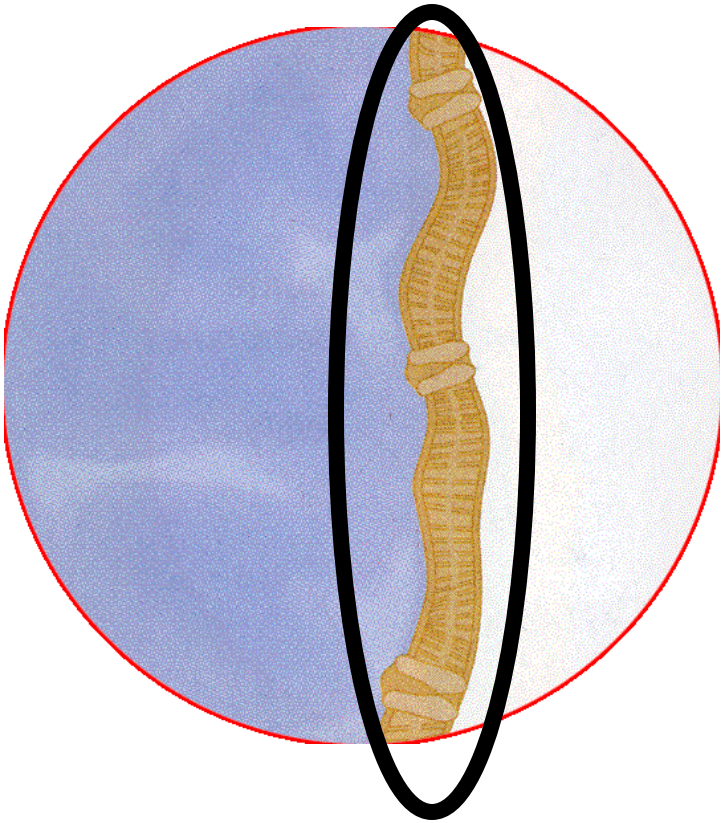
The Cell Membrane

Why cells must control materials

Living cells must maintain homeostasis for survival.



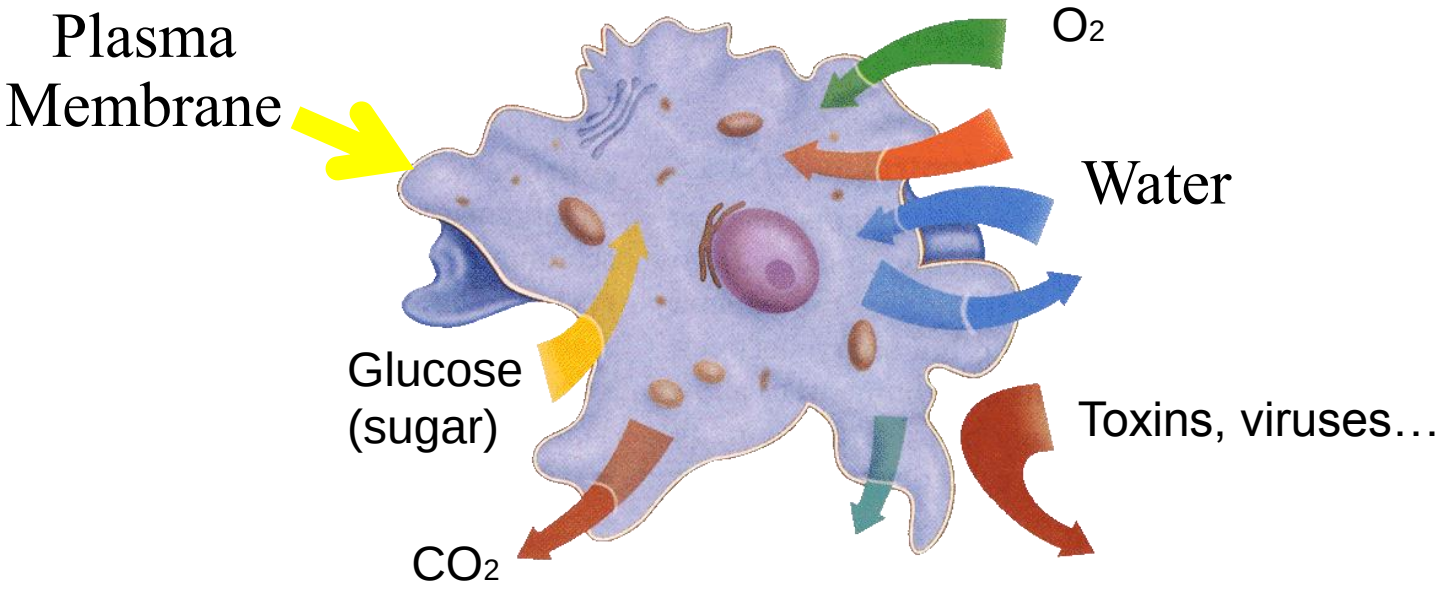
The **cell membrane** is the boundary between the cell and its environment.

