CELL MEMBRANE FUNCTION

MEMBRANE TRANSPORT

The cell membrane consists of a lipid bilayer is semipermeable, it regulates the transport of materials entering and exiting the cell

Definitions

1, Transport

In general, the term transport is the movement (of something) from one place to another.

In biology, transport is the act or the means by which molecules, ions, or substrates are moved across a biological membrane, such as the plasma membrane.

2, Selective permeability

The double layer of lipids is

Permeable to:

*Very small molecules (H_2O, CO_2, O_2)

*Fat-soluble molecules (hydrophobic, non-polar)

Raincoat to: *Big molecules and most polar molecules *Ion (K^+, Cl^-, Na^+)

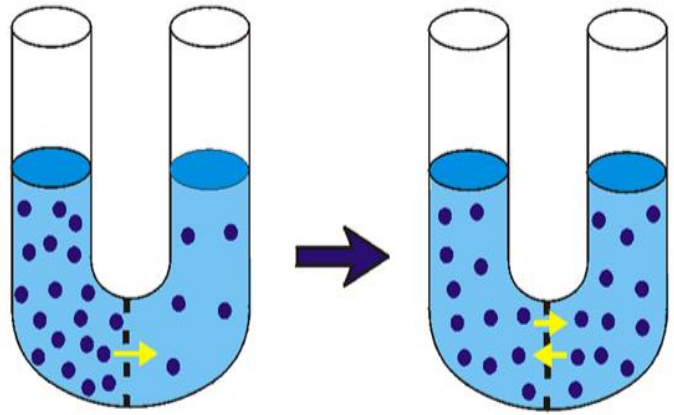
3, Concentration gradient

Gradient = difference

The concentration gradient between two media is the difference in concentration between the two media.

A diffuse substance follows its concentration gradient:

from the **most** concentrated area to the **least** concentrated area.



Types of transport

The passage of substances through the membrane can take place:

Exchanges without deformation of the plasma membrane

These are small molecule transports, without the intervention of the cytoskeleton. They are of two types, passive transportation and active transportation.

1, Passive transport (without energy expenditure)

*Passage of a substance through a membrane in the direction of the concentration gradient from the **most** concentrated area to the **least** concentrated area. *Doesn't require energy

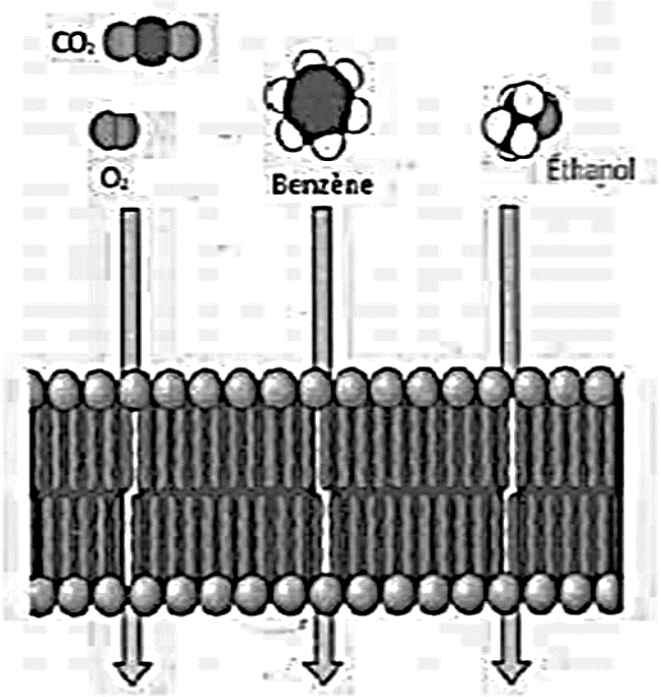
It exists three types Diffusion Osmosis
facilitated diffusion

1, Diffusion

- Moving particles from an area of high concentration to an area of lower concentration

PASSIVE TRANSPORT BY DIFFUSION

OUTSIDE OF CELL: RICH IN O_2 or CO_2 or BENZENE or any ALCOHOL



HIGH CONCENTRATION IN EXTRACELLULAR ENVIRONMENT

MOLECULES MOVE FROM HIGH CONCENTRATION TO LOW CONCENTRATION UNTIL DIFFUSION EQUILIBRIUM (CONCENTRATION WAS EQUAL = ON BOTH SIDES OF THE PLASMA MEMBRAN

