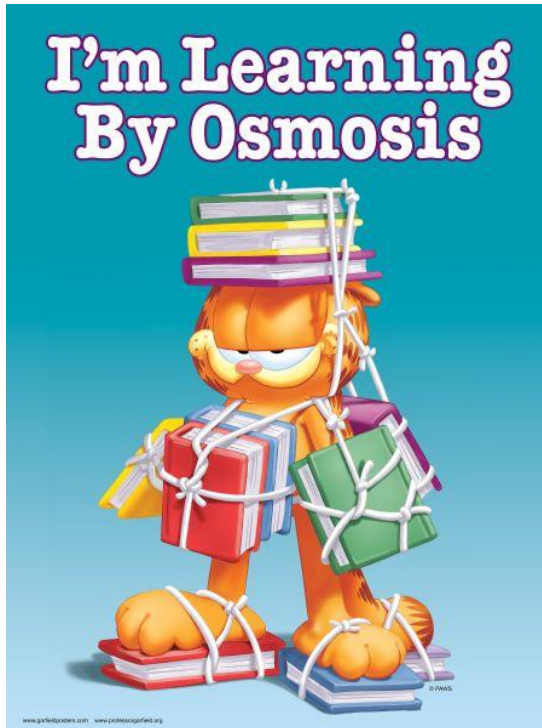
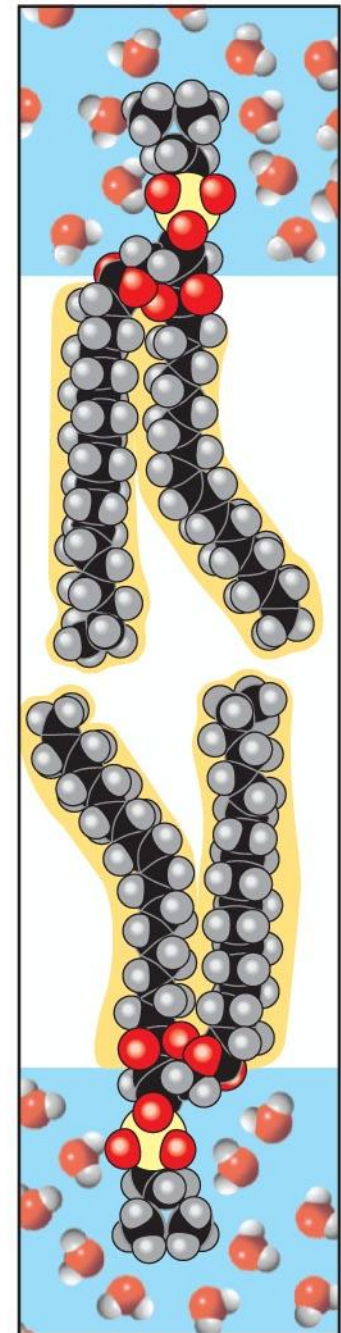
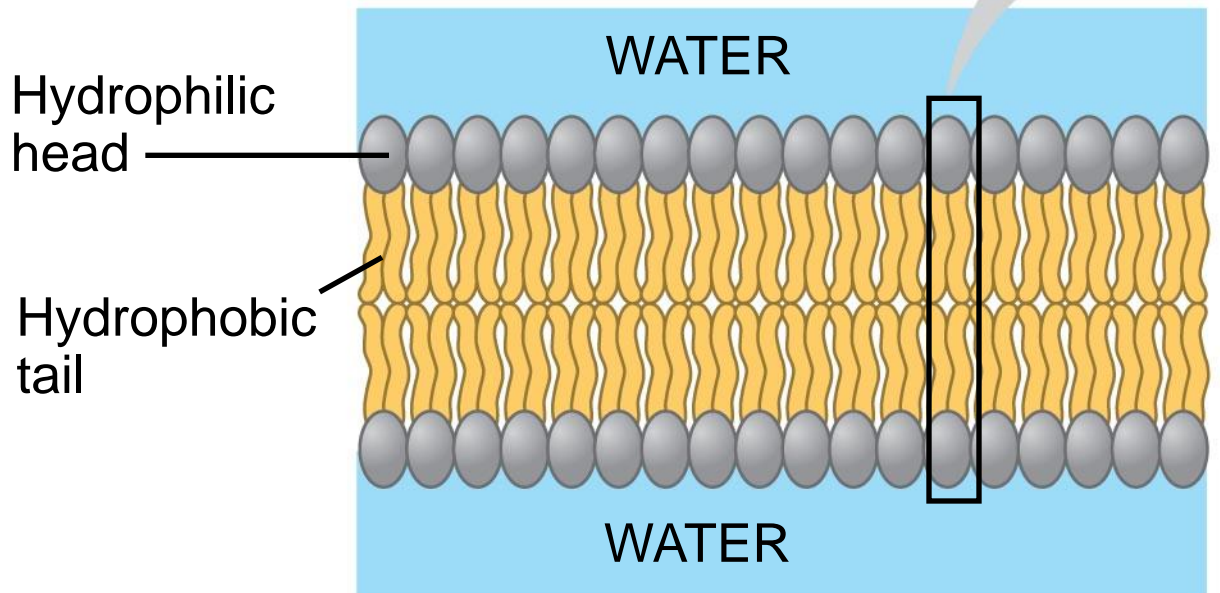
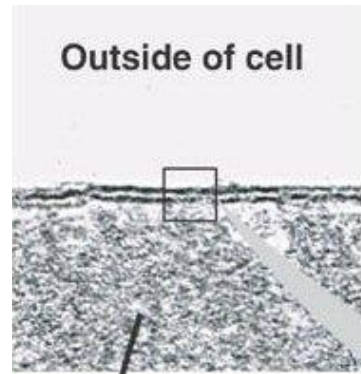