It is the cell membrane's job to:

- allow a steady supply of nutrients to come into the cell
- remove excess amounts of nutrients
- allow waste and other products to leave the cell.

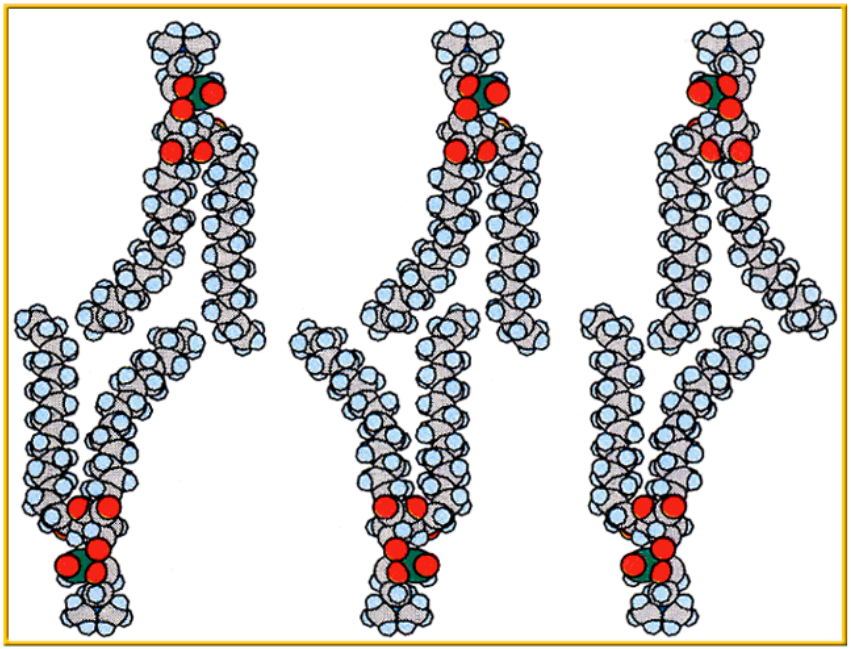
The cell membrane is selectively permeable

-- allows some molecules in while keeping others out.



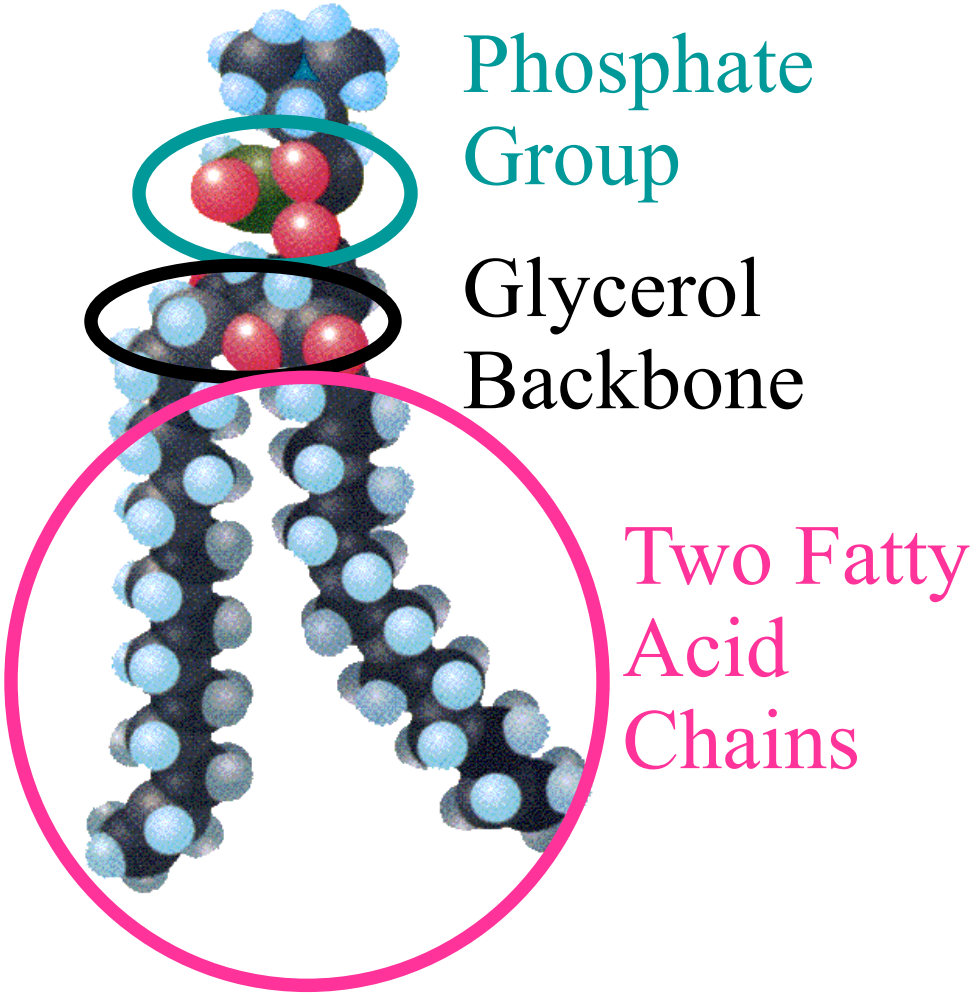
Structure of the Cell Membrane

The cell membrane is composed of 2 layers of phospholipids back-to-back.



