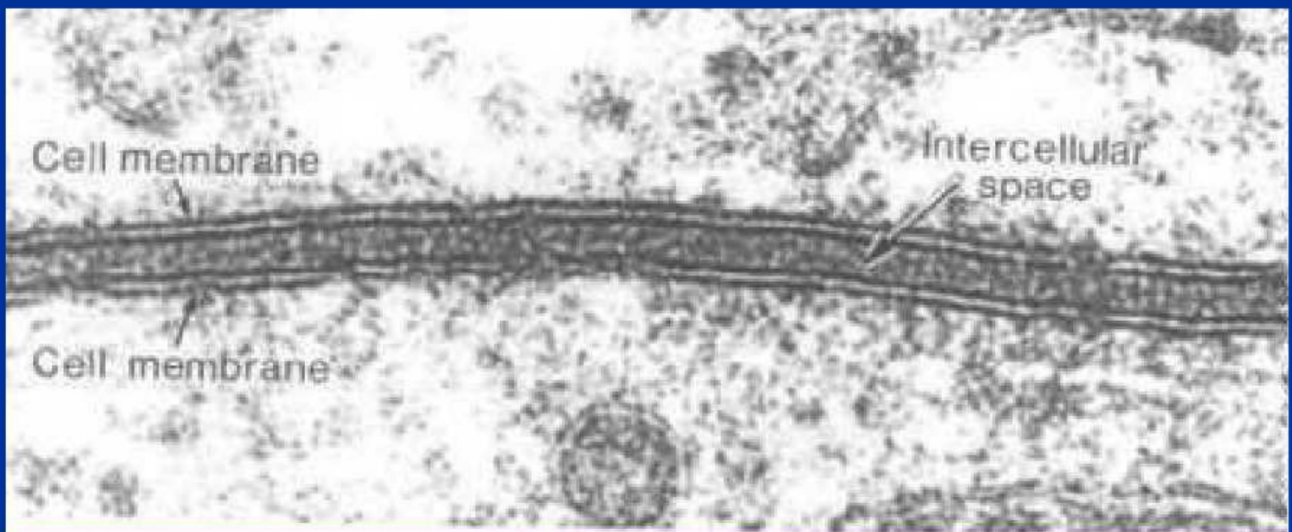
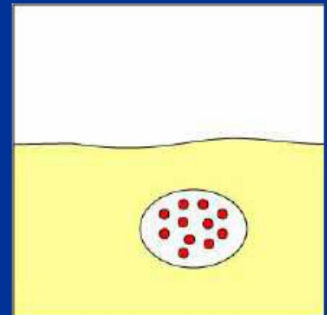
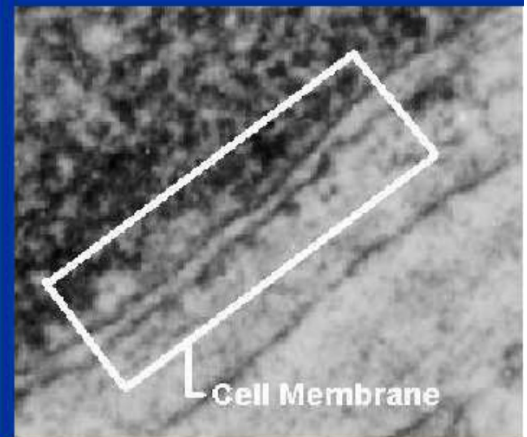


Cellular Transport Notes



Cell Membranes Review

1. All cells have a cell membrane
2. **Functions:**
 - a. Controls what enters and exits the cell to maintain
 - b. Provides protection and support for the cell