Cellular Physiology: Membrane Transport



Cell Membrane Structure



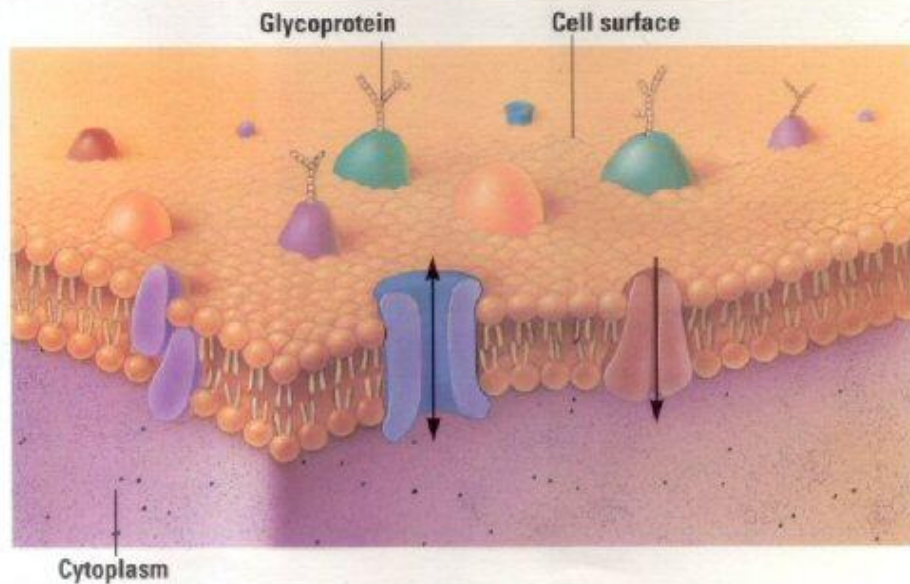
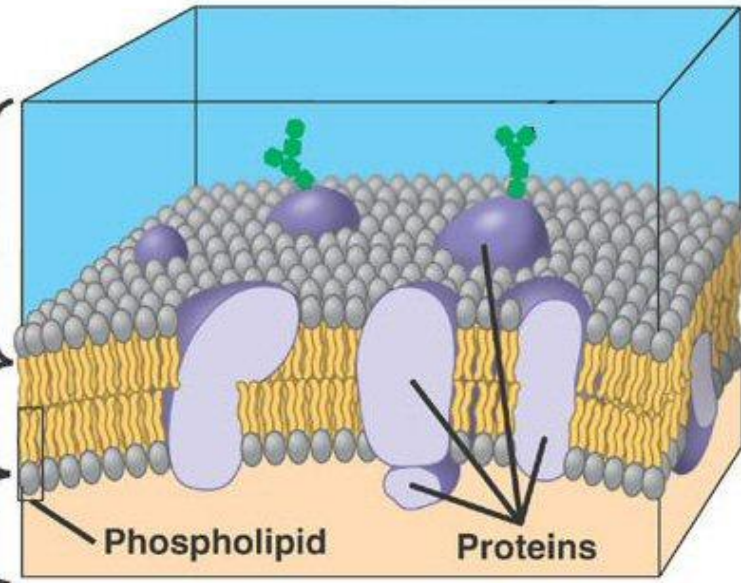