LOW CONCENTRATION IN CYTOSOL

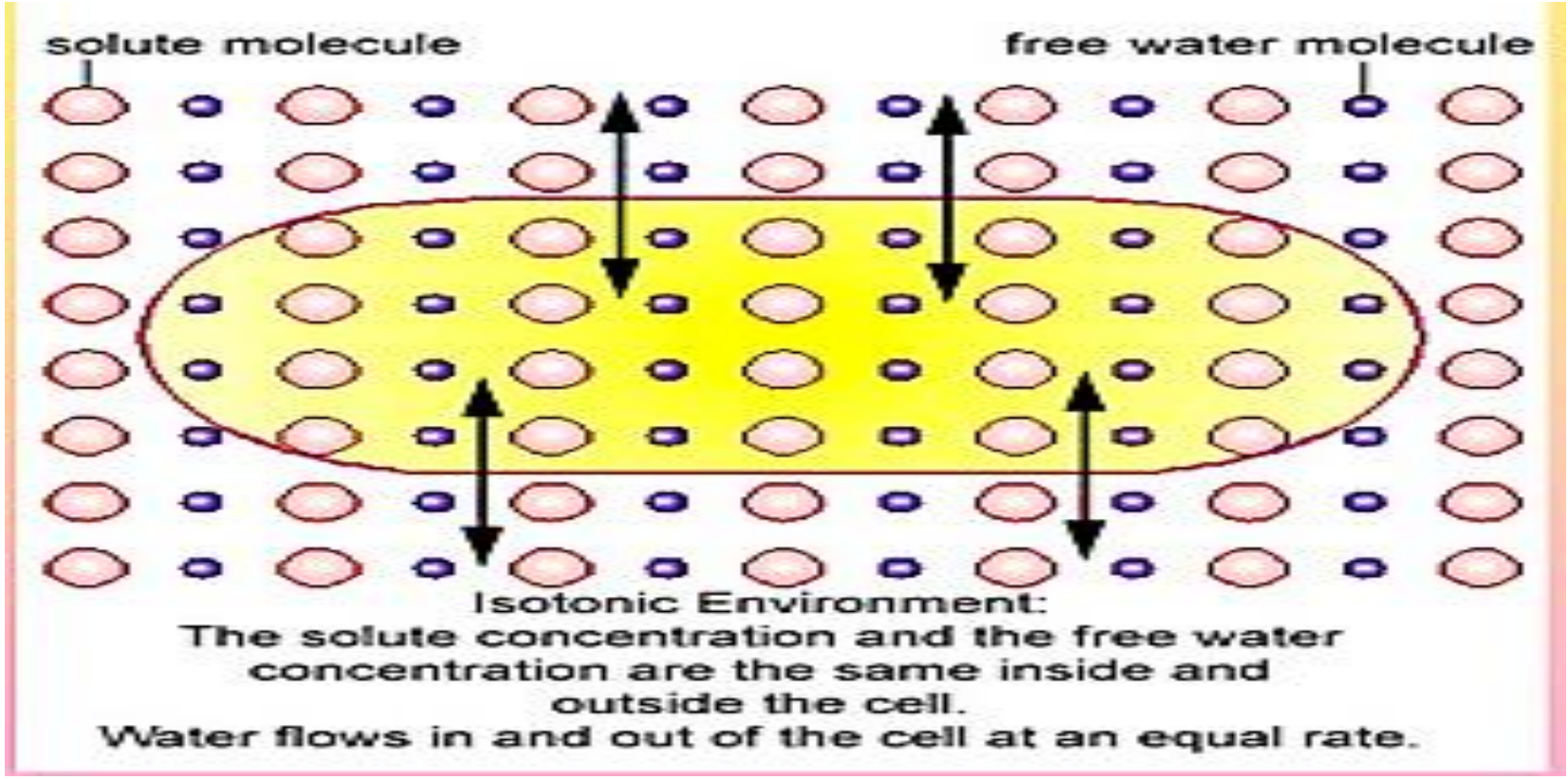
CYTOSOL

2, Osmose

•Diffusion of water through a semi-permeable membrane from an area of high water concentration (low solute concentration) to an area of low water concentration (high solute concentration)
for this type of transport we distinguish three cases