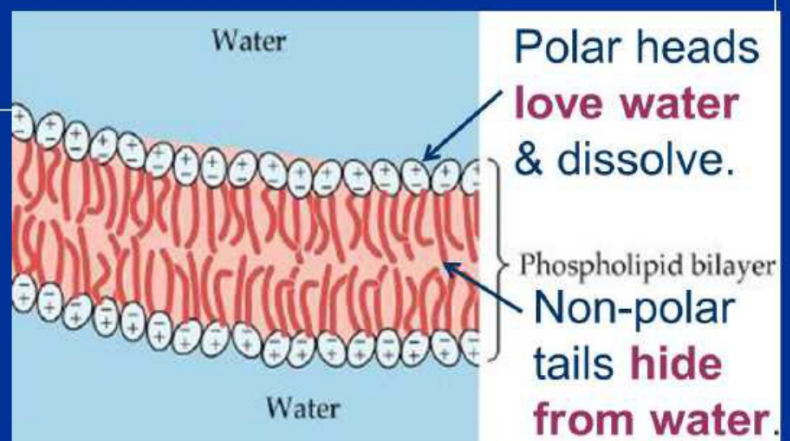
TEM picture of a real cell membrane.

Cell Membranes review (continued)

3. Structure of cell membrane

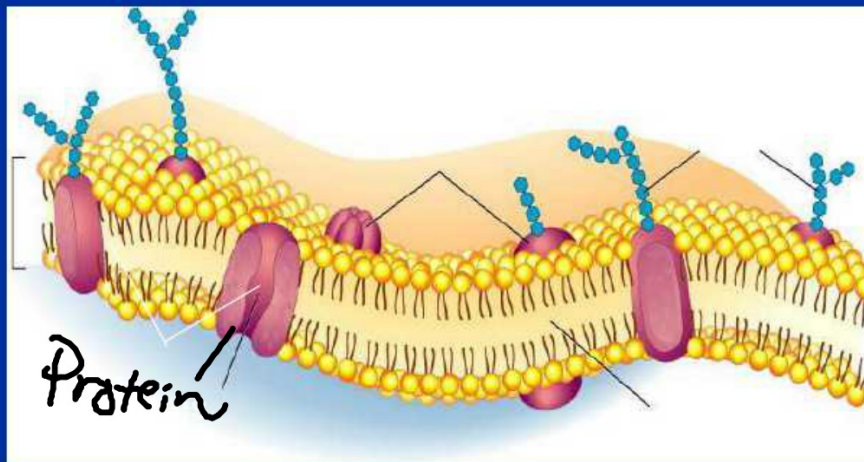
Lipid Bilayer -2 layers of phospholipids

- Phosphate head is **polar** (hydrophilic)
- Fatty acid tails **non-polar** (hydrophobic)
- Proteins channels embedded in membrane



Cell Membranes review (continued)

- 4. Cell membranes have pores (holes) in it
 - a. **Selectively permeable**: Allows some molecules in and keeps other molecules out
 - b. The structure helps it be selective!



Types of Cellular Transport

• [Animations of Active Transport & Passive Transport](#)

- Passive Transport

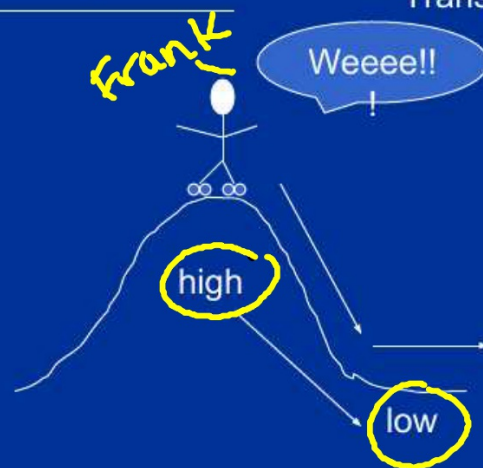
cell doesn't use energy

- ★ 1. Diffusion
- ★ 2. Facilitated Diffusion
- ★ 3. Osmosis

- Active Transport

cell does use energy

- ★ 1. Protein Pumps
- ★ 2. Endocytosis
- ★ 3. Exocytosis



Passive Transport

- cell **uses no energy**
- molecules move randomly
- Molecules spread out **from an area of high concentration to an area of low concentration**. (High→Low)
- **Three types:**
 1. **Diffusion**
 2. **Facilitative Diffusion** – diffusion with the help of transport proteins
 3. **Osmosis** – diffusion of water