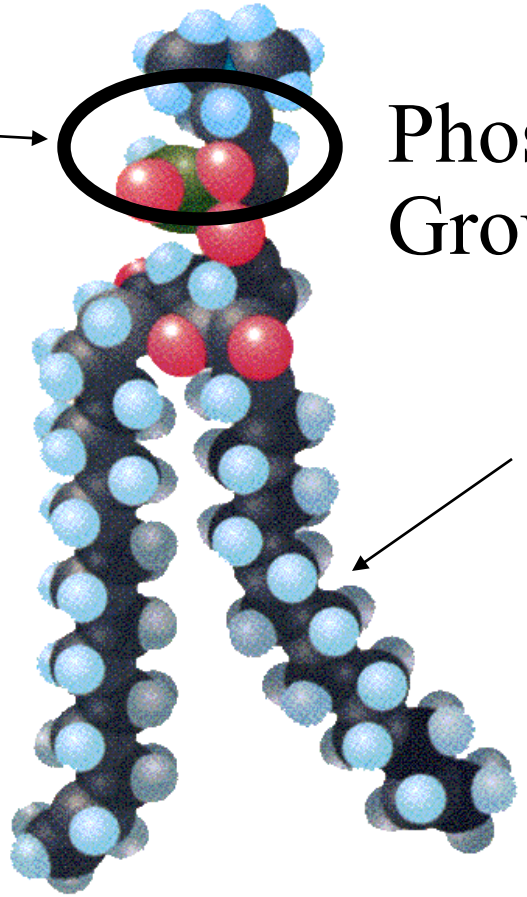
Phospholipids are lipids (fat) with a phosphate attached to them.

Structure of a Phospholipid:



Makeup of the phospholipid bilayer

Hydrophilic = “loves water”



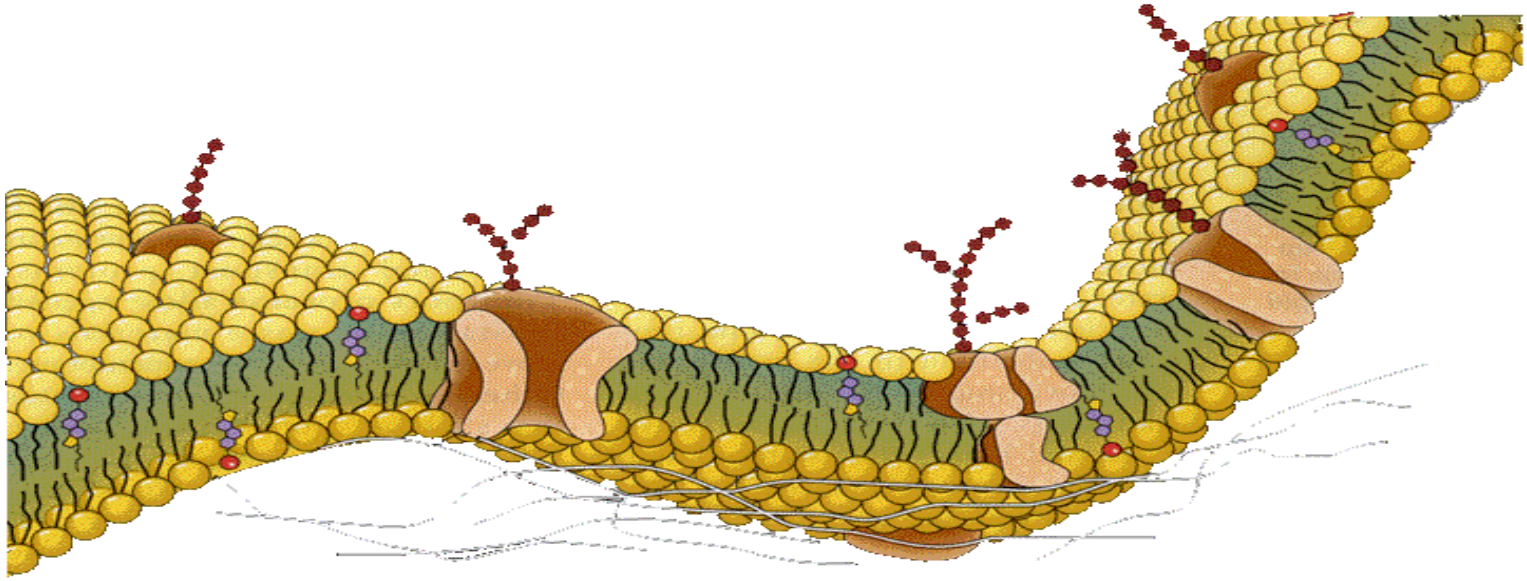
Phosphate Group

Hydrophobic – “hates” water

The phosphate group creates a polar and a nonpolar end, which allows for formation of a cell membrane