Inside of cell

Hydrophilic region

Hydrophobic region

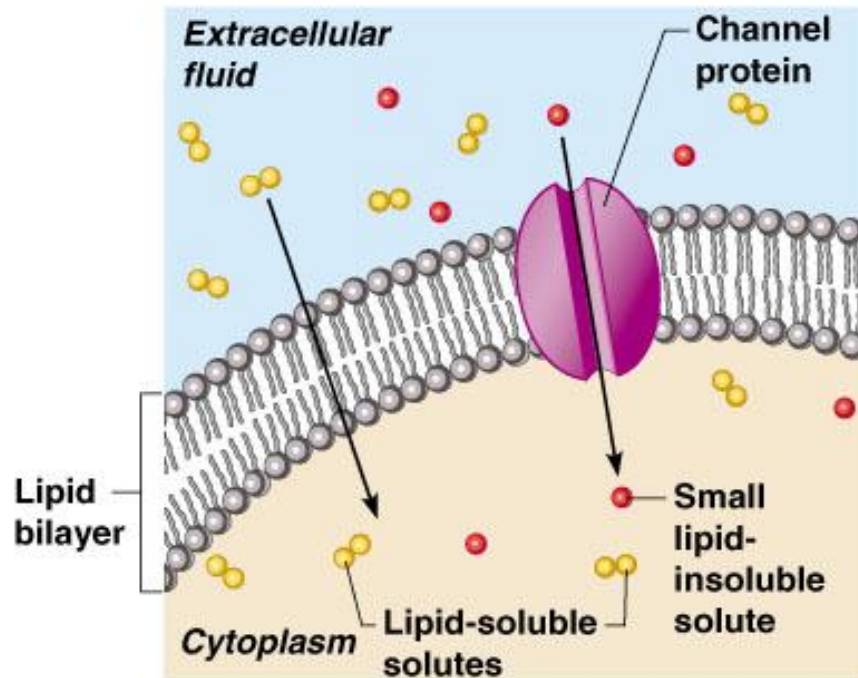
Hydrophilic region



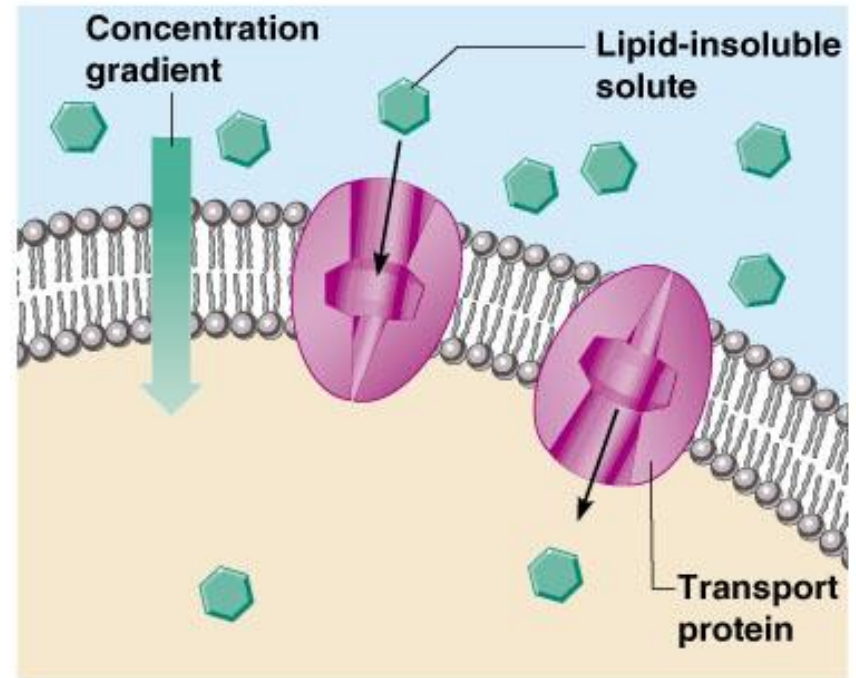
Cellular Physiology: Membrane Transport

- **Two Types of Transport**
 - **Passive transport**
 - Does not require **energy**

