Lesson Overview

8.3 Cell Transport

Passive Transport

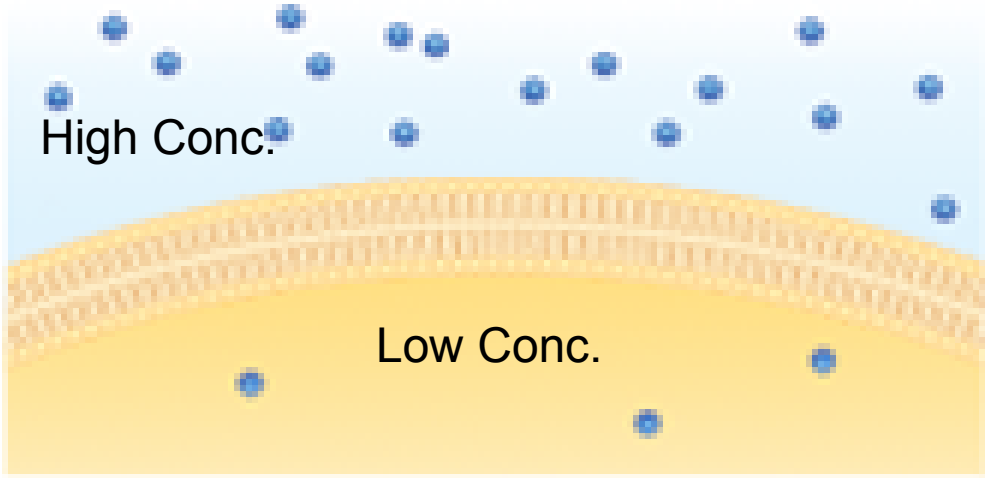
The movement of materials across the cell membrane without using cellular energy is called passive transport.

Diffusion

The process by which particles move from an area of high concentration to an area of lower concentration is known as **diffusion**.

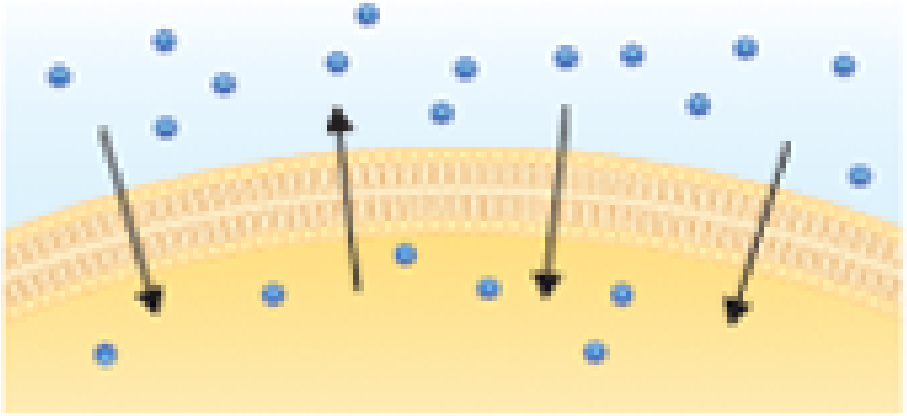
- form of passive transport
- particles move **down** the concentration gradient

Diffusion



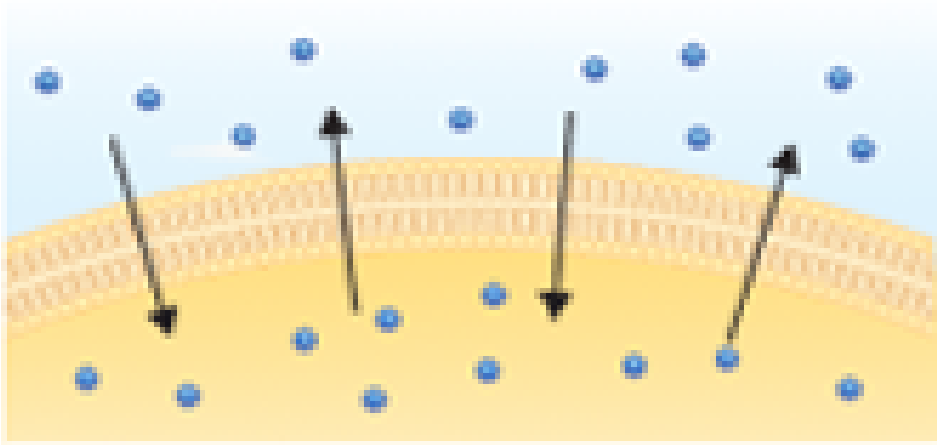
There is a higher concentration of solute on one side of the membrane than on the other.

