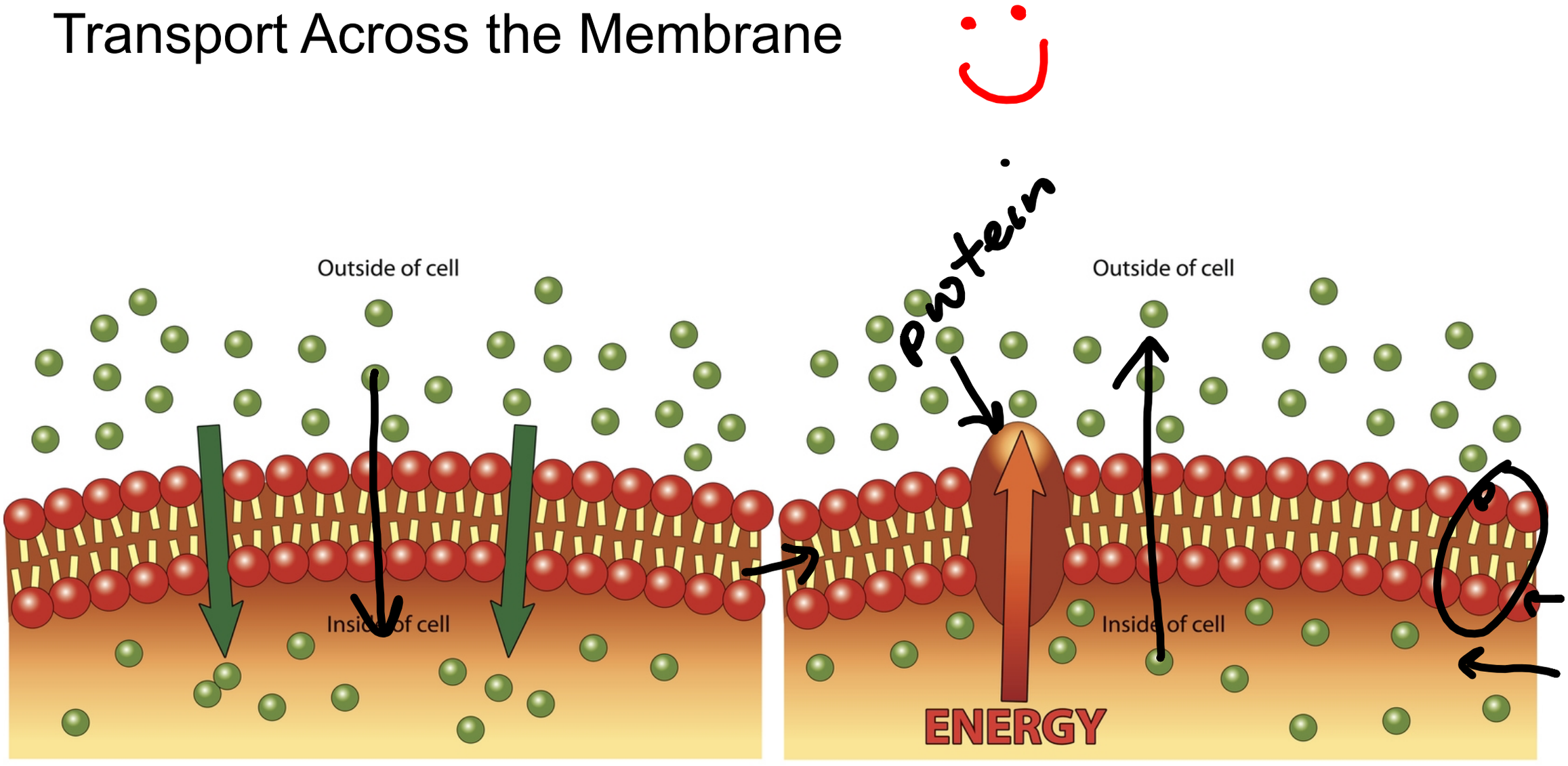
Transport Across the Membrane



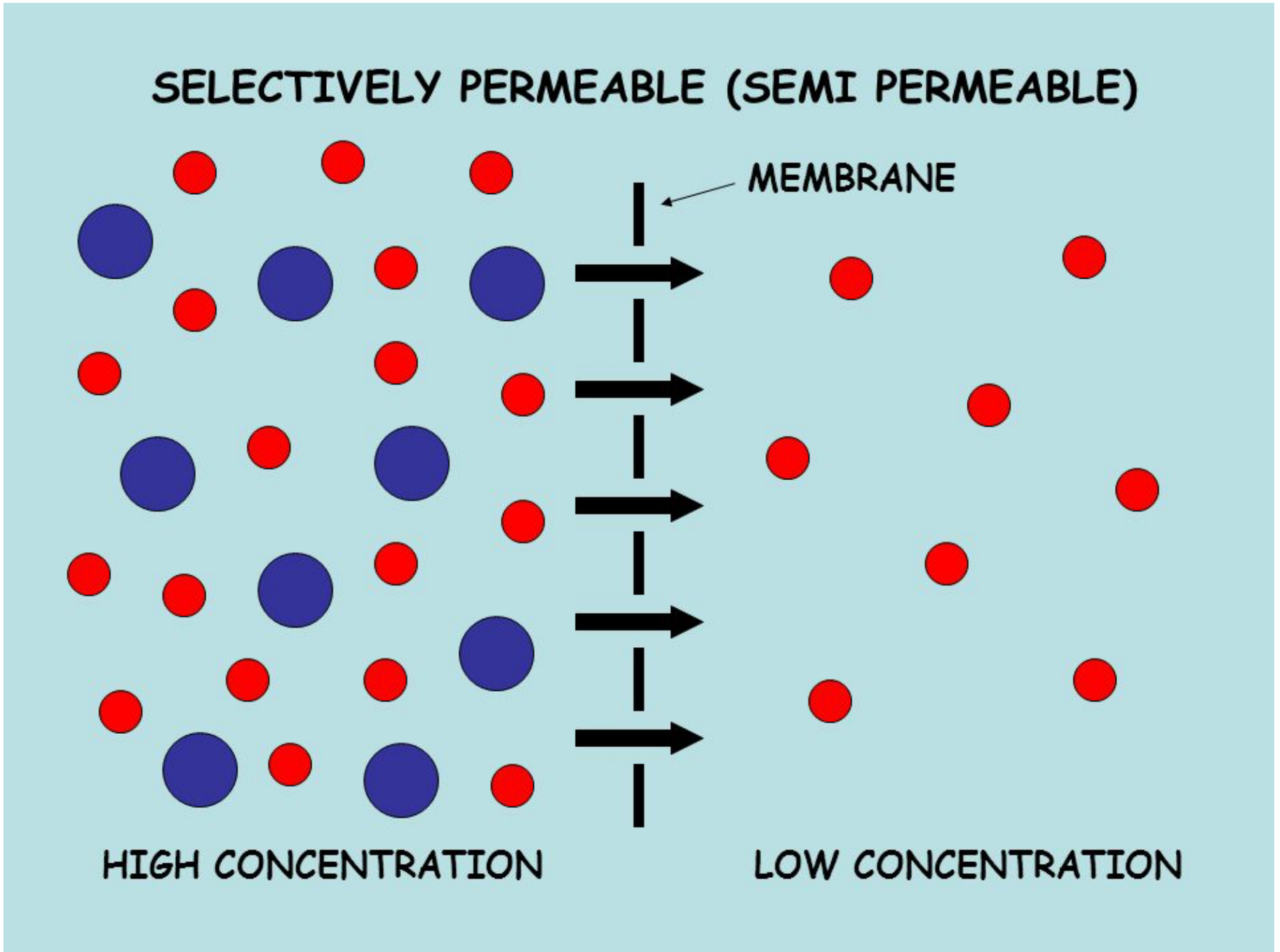
→ PASSIVE TRANSPORT

No energy

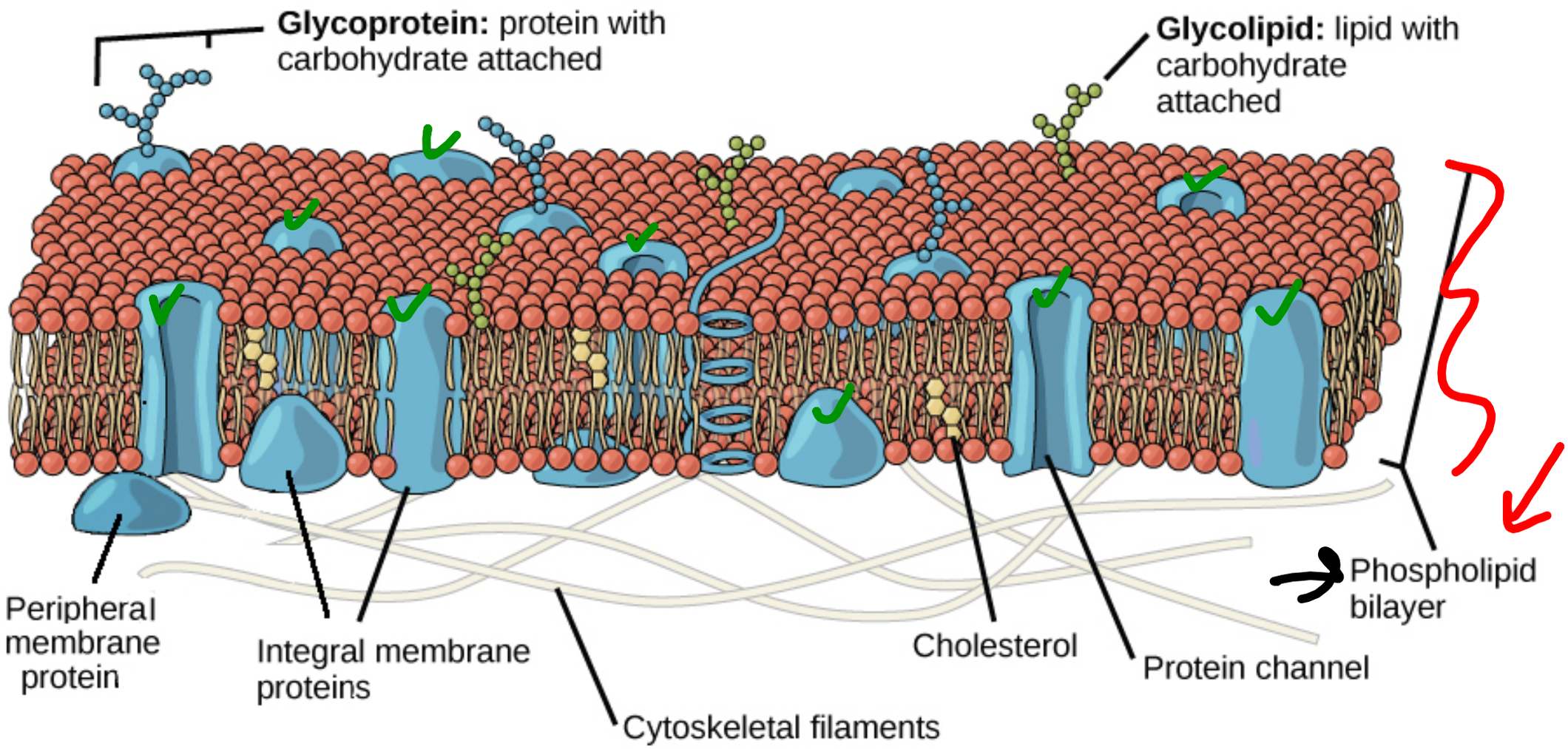
→ ACTIVE TRANSPORT

requires energy

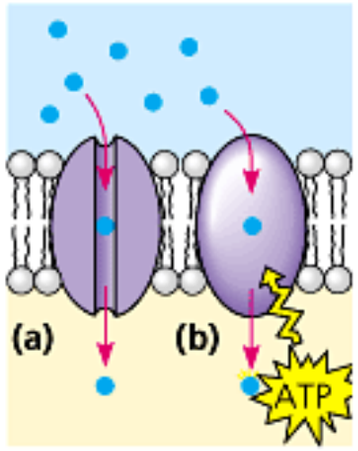
The cell membrane is a **semi-permeable** barrier that controls the flow of material into and out of the cell.