Diffusion through the Plasma Membrane



(a) Simple diffusion



(b) Facilitated diffusion

Figure 3.9

Passive Transport Processes

- **Simple diffusion**

- Particles tend to **distribute themselves evenly** within a solution
- Movement is from **high concentration to low concentration**, or down a **concentration gradient**

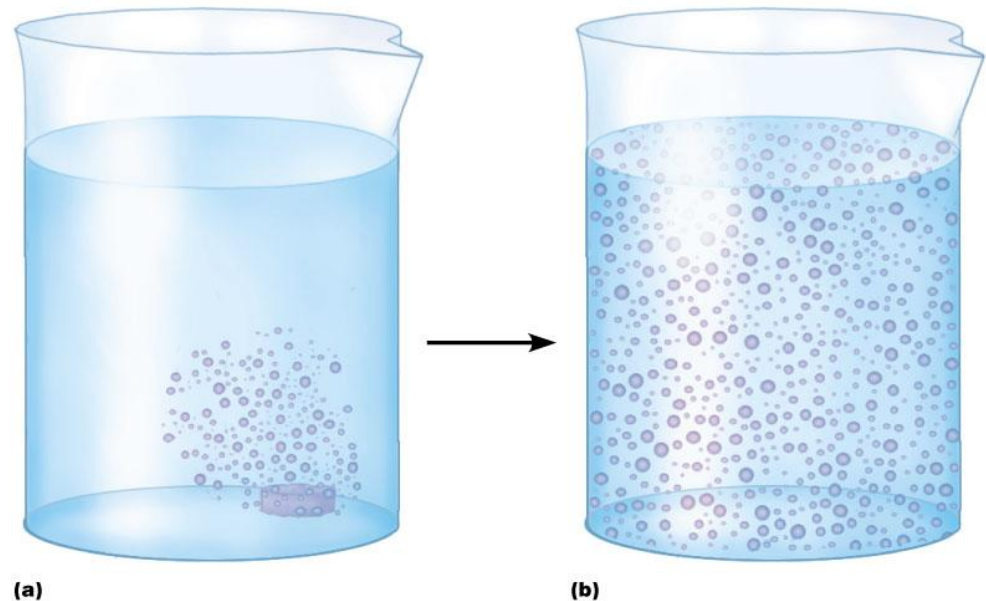


Figure 3.8

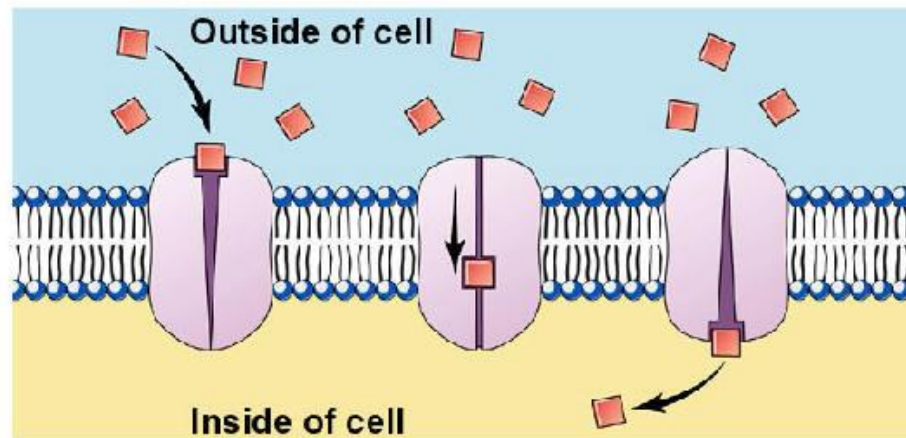
Passive Transport Processes

- **Facilitated diffusion**

- Allows **lipid insoluble** substances (i.e. glucose) to pass through using a **protein carrier** from **high concentration** to **low concentration**