Diffusion



Diffusion causes a net movement of solute particles from the side of the membrane with the higher solute concentration to the side with the lower solute concentration.

Diffusion



Once equilibrium is reached, solute particles continue to diffuse across the membrane in both directions but at approximately equal rates, so there is no net change in solute concentration.

Facilitated Diffusion

Some molecules that cannot directly diffuse across the membrane pass through special protein channels in a process known as **facilitated diffusion.**

- protein channels are molecule specific
- form of passive transport
- particles move **down** concentration gradient

Osmosis: An Example of Facilitated Diffusion

Osmosis is the diffusion of water through a selectively permeable membrane.

- water moves down concentration gradient
- passive

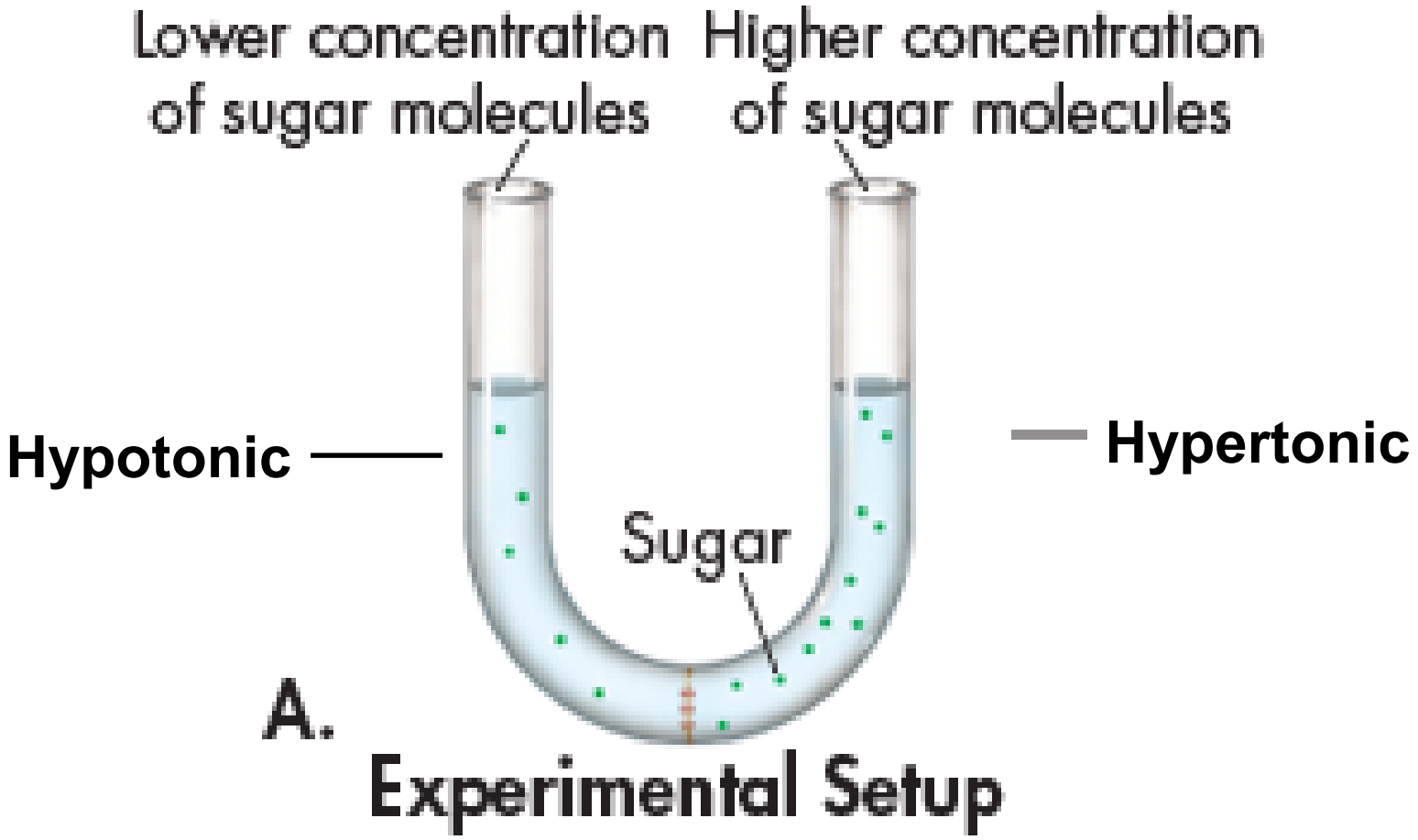
Osmosis: An Example of Facilitated Diffusion