Passive Transport:

1. Diffusion

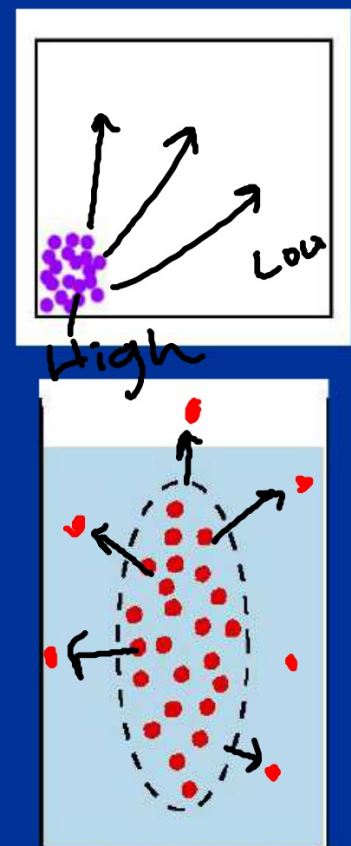
1. **Diffusion:** random movement of particles **from an area of high concentration to an area of low concentration.**

(High to Low)

2. Diffusion continues until all molecules are evenly spaced (**equilibrium** is reached)

Note: molecules will still move around but stay spread out.

[Simple Diffusion Animation](#)



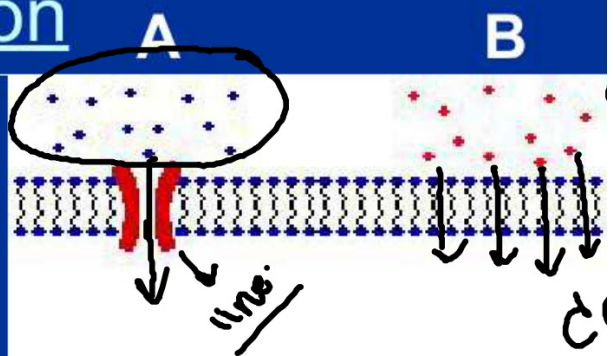
<http://bio.winona.edu/berg/Free.htm>

Passive Transport:

2. Facilitated Diffusion

2. Facilitated diffusion:
diffusion of specific particles **through transport proteins** found in the membrane

- Transport Proteins are specific – they “select” only certain molecules to cross the membrane
- Transports larger or charged molecules

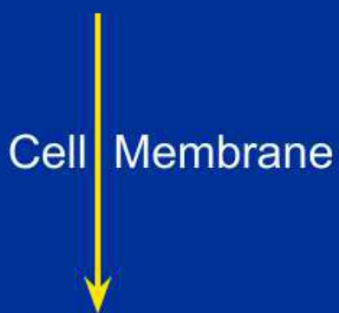


Facilitated
diffusion
(Channel
Protein)

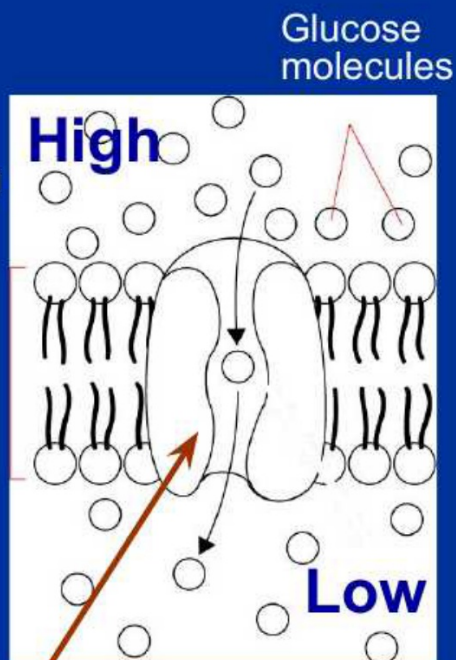
Diffusion
(Lipid
Bilayer)