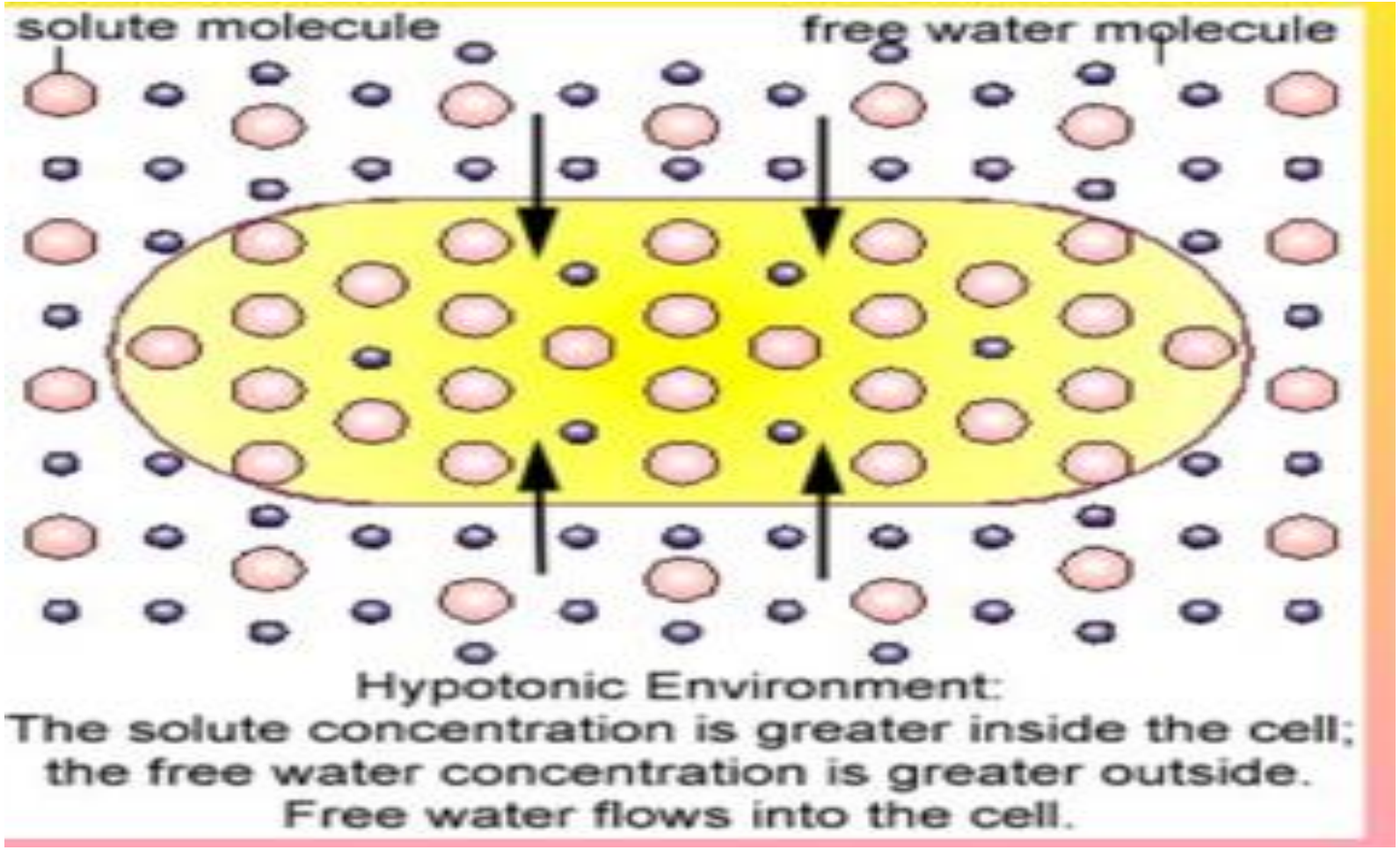
A, Isotonic solution

•Outside solute concentration = inside solute concentration



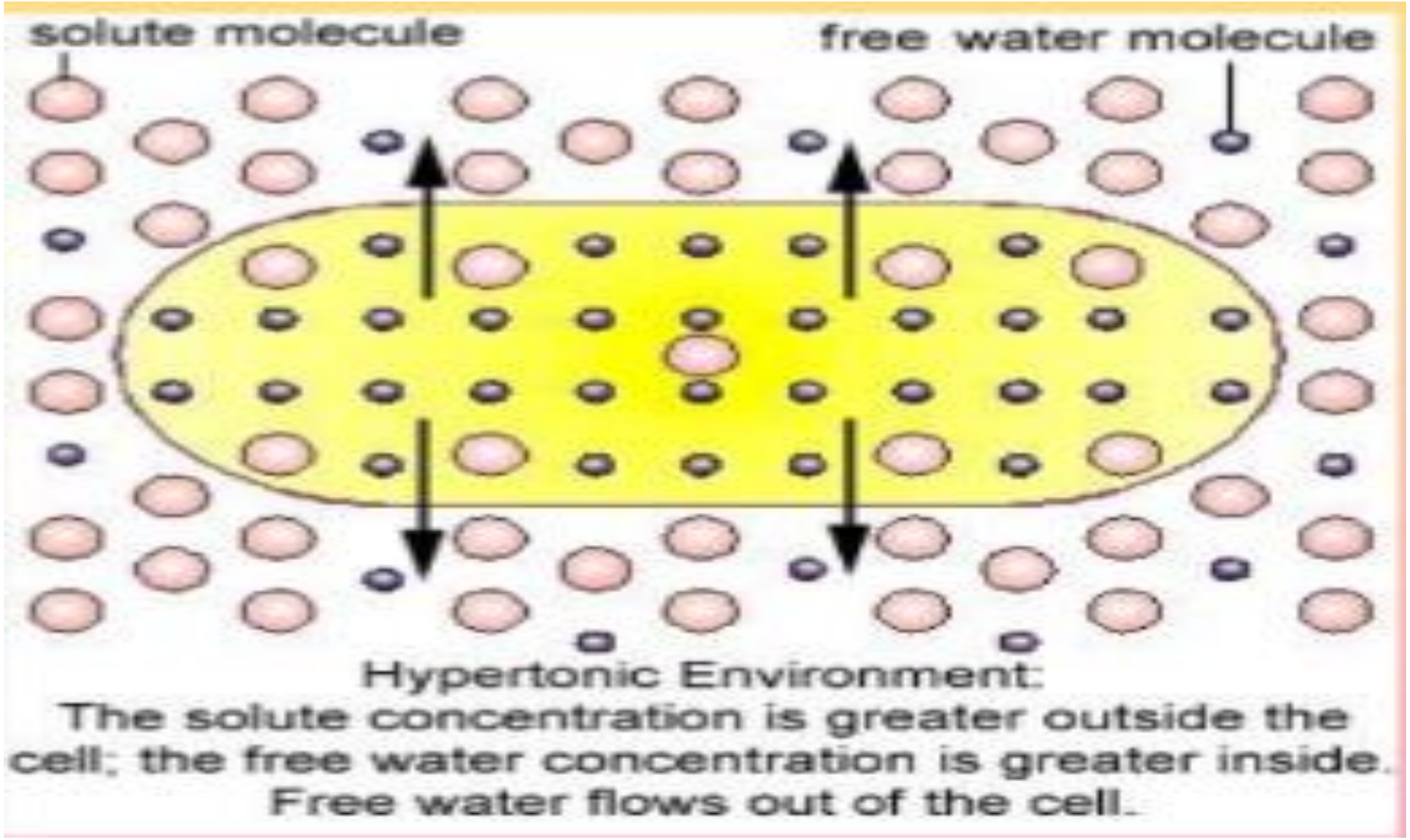
B, Solution hypotonique

•Outdoor solute concentration < indoor solute concentration

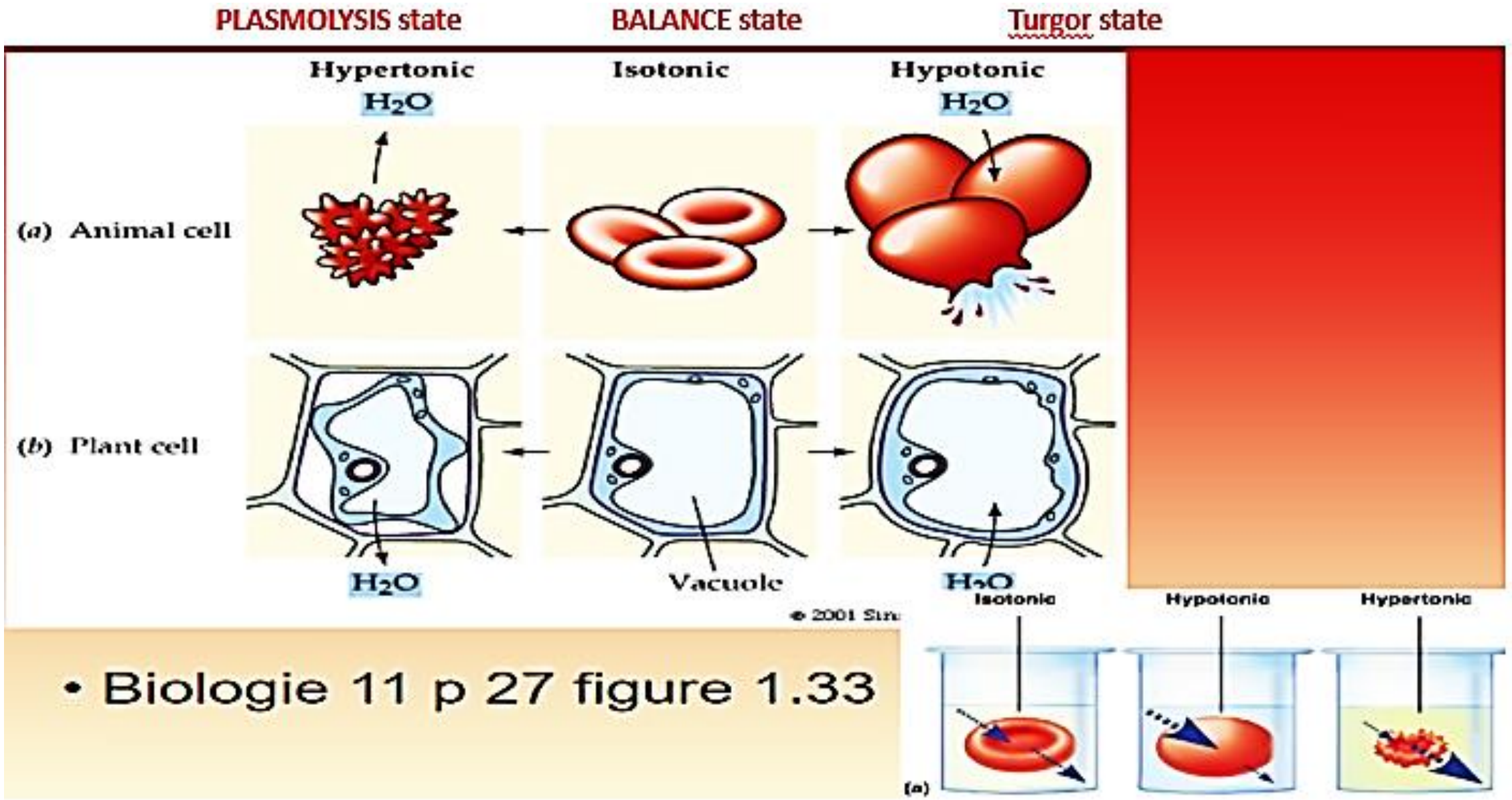