Hypertonic - higher concentration of solute; low concentration of solvent (water)

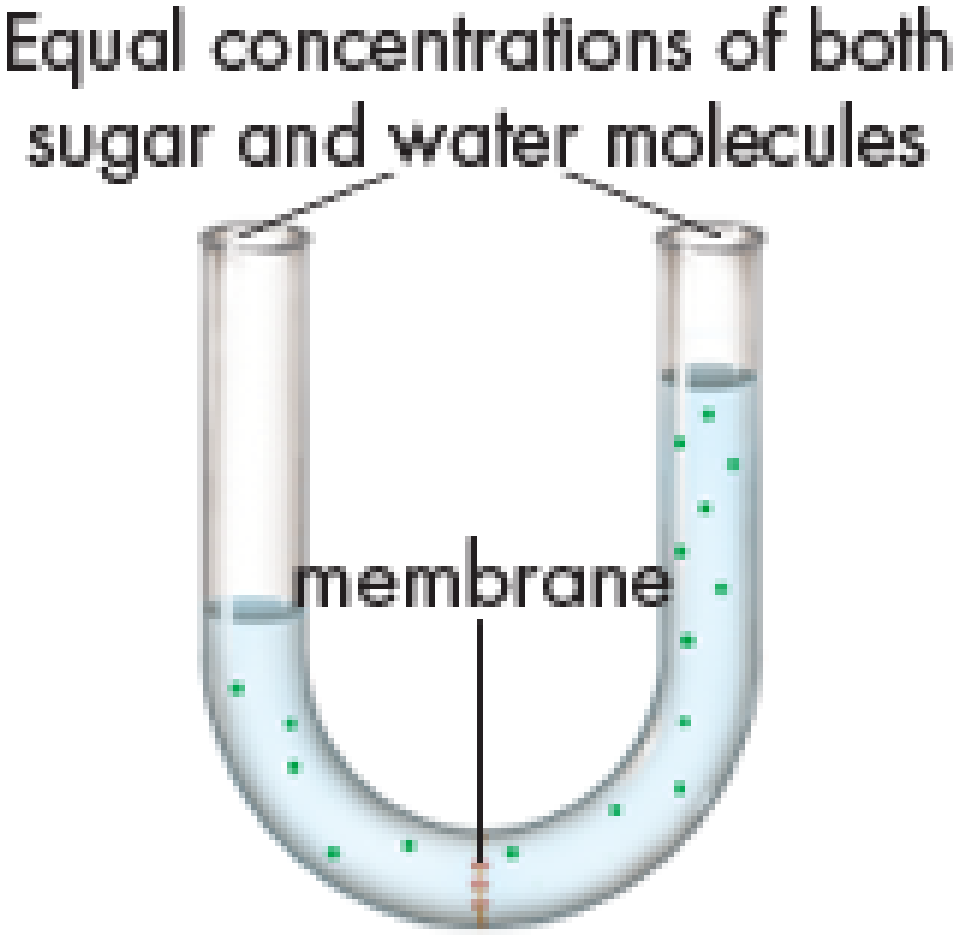
Hypotonic - lower concentration of solute; high concentration of solvent (water)