Passive Transport: 2. Facilitated Diffusion

Cellular Transport From a High Concentration



Low Concentration



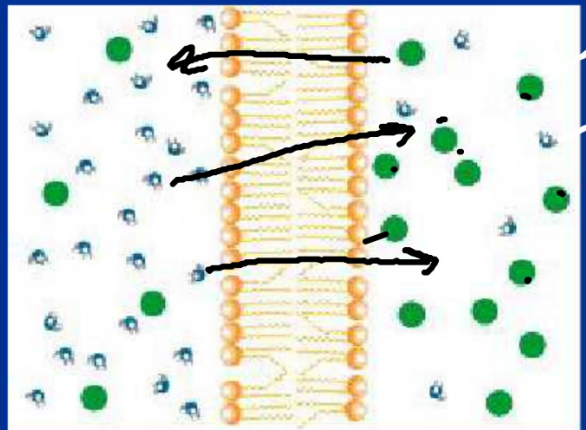
Through a → Transport Protein

Go to Section:

Passive Transport: 3. Osmosis

- **3.Osmosis:** diffusion of water through a selectively permeable membrane
- Water seeks equilibrium.
- Water travels to areas of **high solute** concentration

Osmosis
animation



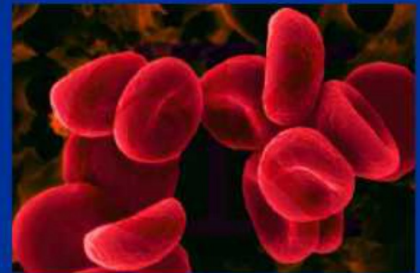
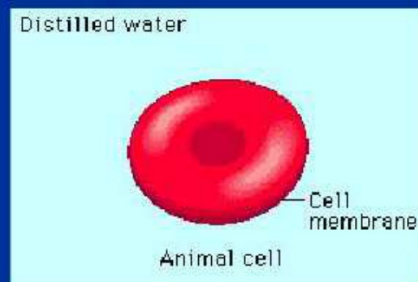
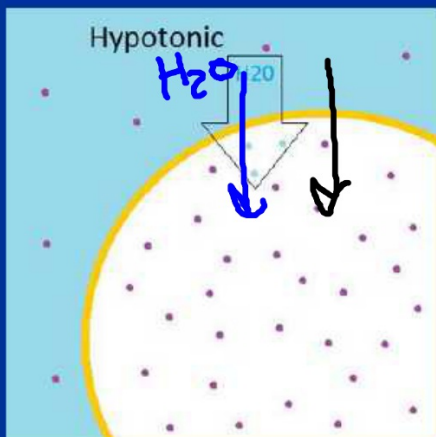
- out* *in*
- Water moves freely through pores.
 - Solute (green) too large to move across.

Less

Hypotonic Solution → outside Cell.

• Osmosis
Animations for
isotonic, hypertonic,
and hypotonic
solutions

Hypotonic: The solution has a lower concentration of solutes and a higher concentration of water than inside the cell. (**Low solute; High water**)

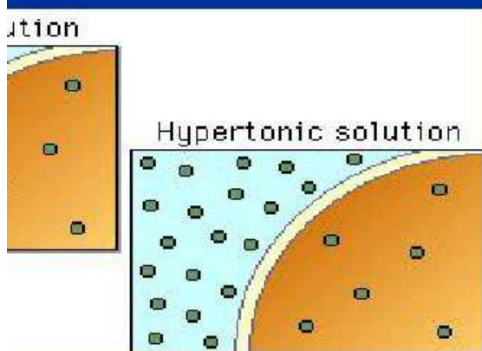


Result: Water moves from the solution to inside the cell): Cell Swells and bursts open (*cytolysis*)!