3, Solution hypertonique

•Concentration of solute outside> Concentration of solute inside



We see these cases in the animal cell and also in the plant cell



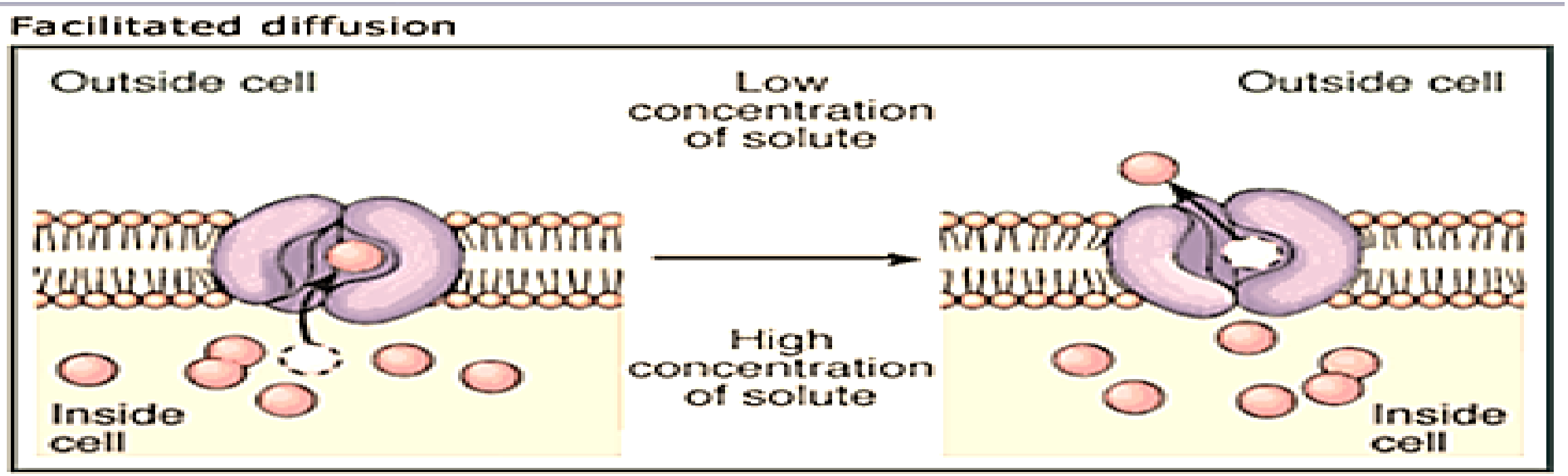
- Biologie 11 p 27 figure 1.33

3, facilitated diffusion

Diffusion occurs via a membrane protein.