Makeup of the phospholipid bilayer

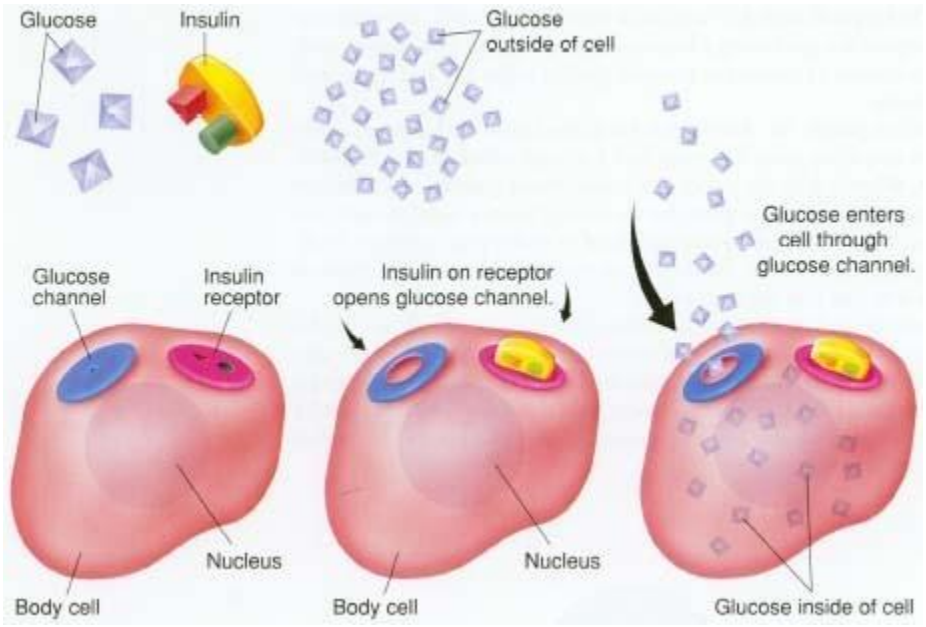
The **fluid mosaic model** describes the plasma membrane as a flexible boundary of a cell. The phospholipids move within the membrane.



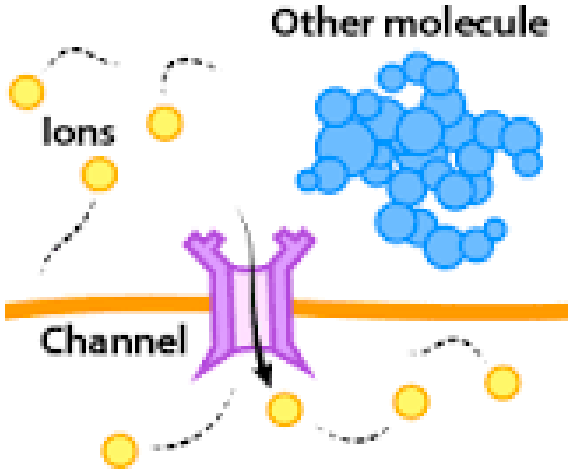
Other components of the plasma membrane:

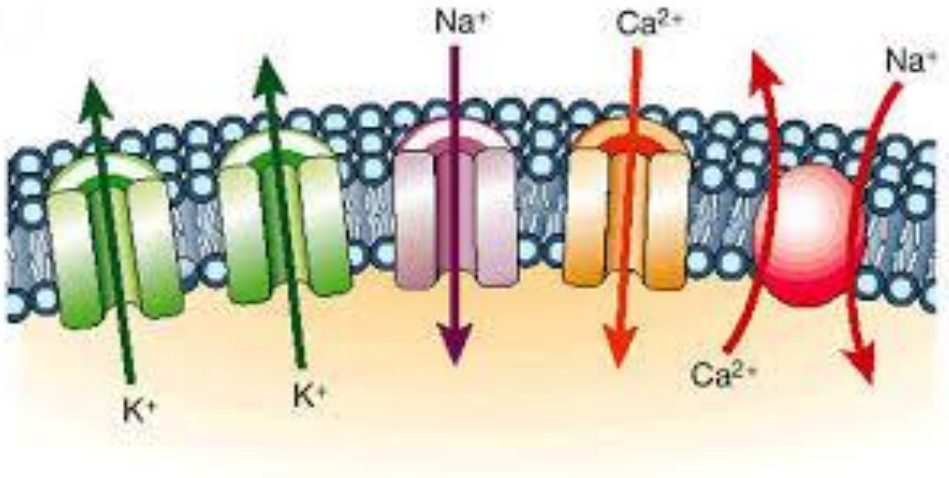
Proteins – on the surface of the c.m. allow needed substances or waste materials to move through

Ex.1 Receptors – bind to hormones and trigger the c.m. to respond (ex. Insulin allows in sugar)



- Ex. 2. Channel proteins – form channels for specific ions or molecules to travel through the c.m.