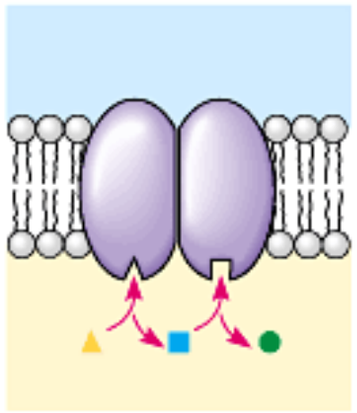
The arrangement of phospholipids, carbohydrates, cholesterol and proteins in the membrane can be described as a **fluid mosaic**.



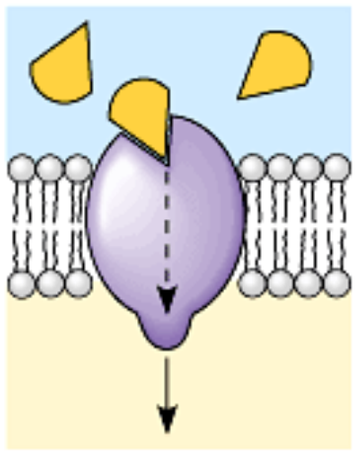
Protein Functions within Membranes



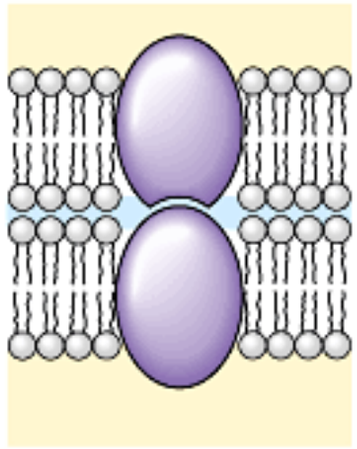
Transport



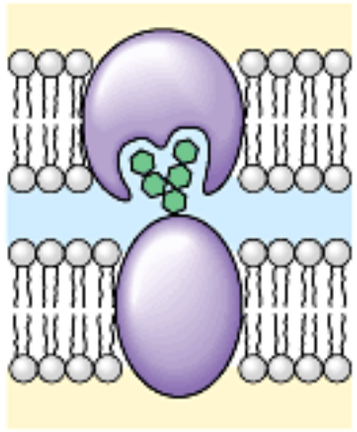
Enzymatic activity



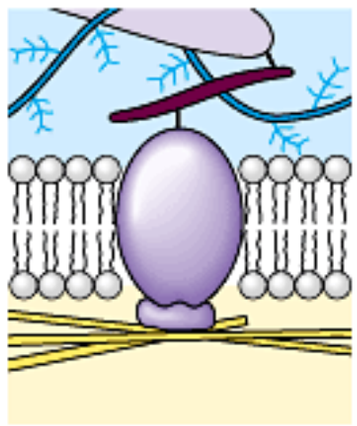
Signal transduction



Intercellular joining



Cell-cell recognition

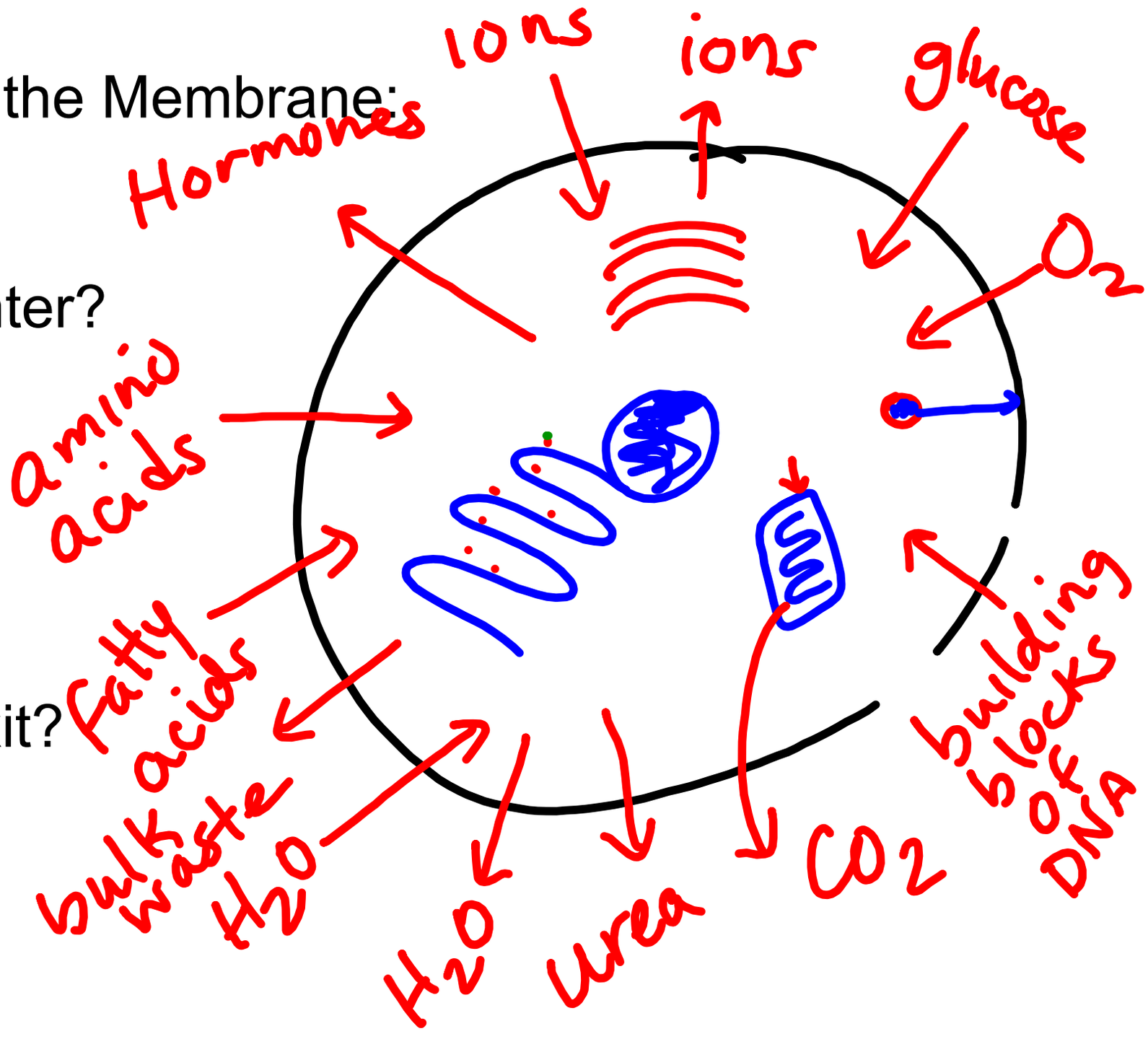


Attachment to the cytoskeleton and extracellular matrix (ECM)

Transport Across the Membrane:

What needs to enter?