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Facilitated Diffusion



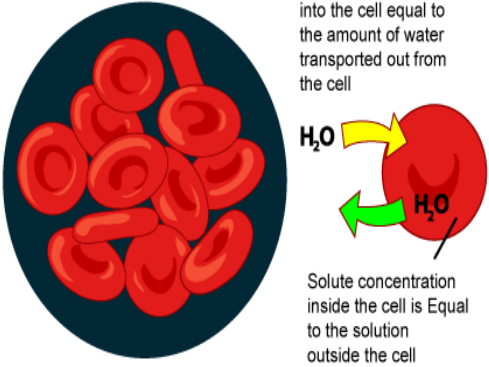
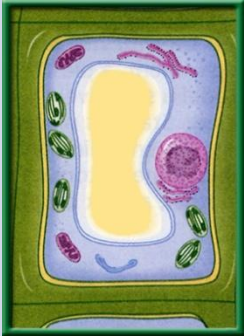
Passive Transport Processes

- **Osmosis** – simple diffusion of water

[Osmosis & Diffusion Animation](#)

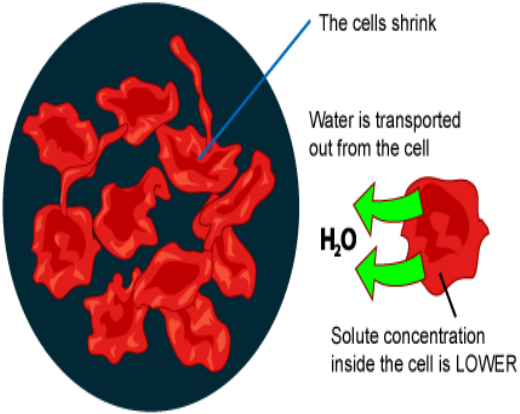
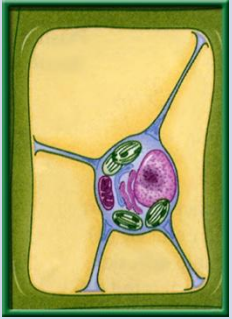
[Animation](#)

Effects of Osmosis on Cells

Solution	Animal Cell	Plant Cell
<p>Isotonic: <u>The concentration of solutes is the same inside and outside the cell.</u></p>	<p>Isotonic</p>  <p>Amount of water transported into the cell equal to the amount of water transported out from the cell</p> <p>Solute concentration inside the cell is Equal to the solution outside the cell</p>	<p>Water moves <u>Equally in and Out of the cell</u></p> 

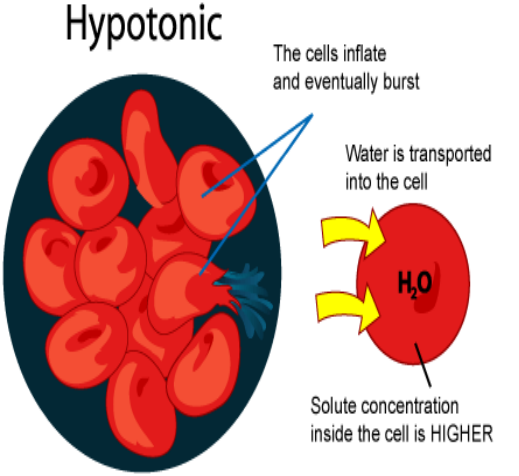

Hint: There is the same amount of “stuff” inside and outside of the cell. There is also the same amount of “water” inside and out side of the cell.

Effects of Osmosis on Cells

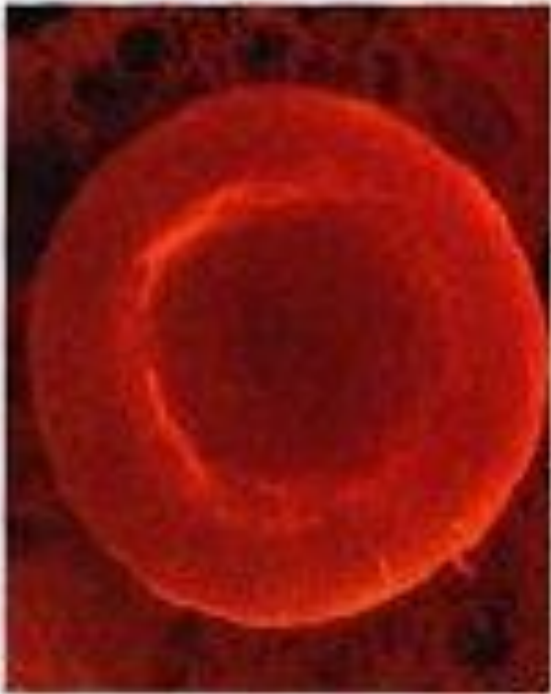
Solution	Animal Cell	Plant Cell
<p>Hypertonic: <u>Solution has a higher solute concentration than the cell.</u></p>	<p>Hypertonic</p>  <p>The cells shrink</p> <p>Water is transported out from the cell</p> <p>H₂O</p> <p>Solute concentration inside the cell is LOWER</p>	<p>Water leaves the cell and it loses <u>turgor pressure</u> And causes the Cell to <u>crenate</u> (shrink)</p> 