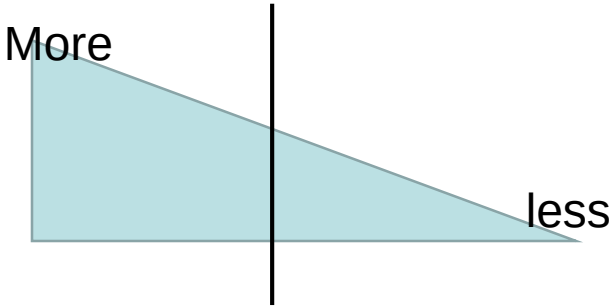




Diffusion and Osmosis

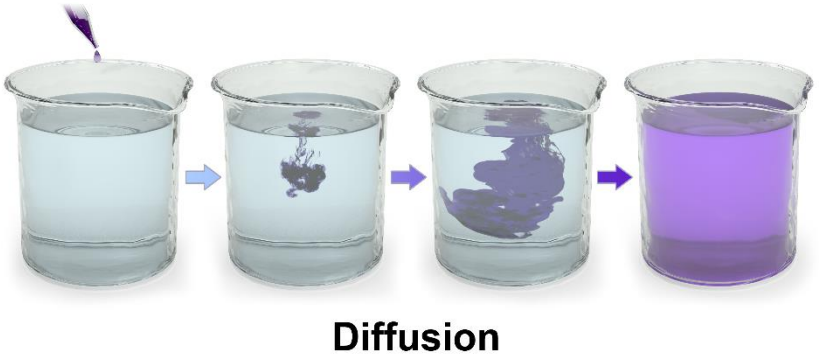
- Diffusion = movement of particles from an area of higher concentration to an area of lower concentration.
- Concentration gradient = unequal distribution of particles

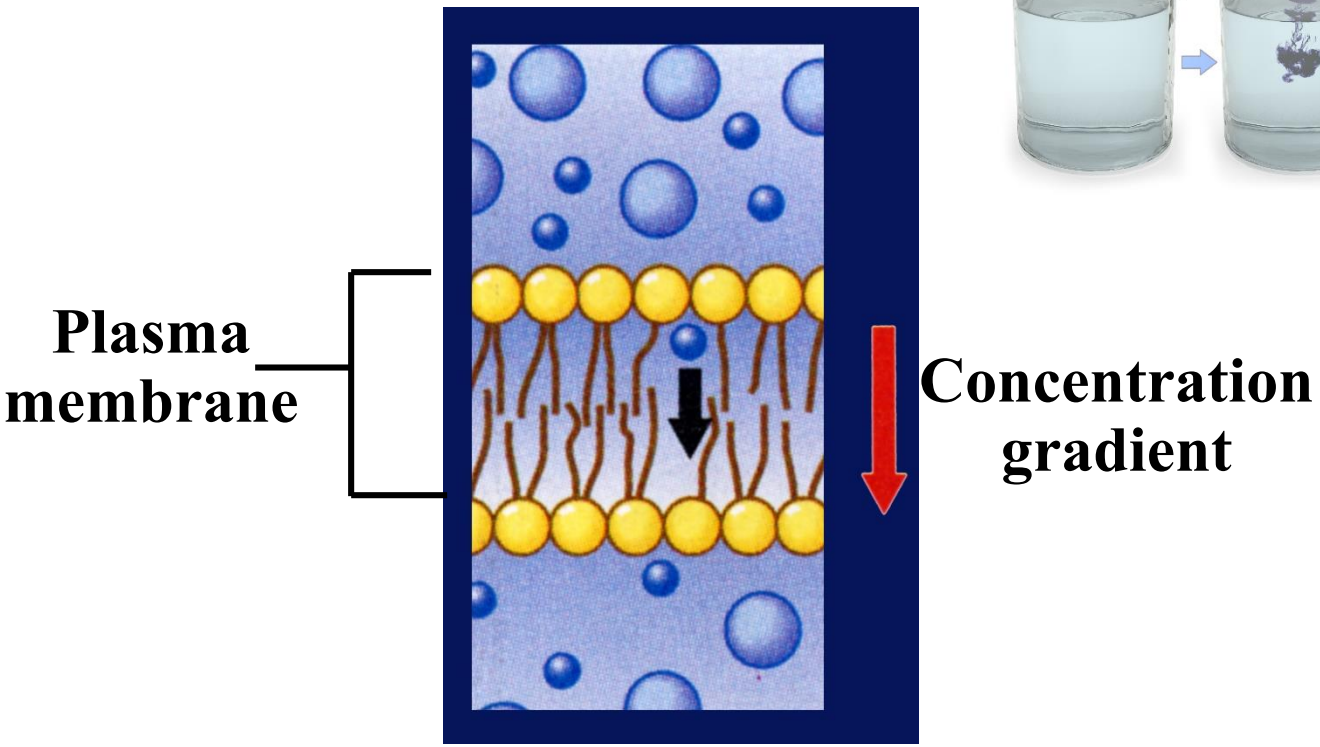
"Things flow from high to low"
Think of a hill
(steep grade)