What needs to exit?



Passive Transport is the movement of material across the membrane from areas of high concentration to low concentration.

It requires no input of energy (ATP).

Three Types of Passive Transport:

NO energy required

1) Diffusion – gasses (thru the lipid bilayer (O_2 + CO_2)

2) Osmosis - H_2O

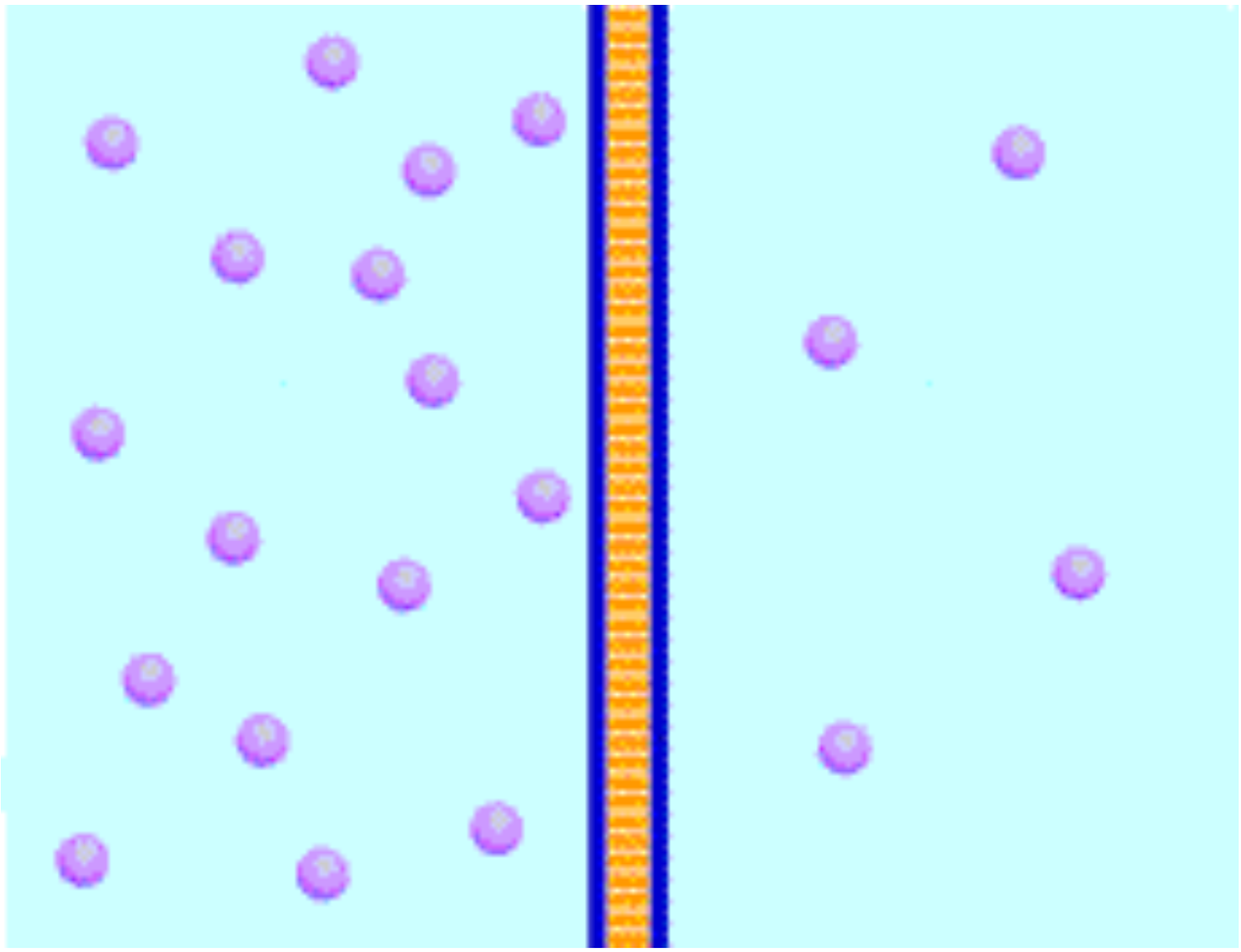
3) Facilitated Diffusion → movement of molecules across membrane thru a protein channel.

Down the concentration gradient

Diffusion

The flow of material through a membrane from high to low.

Small, non-polar molecules like CO_2 and O_2 can dissolve into the bilayer and pass easily into and out of the cell.