Hint: There is a hyper amount or more amount of “stuff” than there is water

Effects of Osmosis on Cells

Solution	Animal Cell	Plant Cell
<p>Hypotonic: <u>Solution has a lower solute concentration than the cell.</u></p>	<p>Hypotonic</p>  <p>The cells inflate and eventually burst</p> <p>Water is transported into the cell</p> <p>H_2O</p> <p>Solute concentration inside the cell is HIGHER</p>	<p>Water enters The cell and Pushes against The cell wall Increasing the <u>Turgor pressure</u> Causing the cell To <u>swell</u></p> 

Hint: There is more water than there is “stuff,” Hypo = more H_2O



A



B



C

Active Transport Processes

- **Solute pumping**
 - **Molecules** that cannot go through the **membrane** use solute pumps
 - Adenosine Triphosphate (**ATP**) provides the **energy**
 - Solutes move from **low to high**, or **against the concentration gradient**

Active Transport Processes

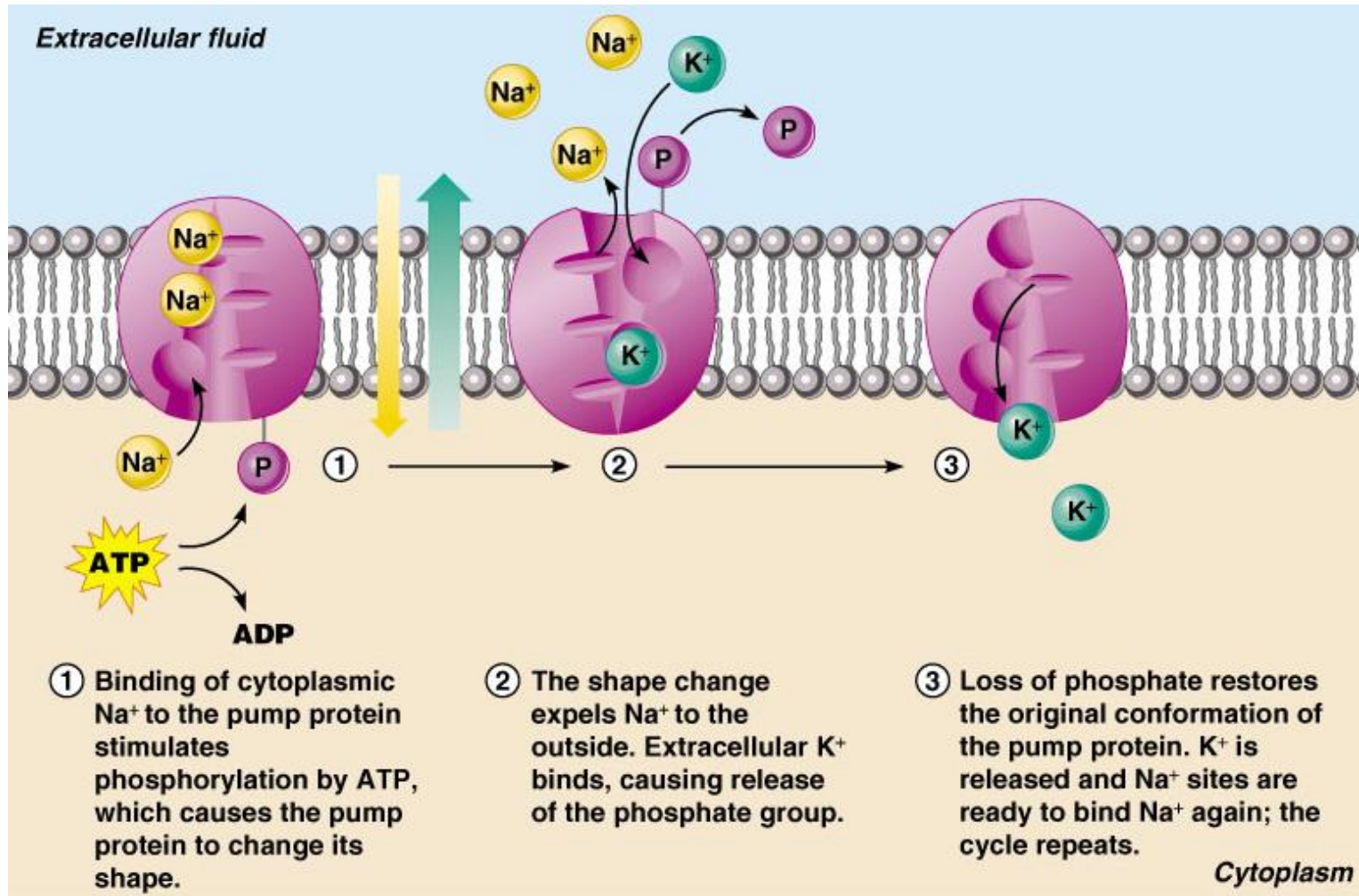


Figure 3.10

Cellular Physiology: Membrane Transport

- **Two Types of Transport**
 - **Active transport**
 - Requires **energy**

Active Transport Processes

- Bulk transport
 - **Exocytosis**
 - Moves materials **out of the cell**
 - Material is carried in a **vacuole**
 - Vacuole migrates to **cell membrane**
 - Vacuole **combines** with cell membrane
 - Material is emptied to the **outside**

