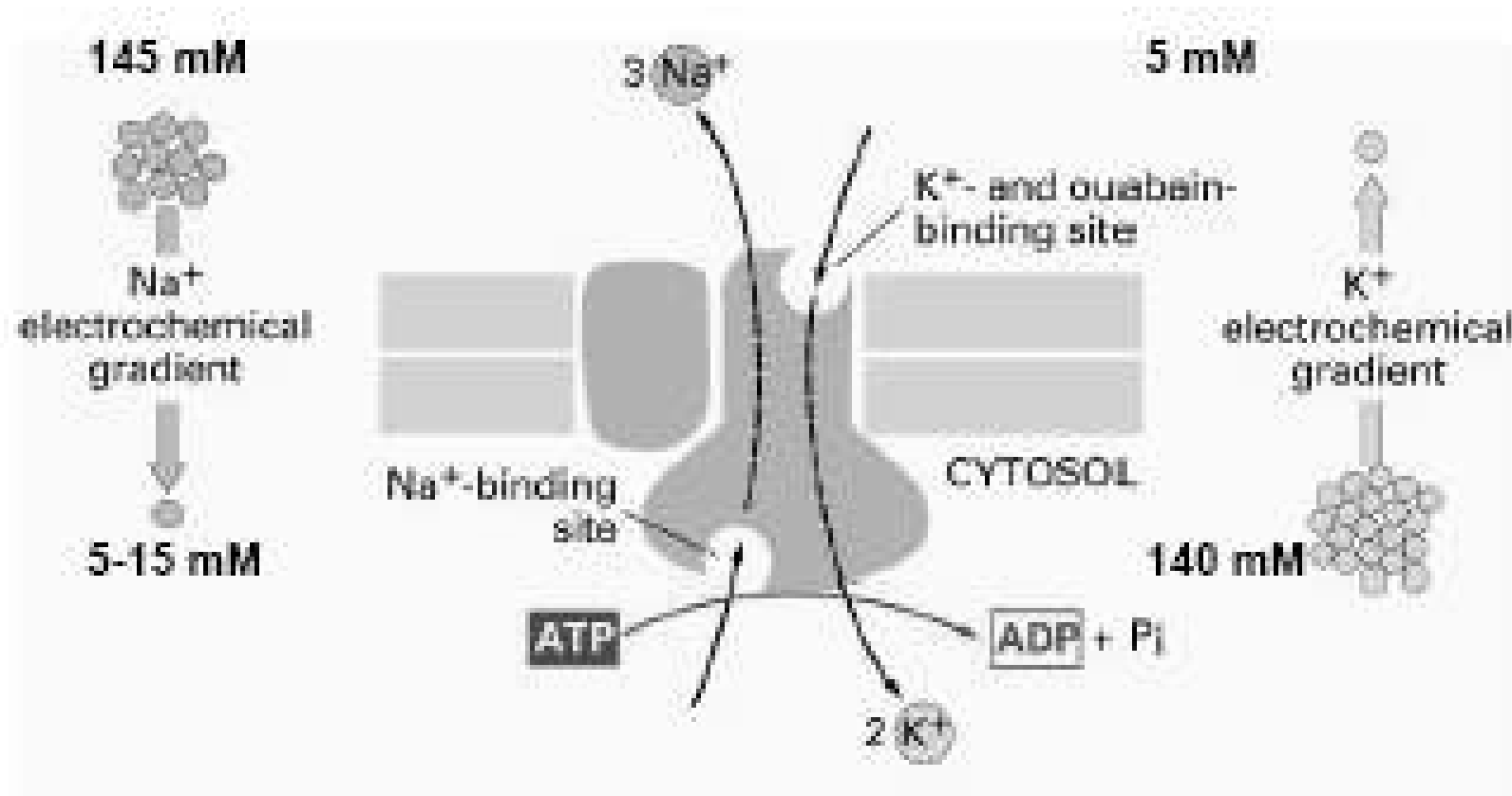
Passive and Active Transport

PASSIVE TRANSPORT

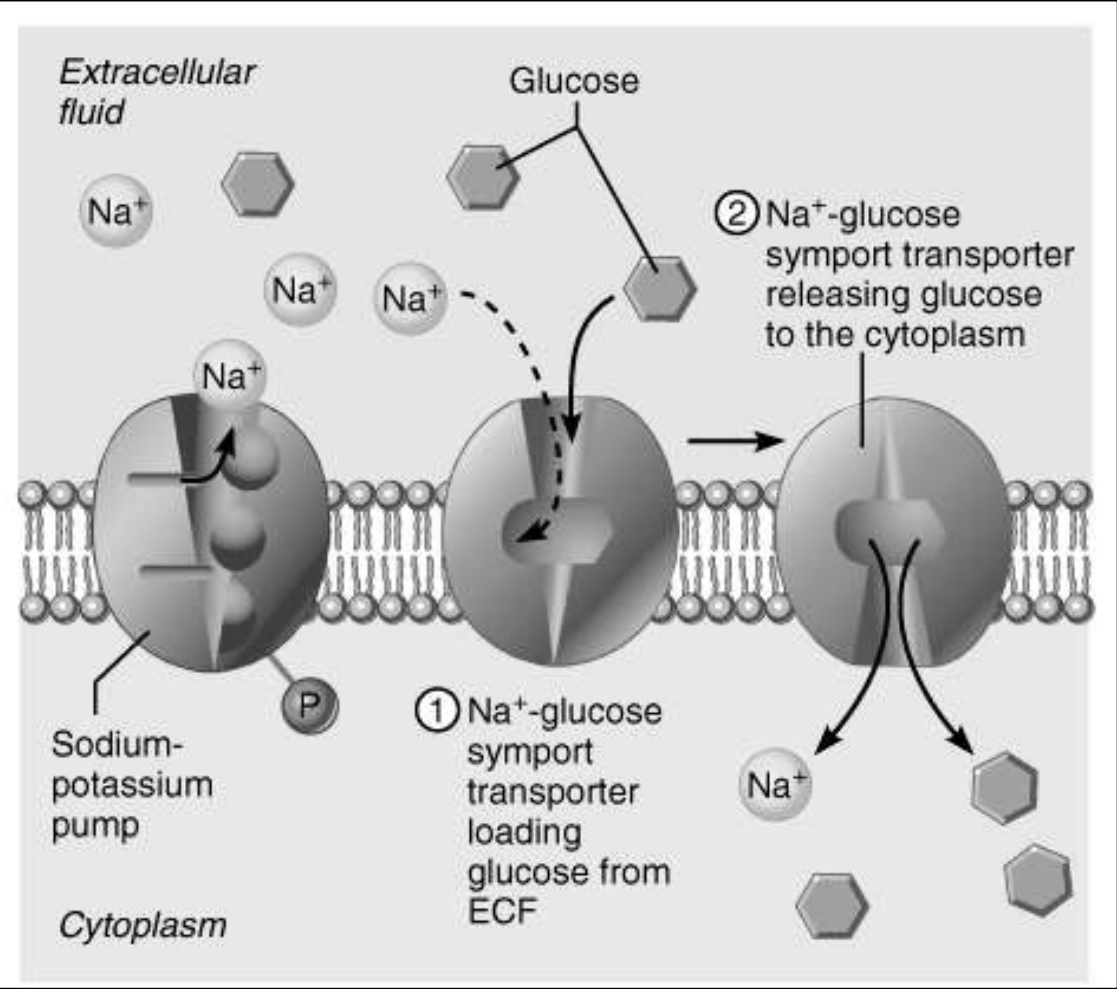


ACTIVE TRANSPORT

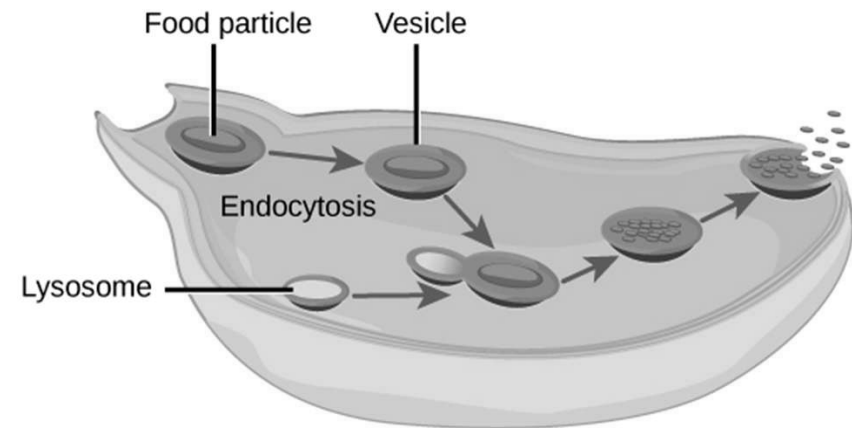




Na-Glu Co-transport system



- Endocytosis- the movement of a substance into the cell by a vesicle. A vesicle is a form of packaging that is used by cells.
- Exocytosis- the movement of a substance out of the cell by a vesicle.
- Phagocytosis- cytoplasm of cell surrounds and engulfs particle--ex. ameba and white blood cell
- Pinocytosis- plasma membrane "pinches in" to permit entry of molecules too large to diffuse through



Exocytosis