- For big molecules
- For non-fat-soluble molecules
- For Transport protein that recognizes a particular molecule

NOTICED / Does not require energy expenditure / Is done according to the concentration gradient

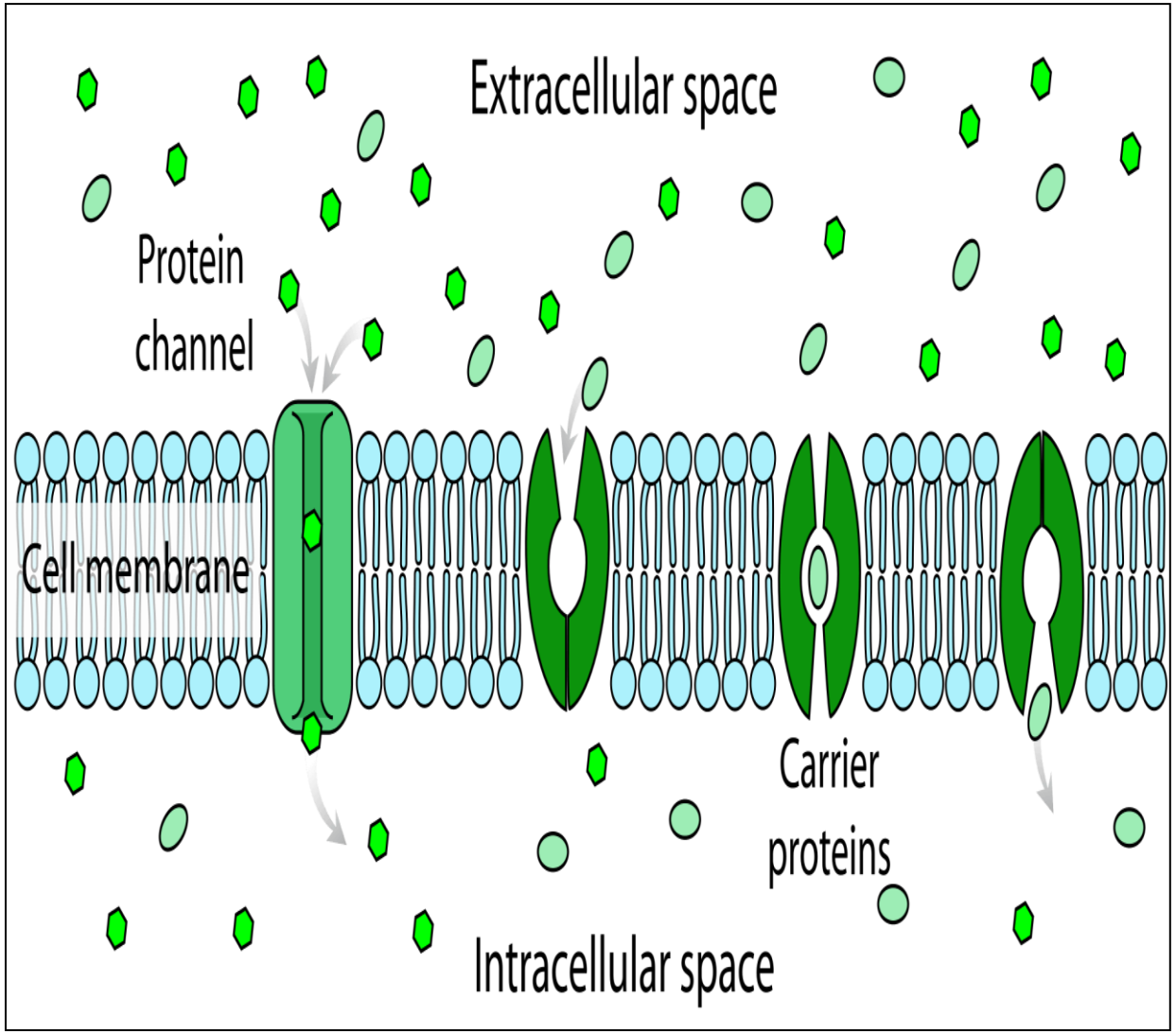


•Proteins in the membrane allow the passage of particles that cannot pass through the lipids.

•By forming channels through the membrane

OR

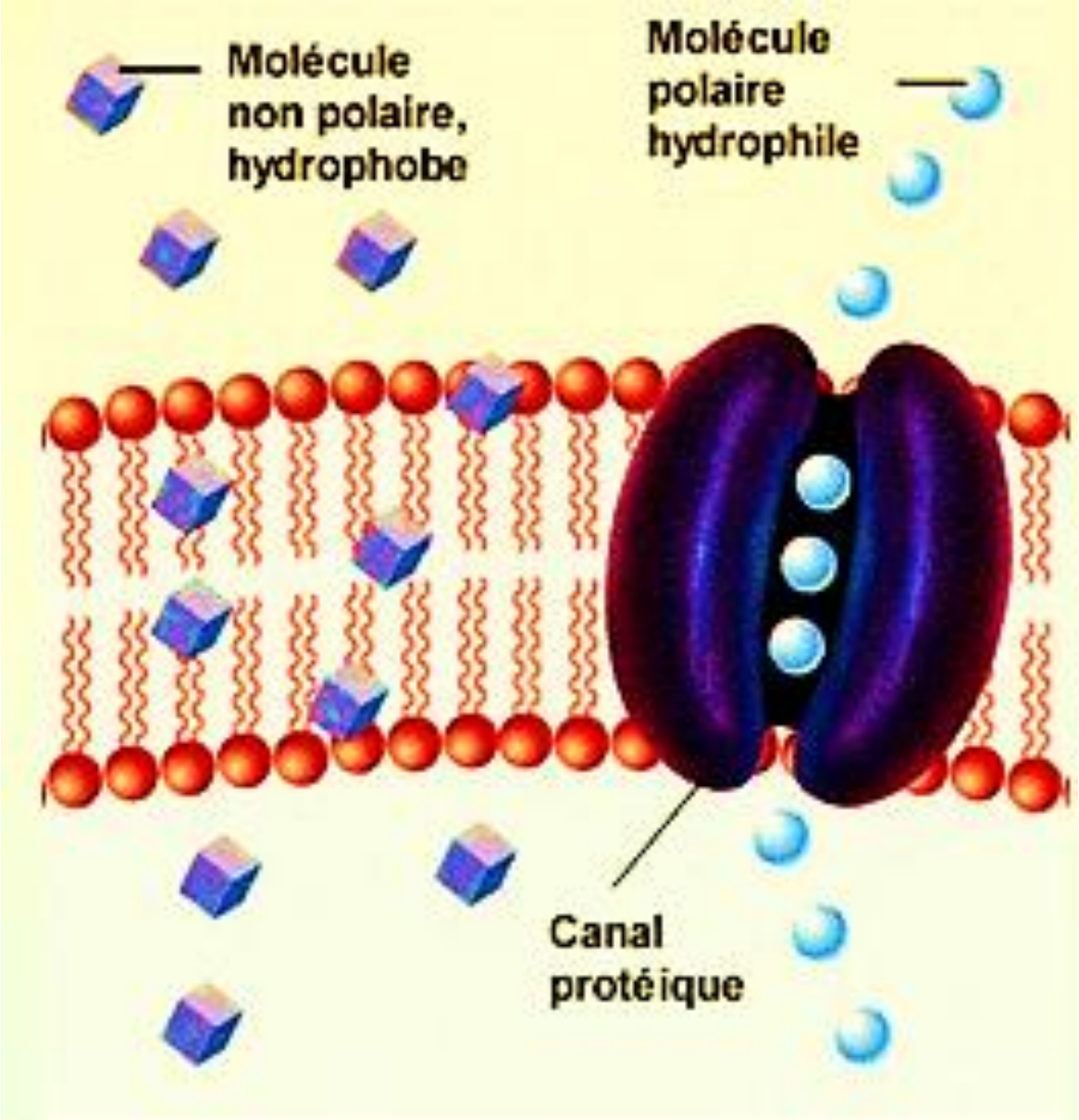
•By associating with the molecules to be transported and moving them through the membrane