Isotonic - equal concentrations of solute

How Osmosis Works



How Osmosis Works

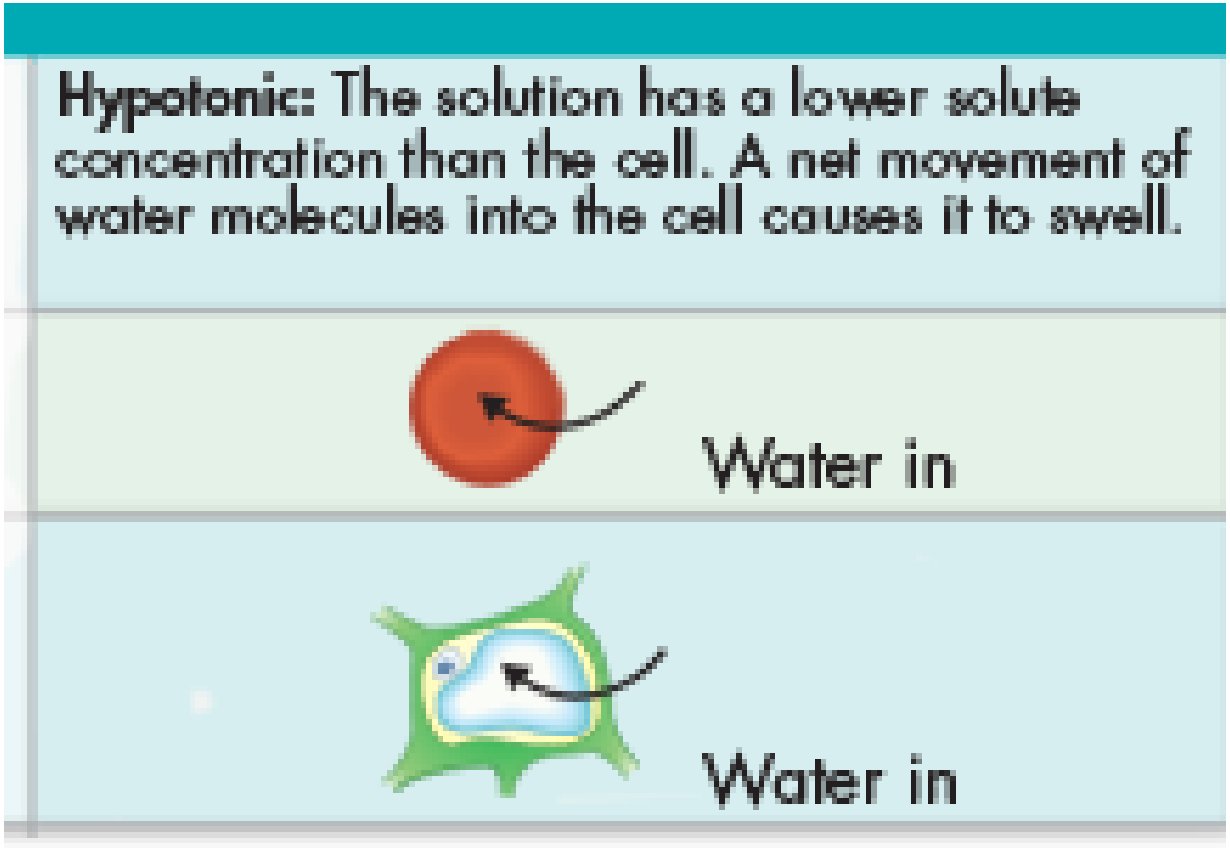


Osmotic Pressure

The net movement of water in or out of a cell exerts a force known as **osmotic pressure.**