- osmosis =diffusion of water across a selectively permeable membrane – EGG Lab

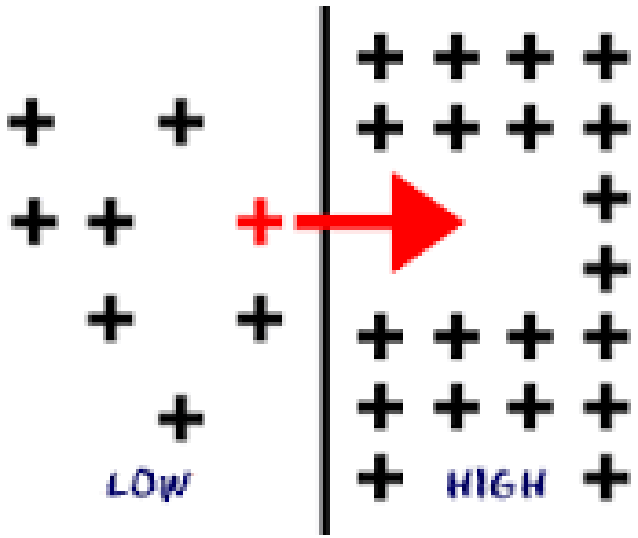
- passive transport – move particles down a concentration gradient, uses no energy





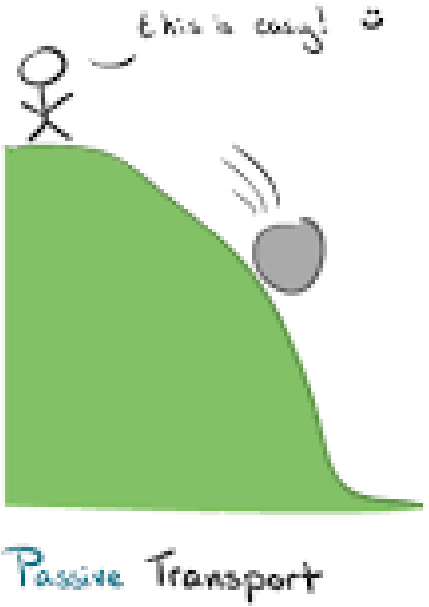
Active Transport

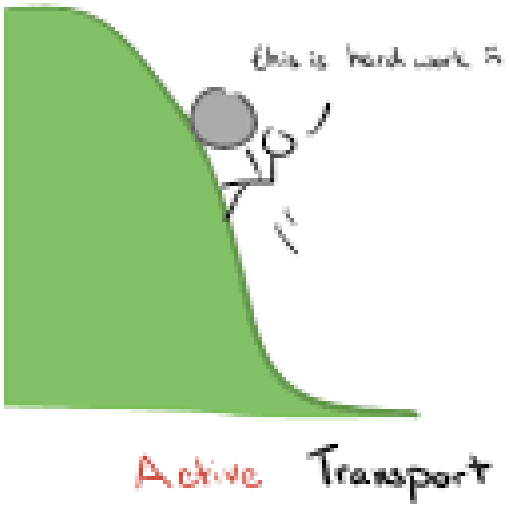
active transport - Move Particles UP a concentration gradient, Uses ENERGY