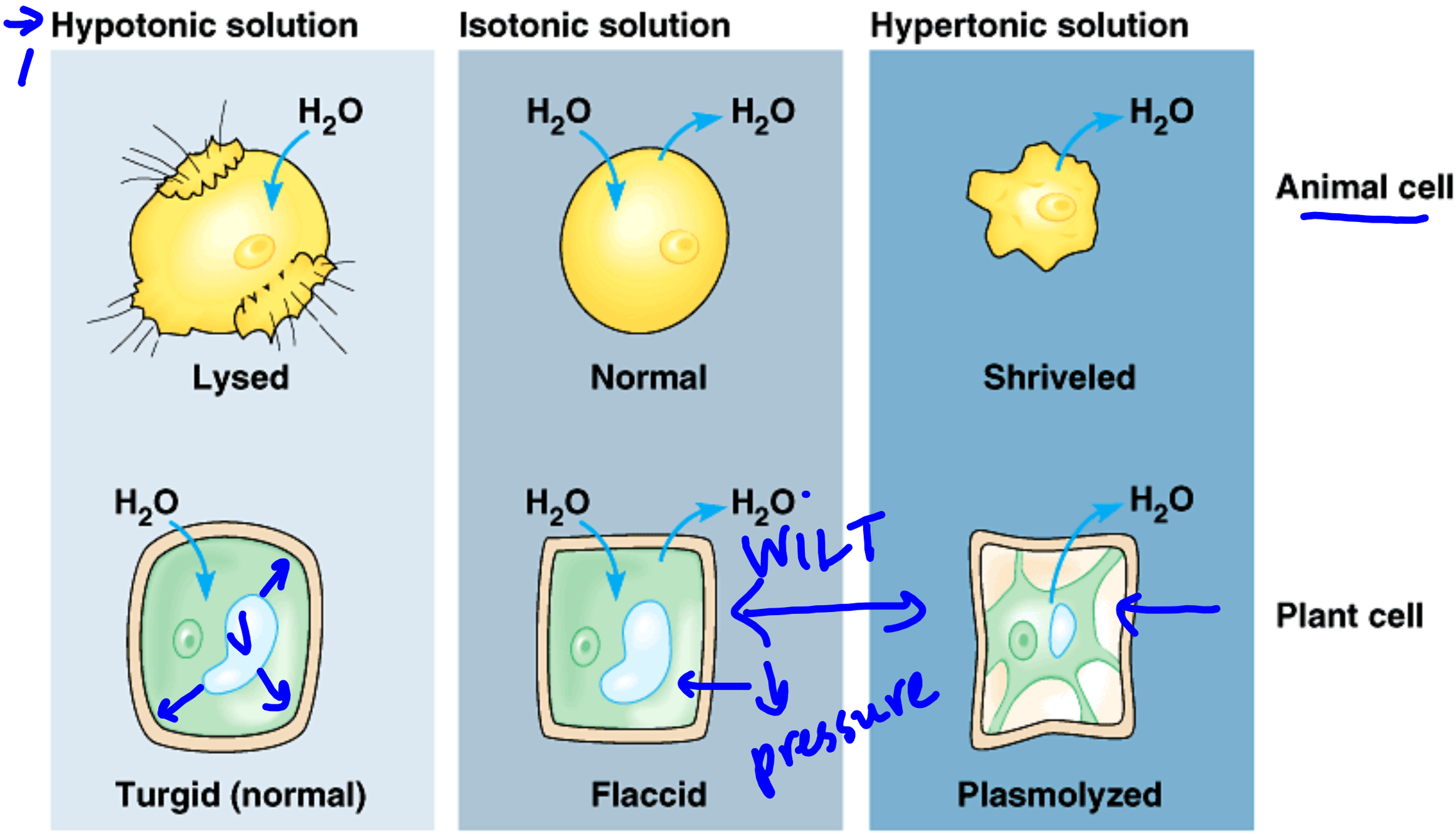
Osmosis

The movement of water through a membrane.

Sometimes water will move through the membrane in order to balance the concentration of the solution on each side.

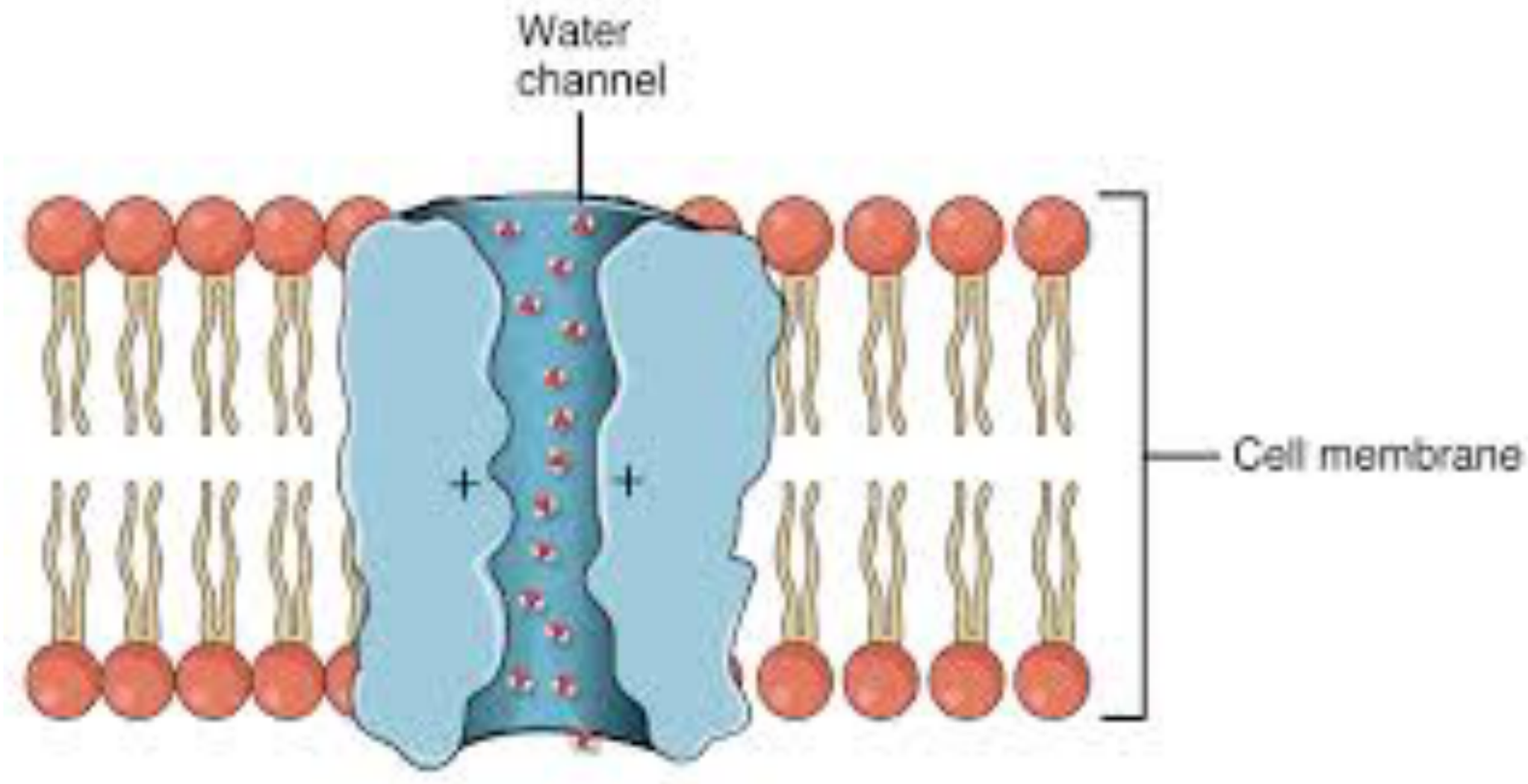
Vocabulary terms to know: solution, solute, solvent, hypertonic, hypotonic, isotonic

Osmosis



Facilitated Diffusion is the passive flow of material through a membrane channel.