NOTICED.

These channels are usually specific: only one specific substance can pass through them and no other.

So, it's not just any substance that can cross the membrane = selective permeability.



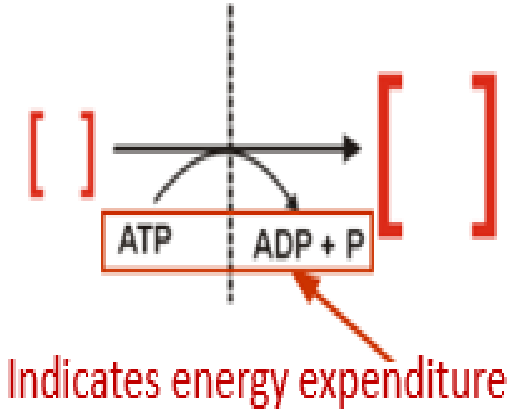
2, Active Transport

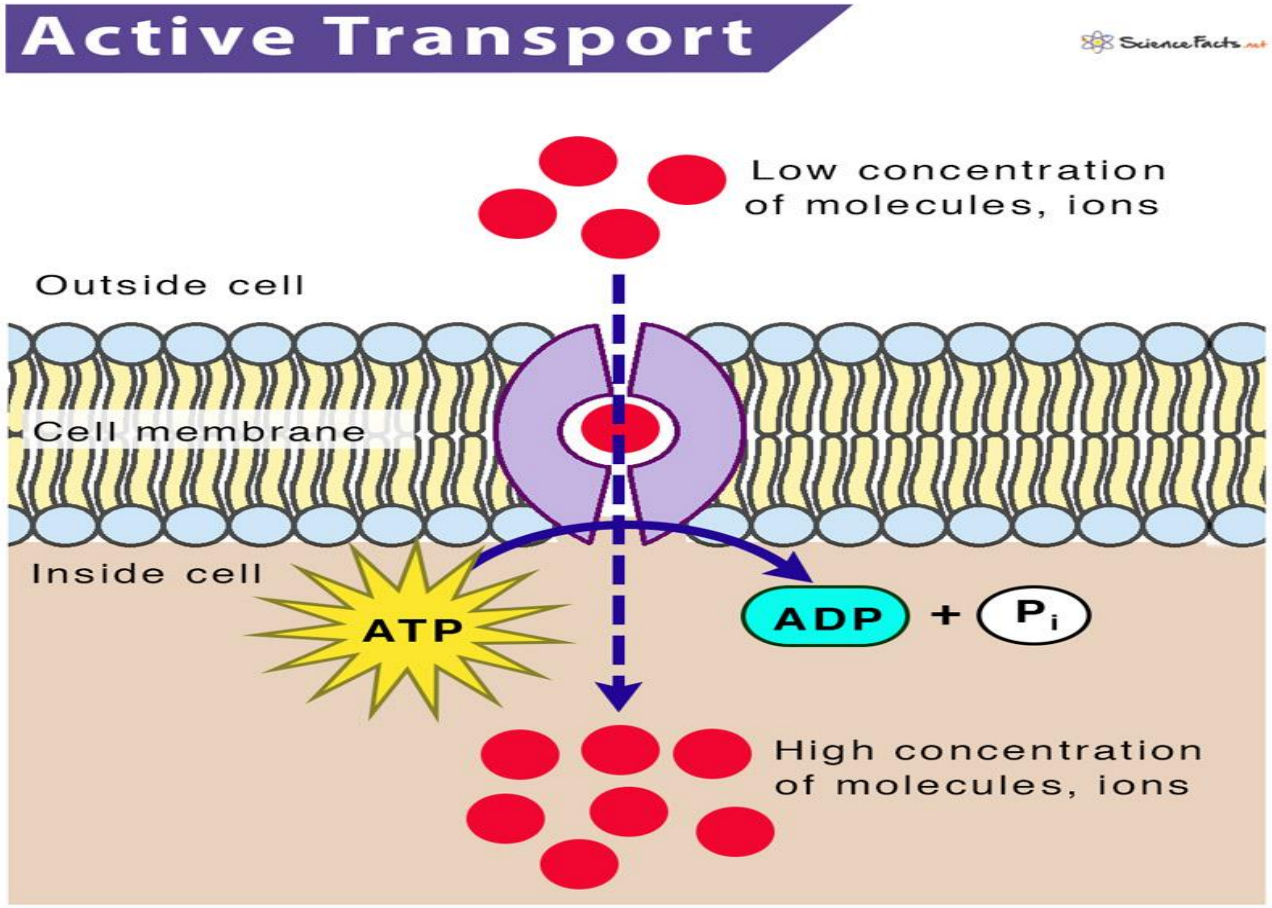
2,1, Primary active Transport : called direct active transport