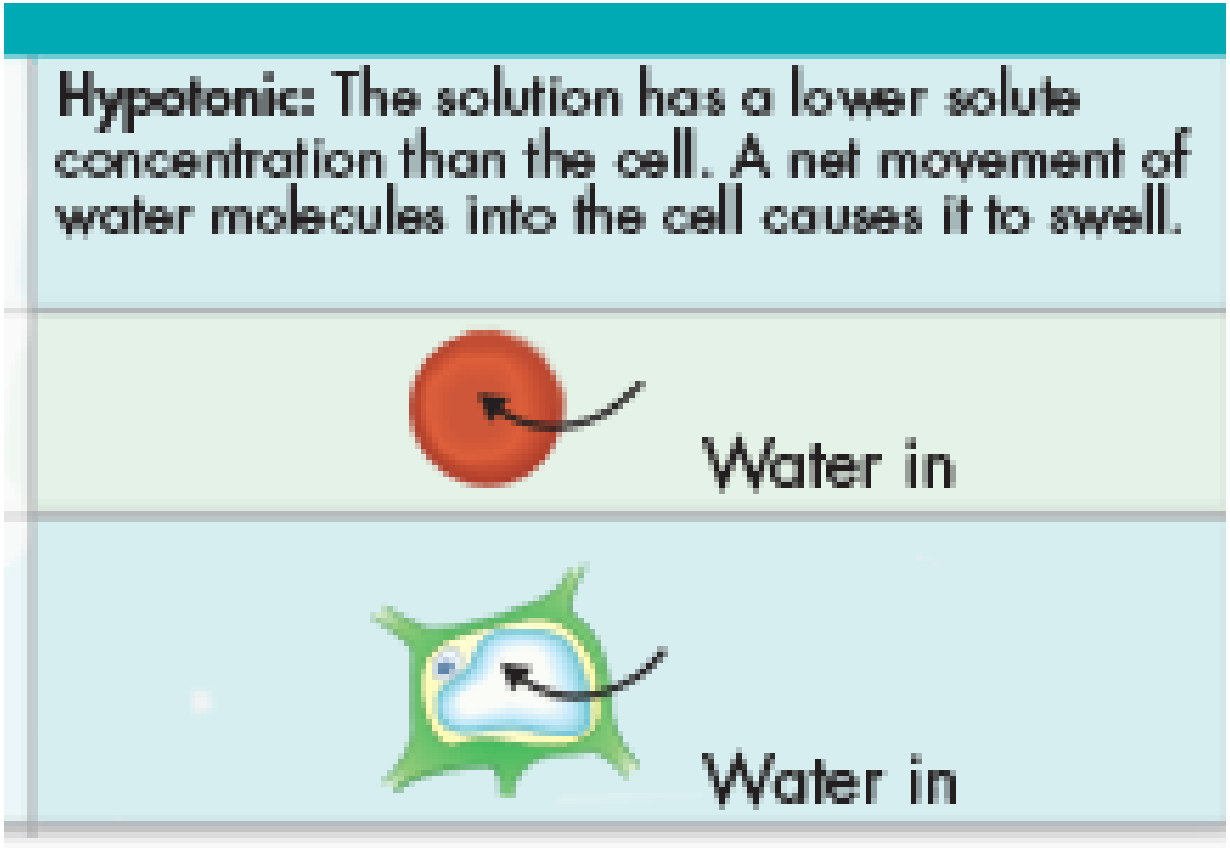
Osmotic Pressure

Because the cell is filled with salts, sugars, proteins, and other molecules, it is almost always hypertonic to fresh water. So if a cell is in fresh water, water tends to move quickly into the cell, causing it to swell or even burst.