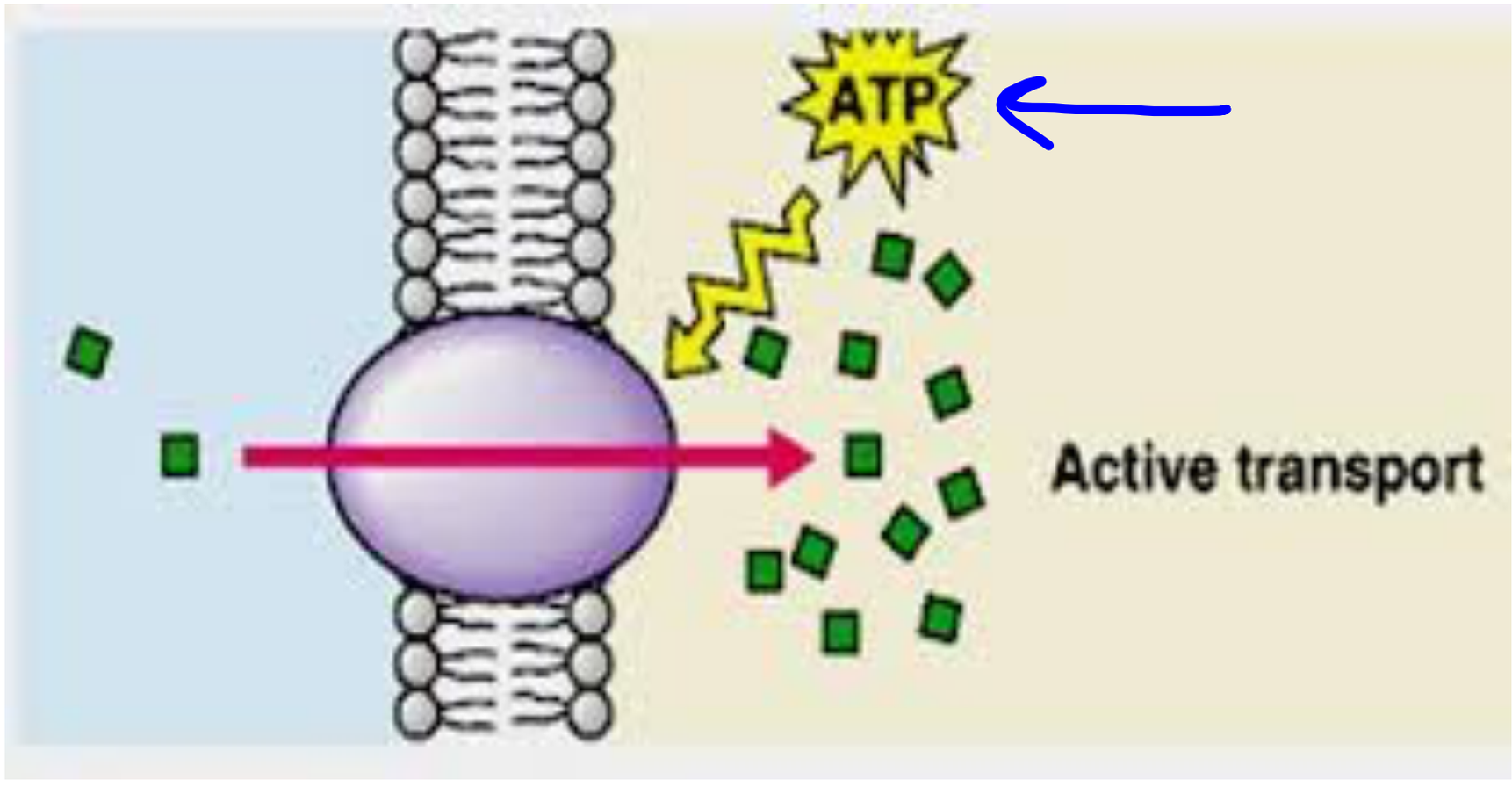
Example: Aquaporins



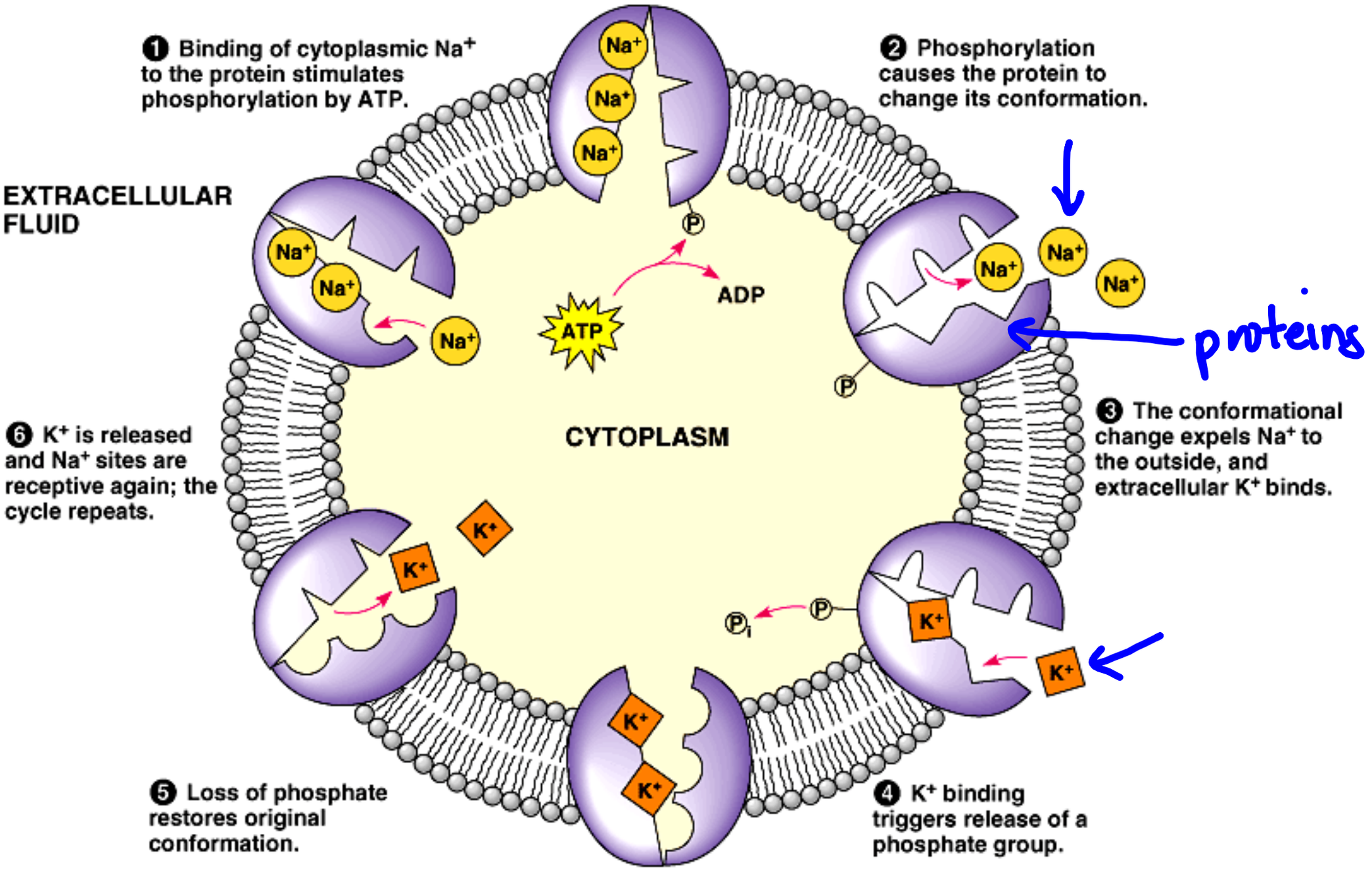
Active Transport is the flow of material up or against the concentration gradient.