*It consumes energy obtained by the hydrolysis of ATP

*And is done AGAINST the concentration gradient

* It involves enzymes called transmembrane ATPase's or pumps

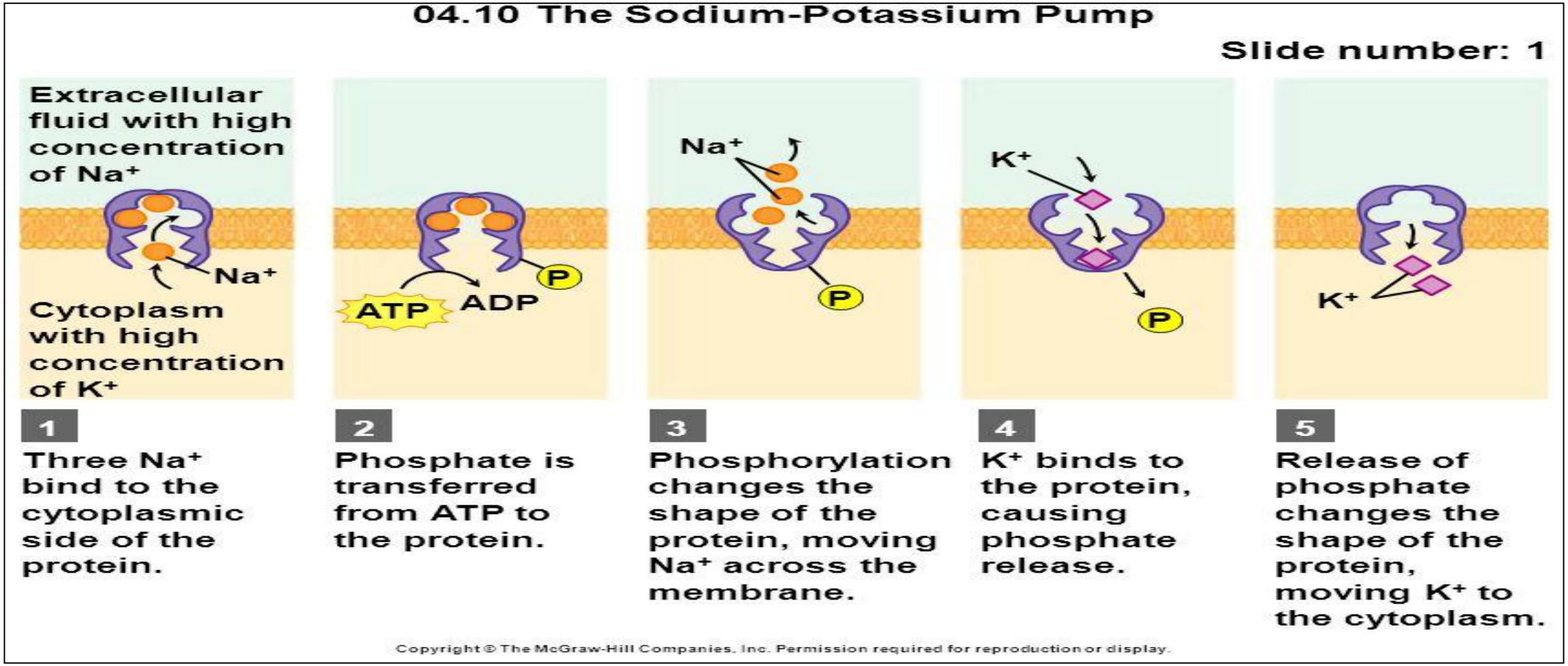




Example of Primary active Transportation

Na-K pump

The sodium-potassium pump uses active transport to move molecules from a high concentration to a low concentration.

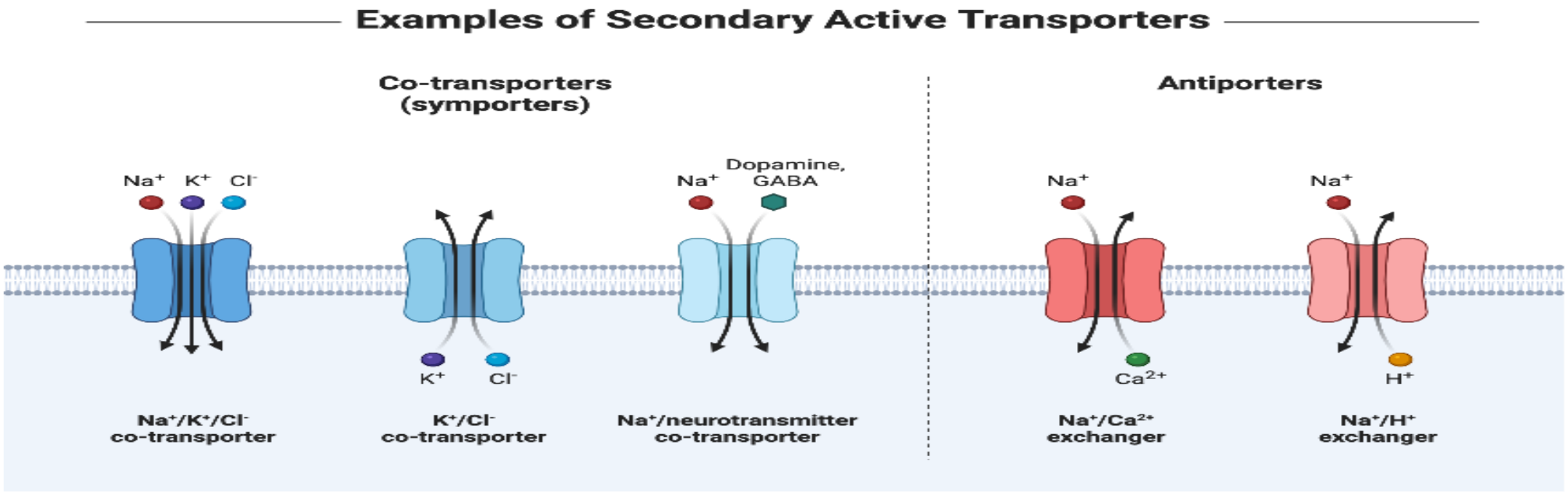


2,2, Secondary active Transport :

unlike direct active transport, it does not use the energy provided by the hydrolysis of ATP, it is the electrochemical potential difference that is used. The two main forms are

Symport: the two substances of different nature are transported in the same direction (Cotransport), one in the direction of its concentration gradient (passive transport) and the other in the opposite direction to its concentration gradient (active transport).