more Hypertonic Solution

- [Osmosis](#)
Animations for isotonic, hypertonic, and hypotonic solutions

Hypertonic: The solution has a higher concentration of solutes and a lower concentration of water than inside the cell. (**High solute; Low water**)



shrinks

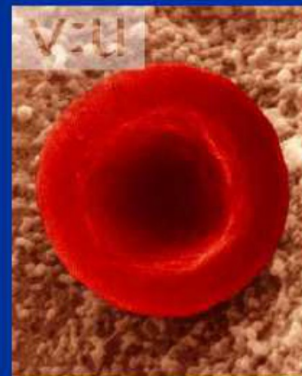
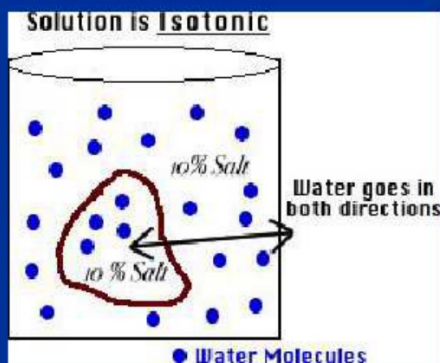
Result: Water moves from inside the cell into the solution: Cell shrinks (*Plasmolysis*)!

Same

Isotonic Solution

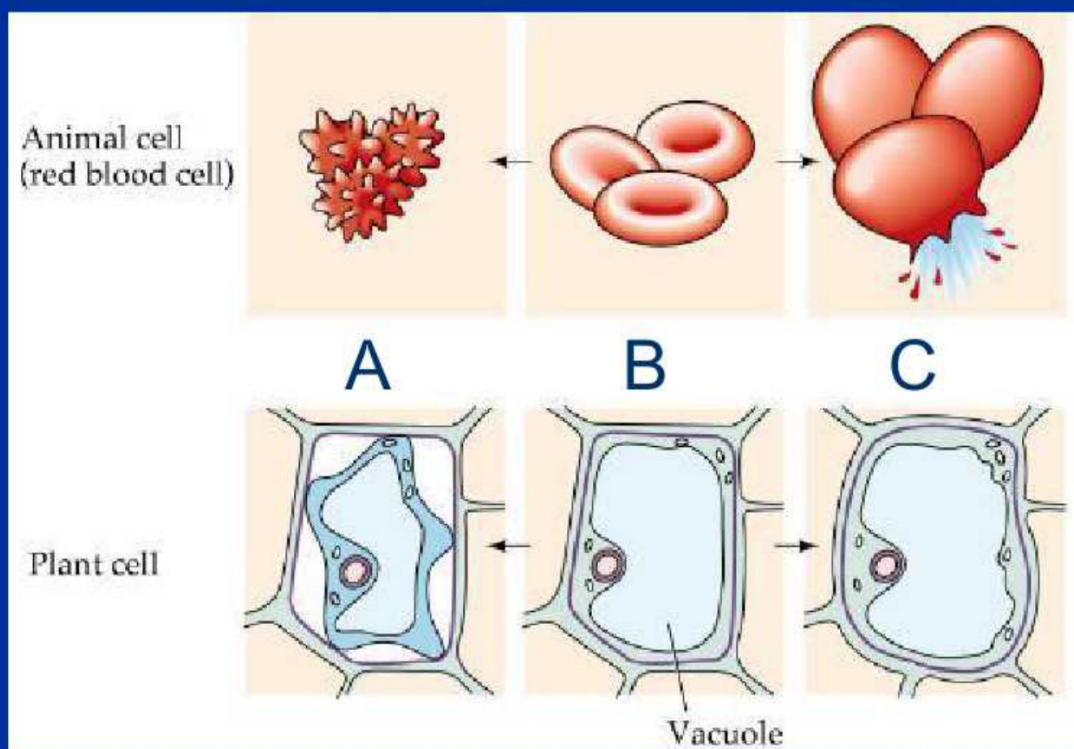
- [Osmosis](#)
Animations for isotonic, hypertonic, and hypotonic solutions

Isotonic: The concentration of solutes in the solution is equal to the concentration of solutes inside the cell.