Active Transport Processes

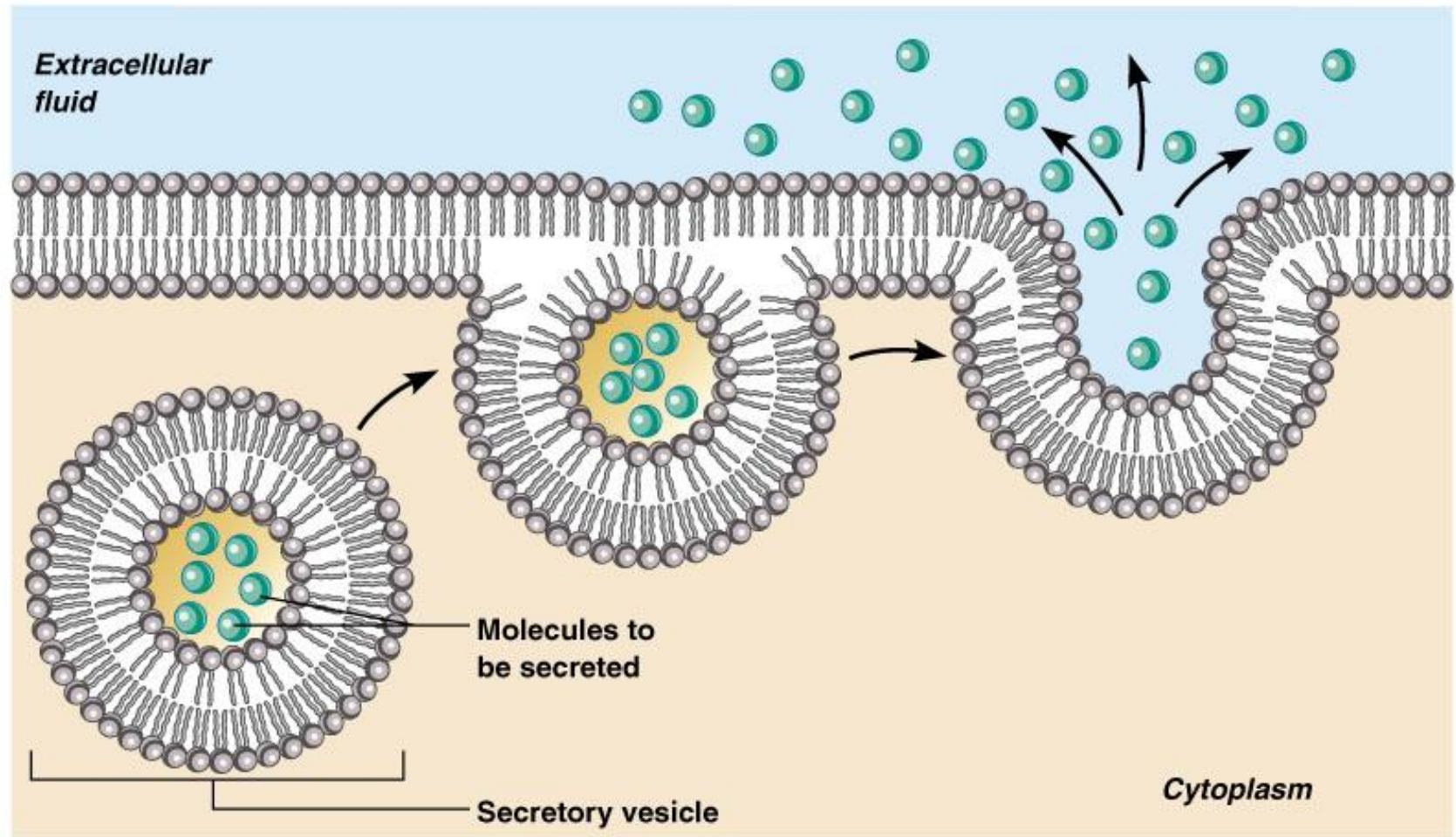


Figure 3.11

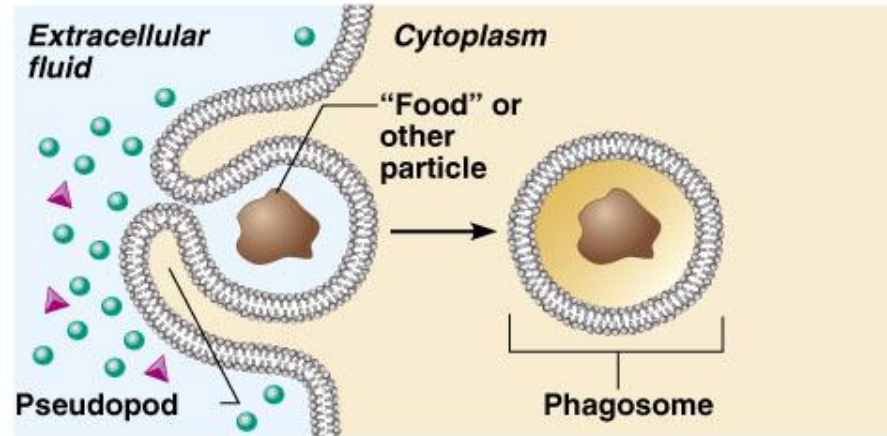
Active Transport Processes

- Bulk transport
 - **Endocytosis**
 - Process of **taking material into the cell** by means of infoldings, or **pockets**, of the cell membrane

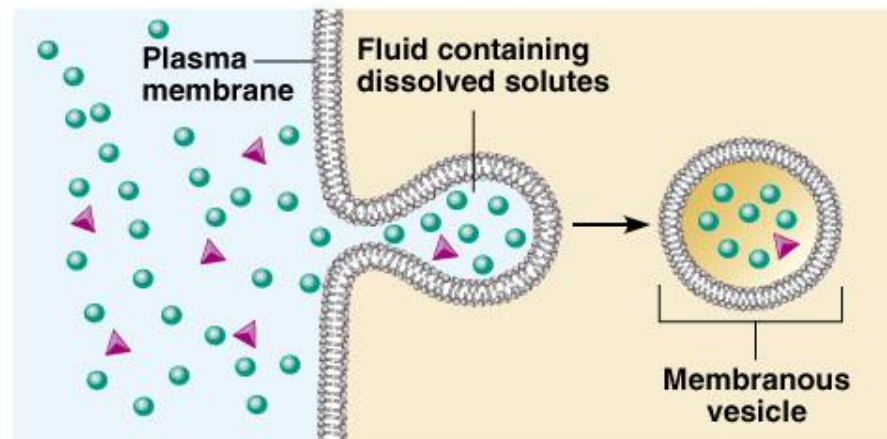
Active Transport Processes

- Bulk transport
 - Types of endocytosis
 - **Phagocytosis** – cell eating – brings in large particles within a food vacuole
 - **Pinocytosis** – cell drinking – cells taking up liquid from the surrounding environment

Active Transport Processes



(a) Phagocytosis



(b) Bulk-phase endocytosis

Figure 3.12