This requires an input of energy (ATP). The proteins involved in active transport are often called pumps.

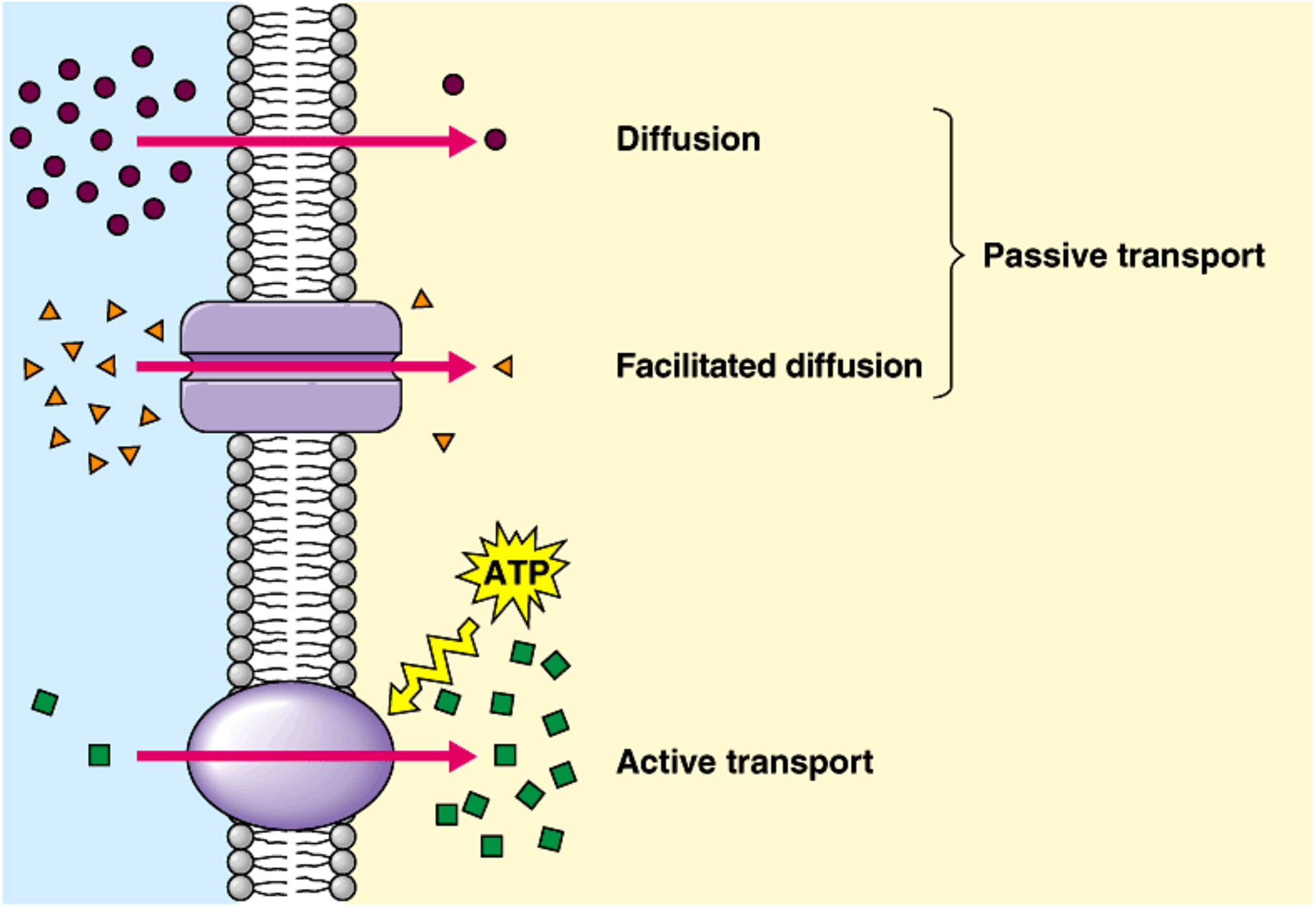
against concentration gradient



Active Transport Example:



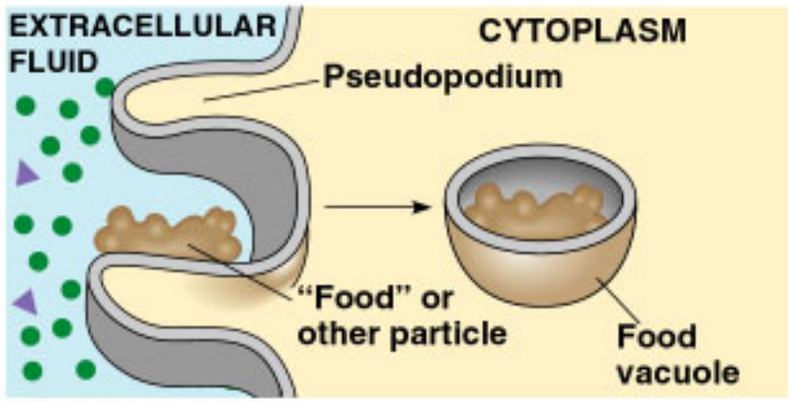
Summary Image:



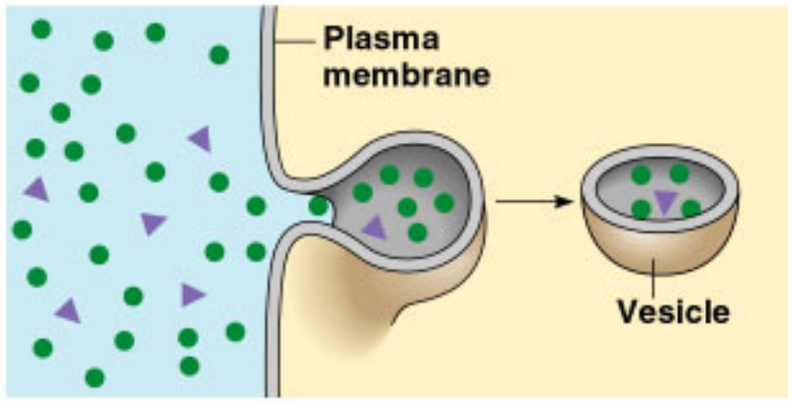
Endocytosis and **exocytosis** are used to move large molecules into or out of the cell.

These processes are classified as active transport due to an input of energy regardless of the concentration gradient.

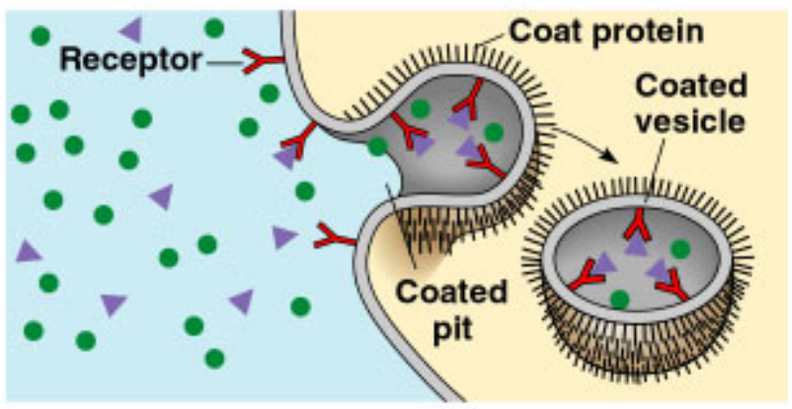
Endocytosis



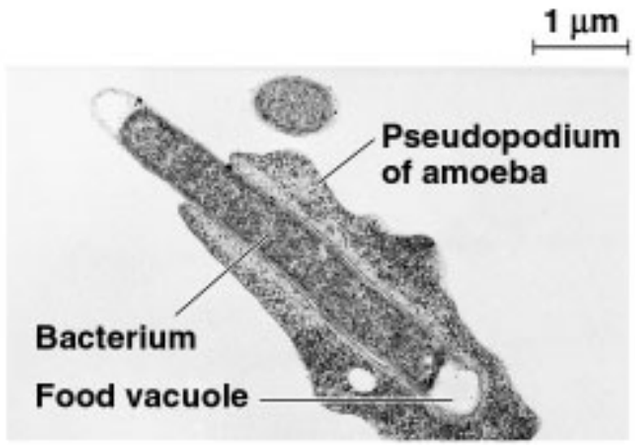
(a) Phagocytosis

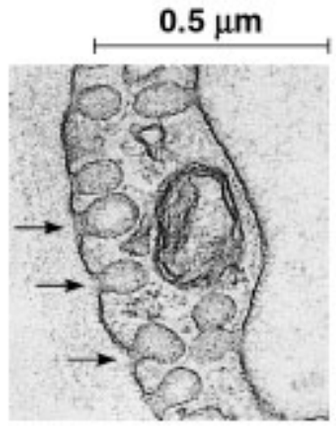


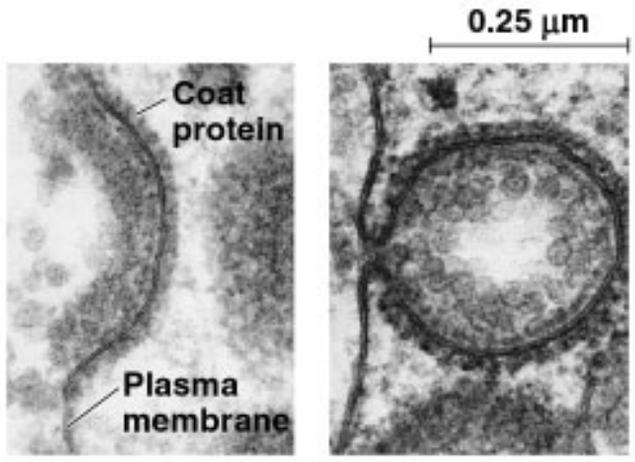
(b) Pinocytosis



(c) Receptor-mediated endocytosis







Exocytosis