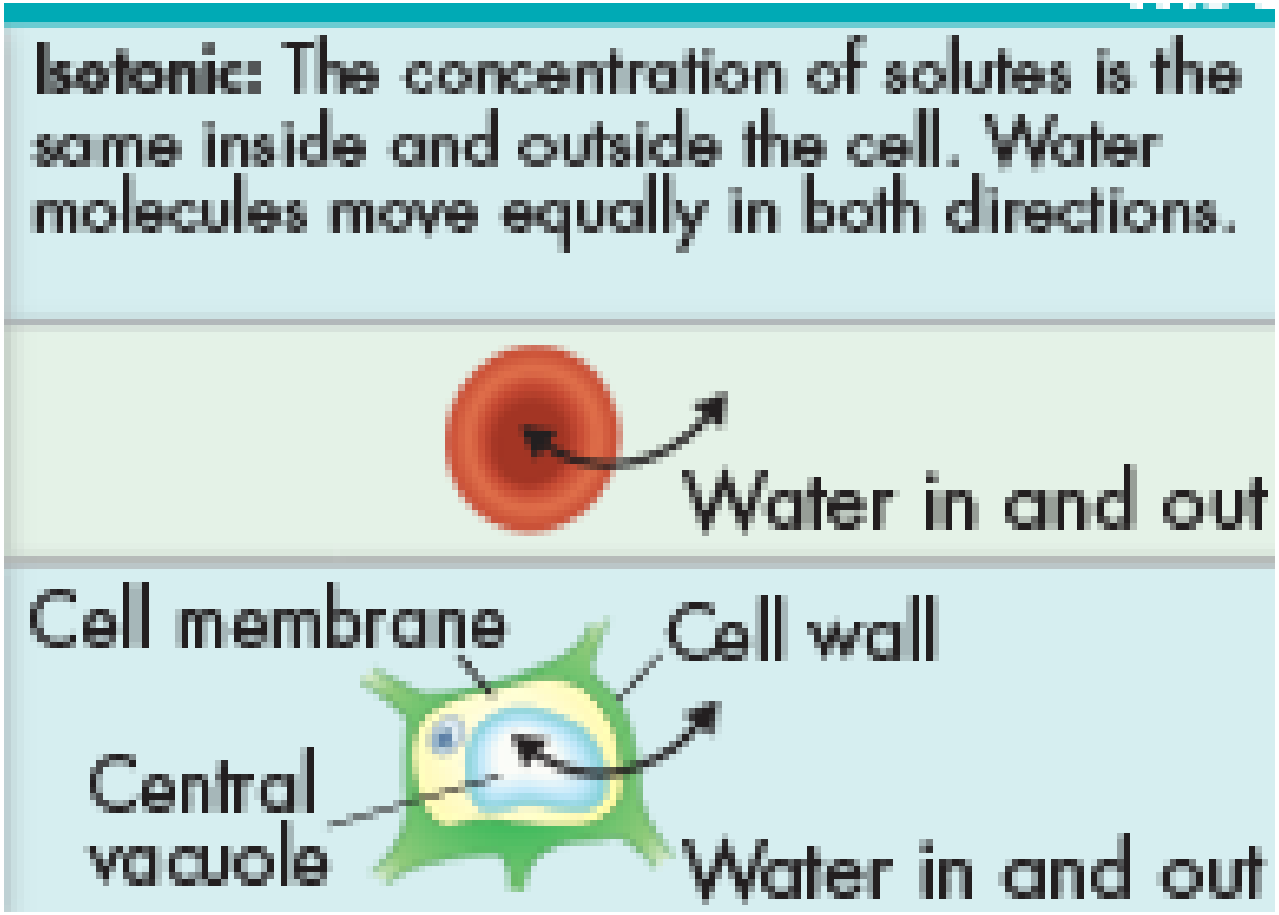
Osmotic Pressure

In plants, the movement of water into the cell causes the central vacuole to swell, pushing cell contents out against the cell wall.