Cell membrane

Passive vs active transport

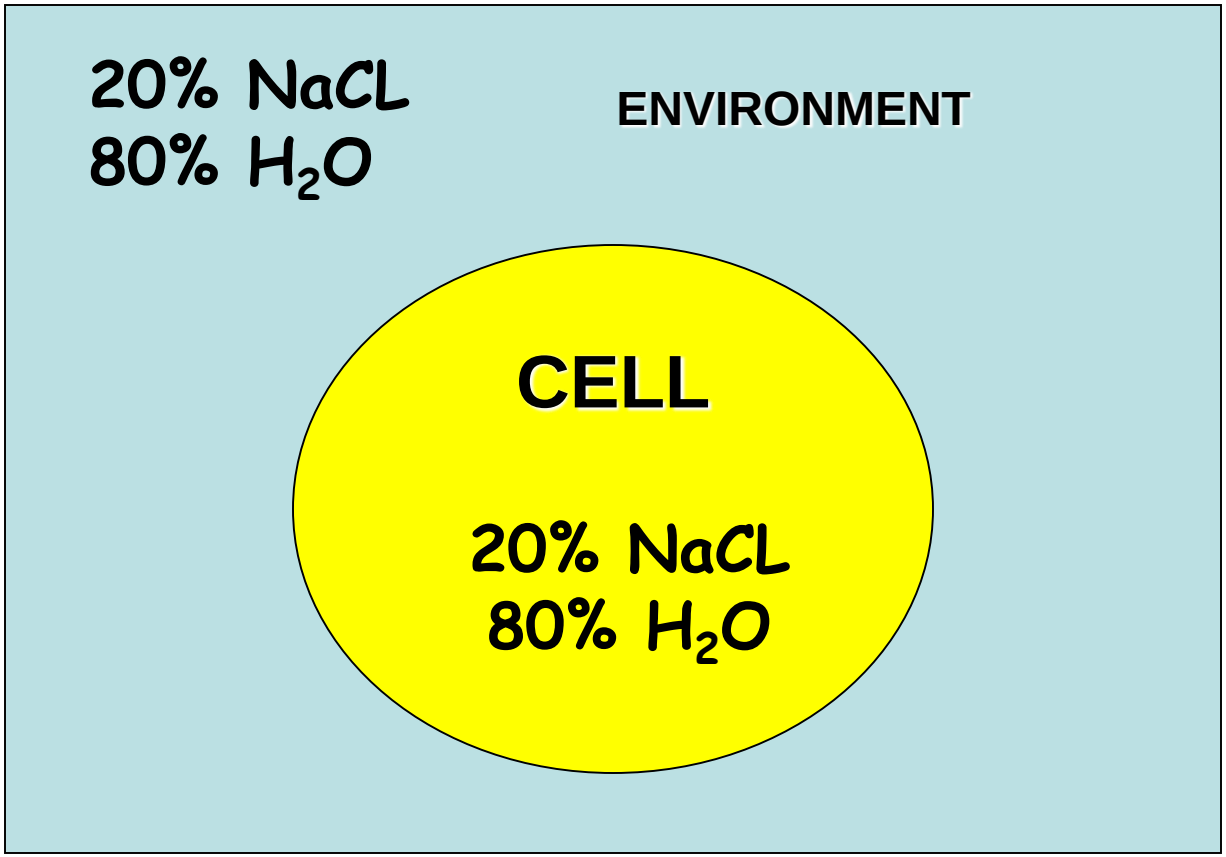




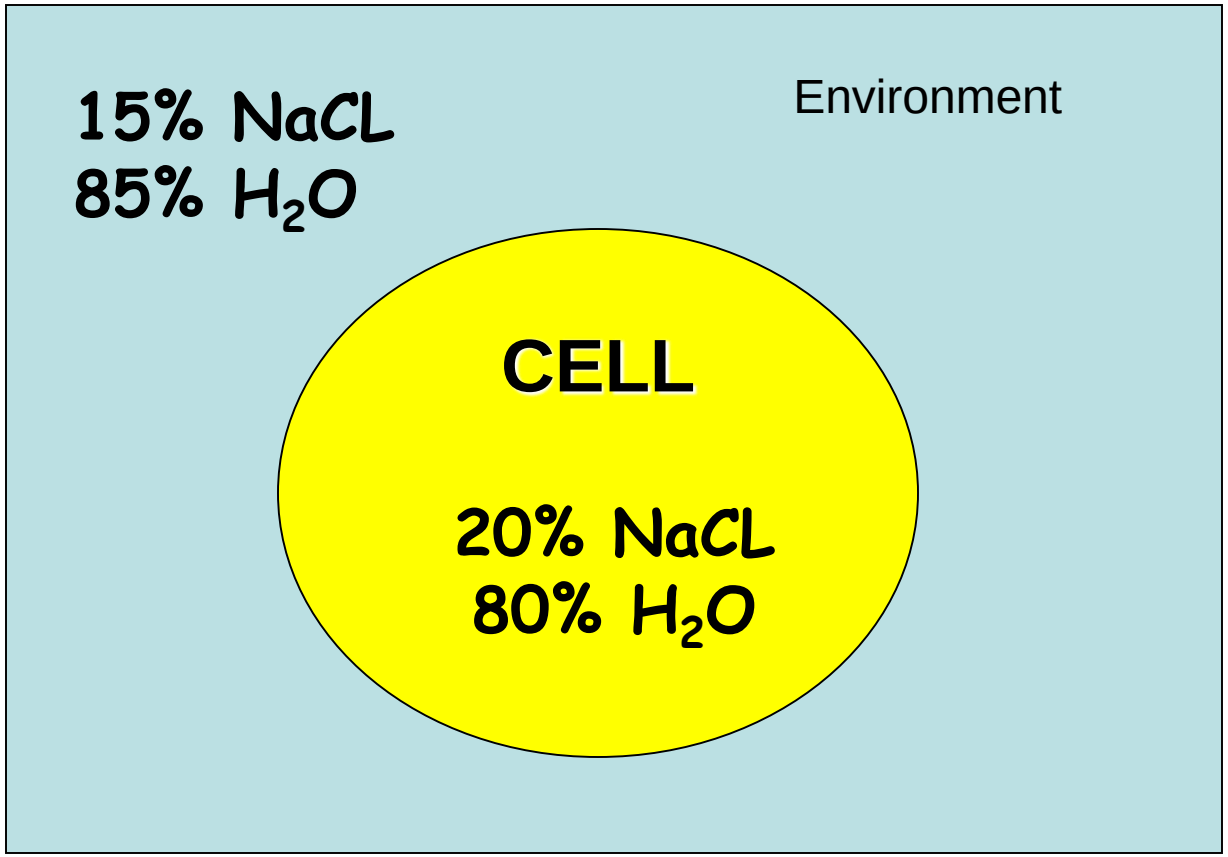