- Anti-port: transport of two or more substances of different nature in opposite directions (counter-transport). One is transported in the direction of the concentration gradient and the other counter-concentration gradient.



Exchanges with plasma membrane deformations

It is the transport of large molecules or particles with intervention of the cytoskeleton, case of endocytosis and exocytosis

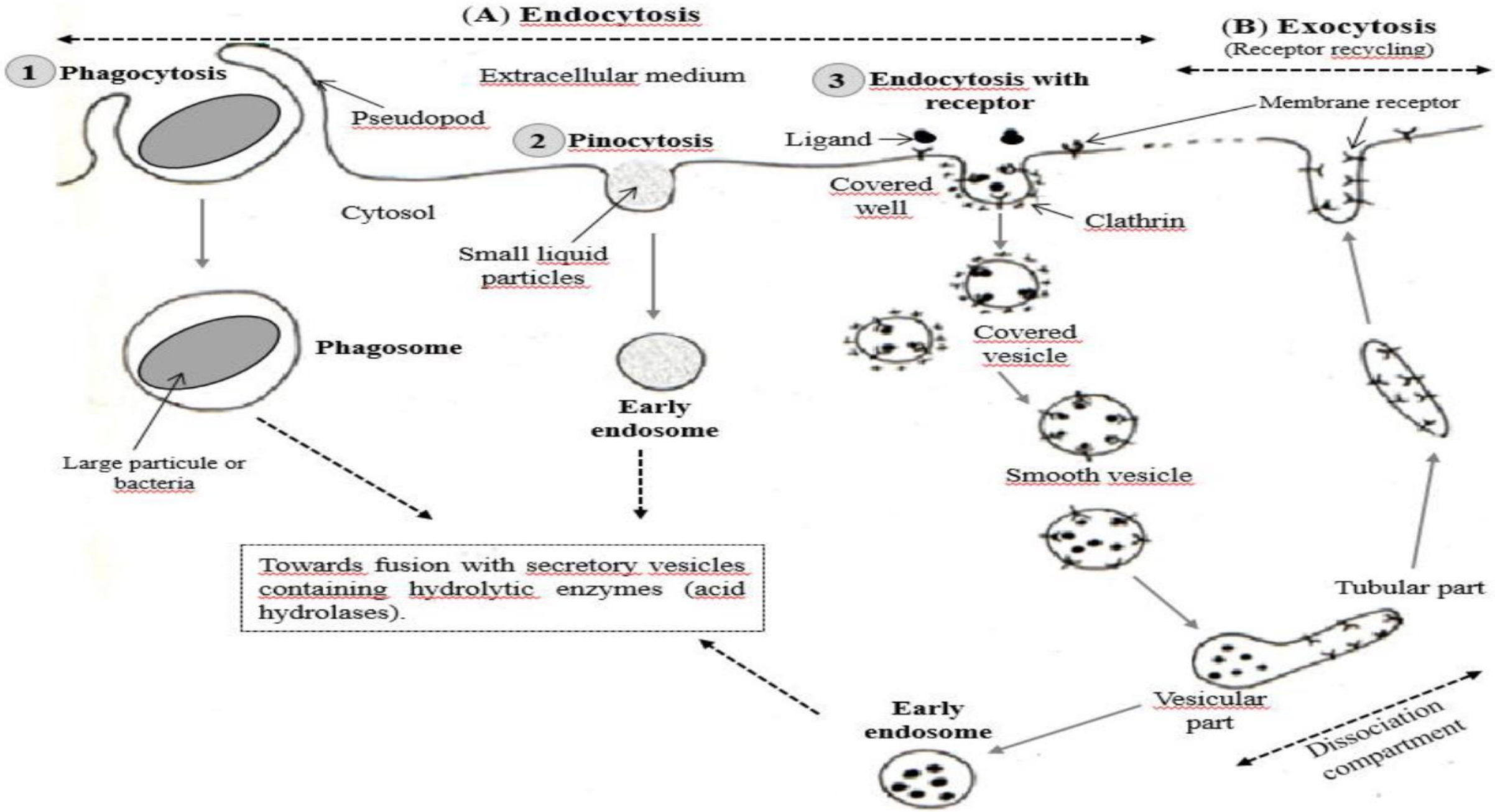
a. Endocytosis

It allows the entry of molecules to the cell (Figure 4A).. Three types of endocytosis are known:

- Phagocytosis (**1**),
- Pinocytosis (**2**) and
- Receptor endocytosis (**3**).

b. Exocytosis

On the contrary, exocytosis ensures the exit of secretion molecules to the extracellular medium and allows the recycling of membrane receptors (Figure 4B).


(A) Endocytosis
(B) Exocytosis
(Receptor recycling)
1 Phagocytosis
Extracellular medium
Pseudopod
2 Pinocytosis
3 Endocytosis with receptor
Membrane receptor
Ligand
Covered well
Clathrin
Cytosol
Small liquid particles
Phagosome
Large particule or bacteria
Early endosome
Covered vesicle
Smooth vesicle
Tubular part
Towards fusion with secretory vesicles containing hydrolytic enzymes (acid hydrolases).
Early endosome
Vesicular part
Dissociation compartment