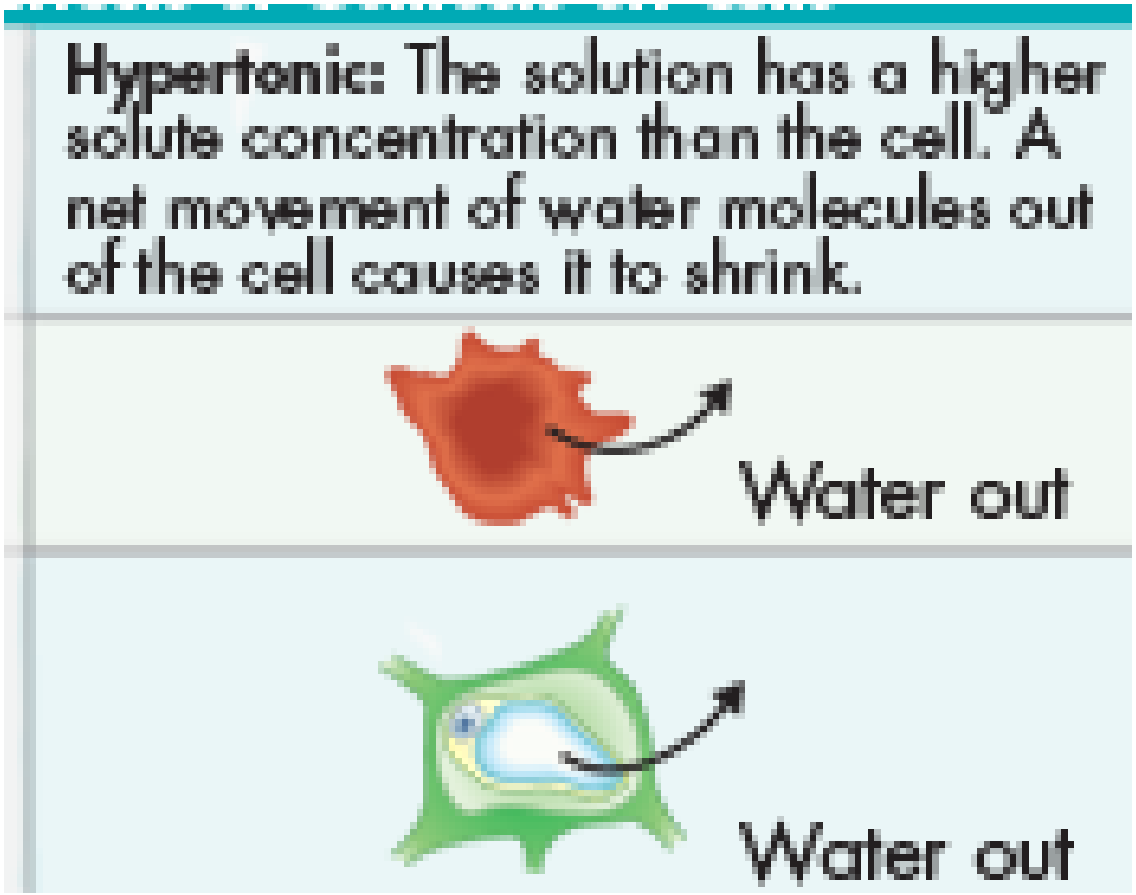
Osmotic Pressure

Cells in an isotonic solution experience no net gain or loss of water.



Osmotic Pressure

In a hypertonic solution, water rushes out of the cell, causing animal cells to shrink and plant cell vacuoles to collapse.



Active Transport

The movement of materials **against or up** a concentration difference is known as **active transport**.

- requires energy (ATP).

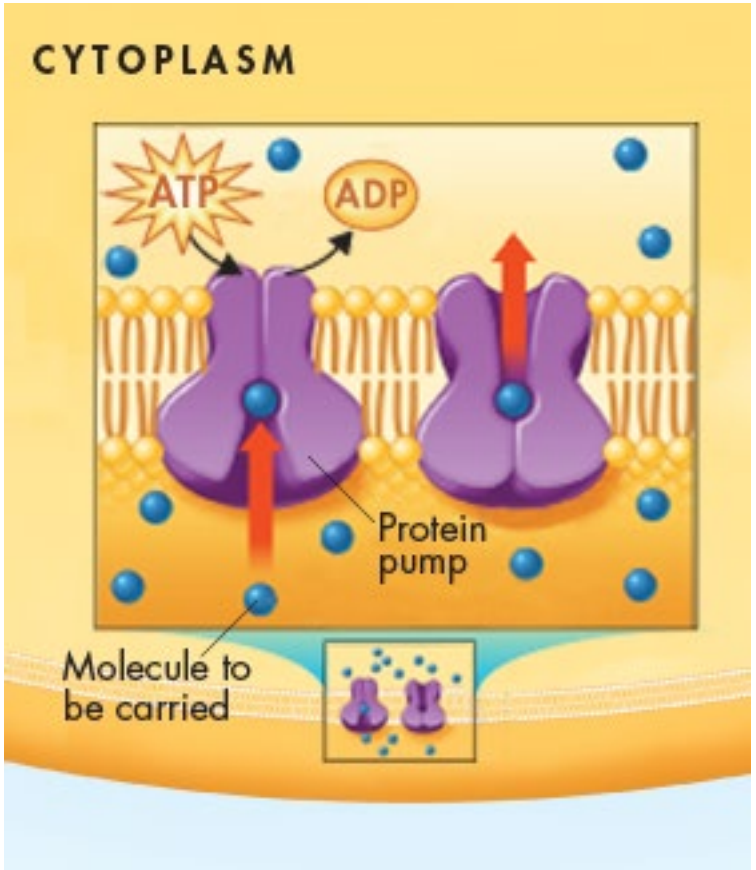
Active Transport

active transport of small molecules or ions happens via transport proteins, or protein "pumps," in the membrane.

calcium, potassium, and sodium ions use this transport.

- example: sodium potassium pump

protein shape changes are important in the process.