Result: Water moves equally in both directions and the cell remains same size! (Dynamic Equilibrium)

What type of solution are these cells in?



Active Transport

- cell **uses energy**
- actively moves molecules to where they are needed
- Movement **from an area of low concentration to an area of high concentration (Low → High)**
- Three Types:
 - Protein Pumps
 - Endocytosis
 - Exocytosis

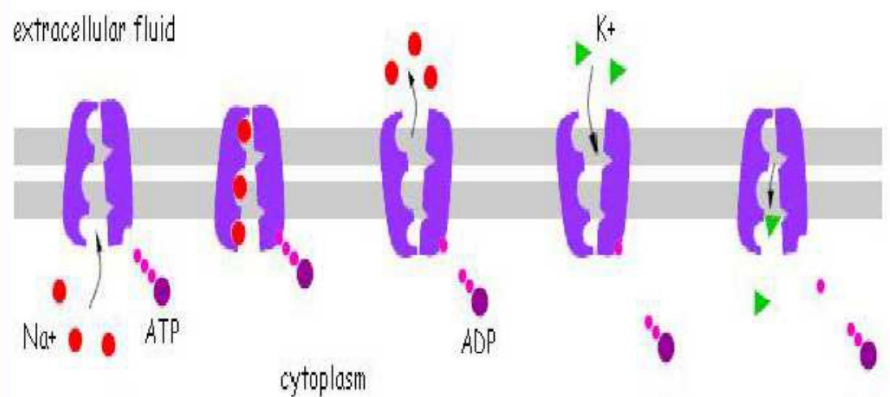
Types of Active Transport

Sodium
Potassium Pumps
(Active Transport
using proteins)

1. Protein Pumps

-transport proteins that require energy to do work

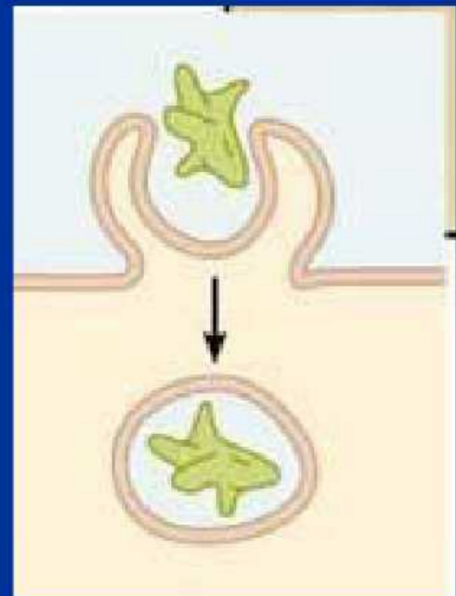
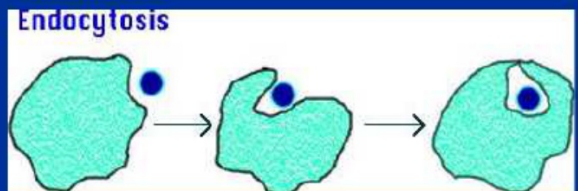
- Example: Sodium / Potassium Pumps are important in nerve responses.



Protein changes shape to move molecules: this requires energy!

Types of Active Transport

- 2. **Endocytosis**: taking bulky material into a cell
 - Uses energy
 - Cell membrane in-folds around food particle
 - “*cell eating*”
 - forms food vacuole & digests food
 - This is how white blood cells eat bacteria!



Types of Active Transport

3. **Exocytosis:** Forces material out of cell in bulk

- membrane surrounding the material fuses with cell membrane
- Cell changes shape – requires energy
- Ex: Hormones or wastes released from cell

[Endocytosis & Exocytosis animations](#)