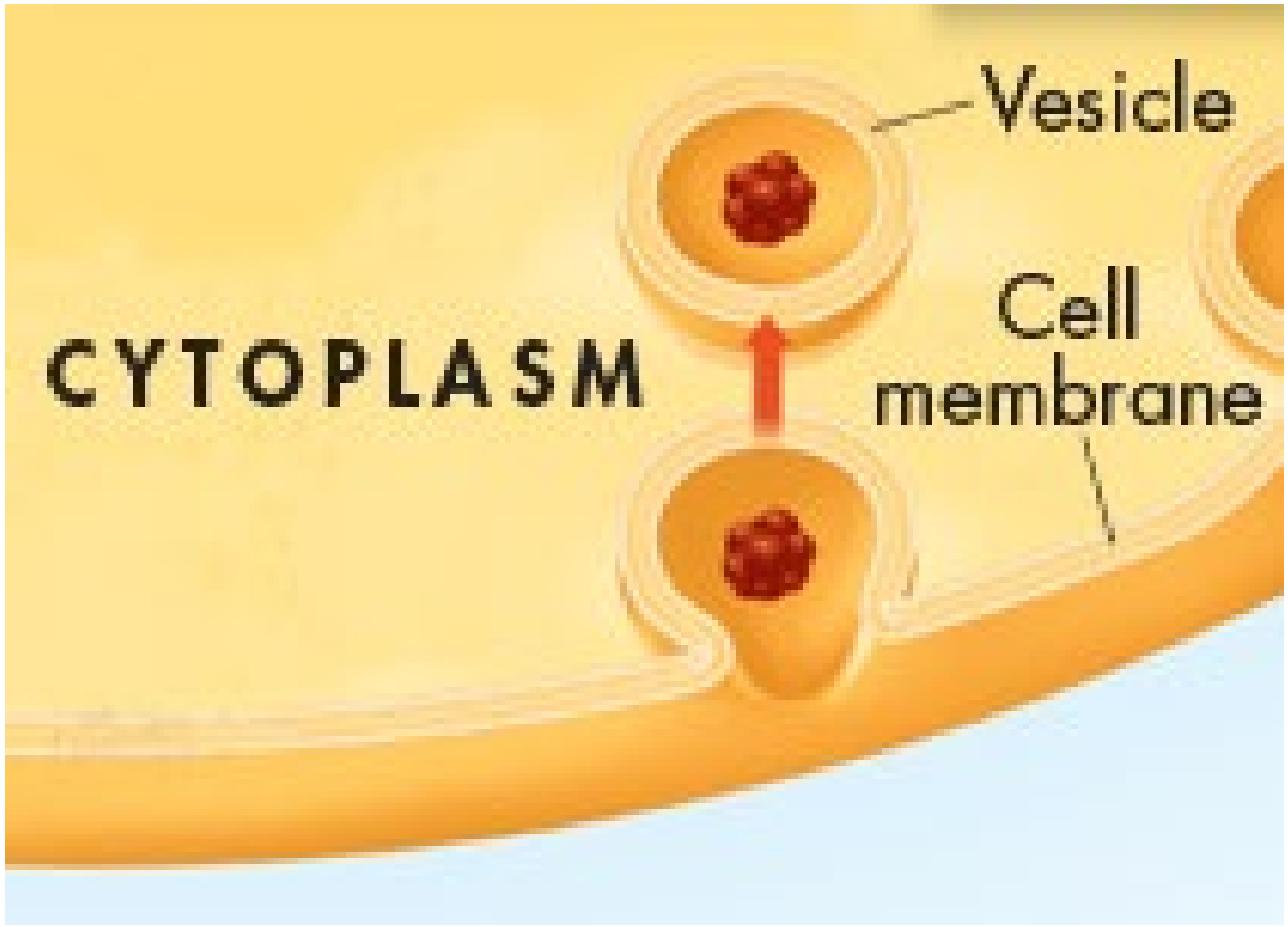
Active Transport: Bulk Transport

Bulk Transport moves larger molecules and clumps of material across cell membranes.

- requires energy (ATP)
- forms:
    1. endocytosis
        a. pinocytosis
        b. phagocytosis
    2. exocytosis

Endocytosis

process of taking material into the cell by vesicles or vacuoles



Endocytosis

Types of endocytosis:

1. phagocytosis - cytoplasm extensions surround a particle and package it within a **food** vacuole. The cell then engulfs it.

Amoebas eat this way.

means “cell eating”

2. pinocytosis - cells form tiny pockets along the cell membrane.

The pockets fill with **liquid** and pinch off to form vacuoles within the cell.

means “cell drinking”

Exocytosis

membrane of a vacuole fuses with the cell membrane, forcing the vacuole contents out of the cell.