Solution = Water + ____

Isotonic
Hypotonic
Hypertonic

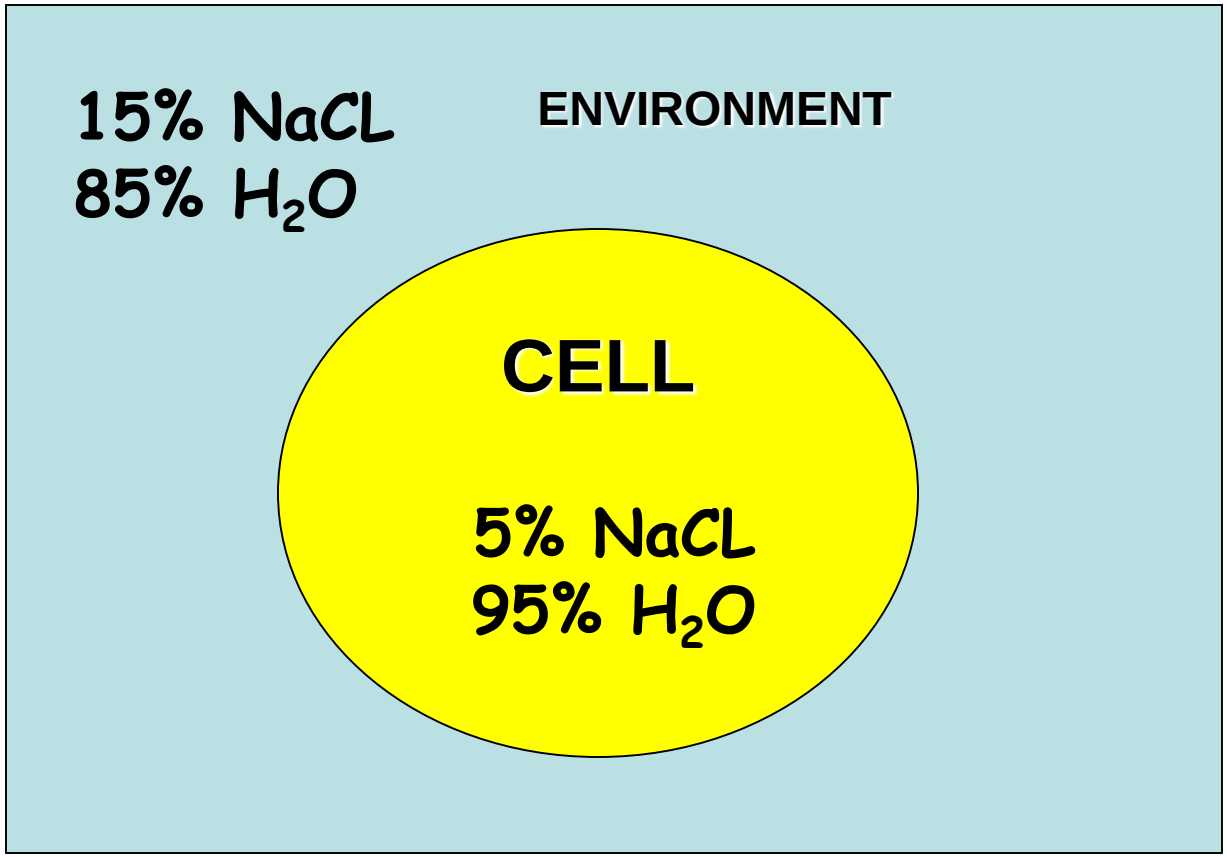
A Cell in Isotonic Solution

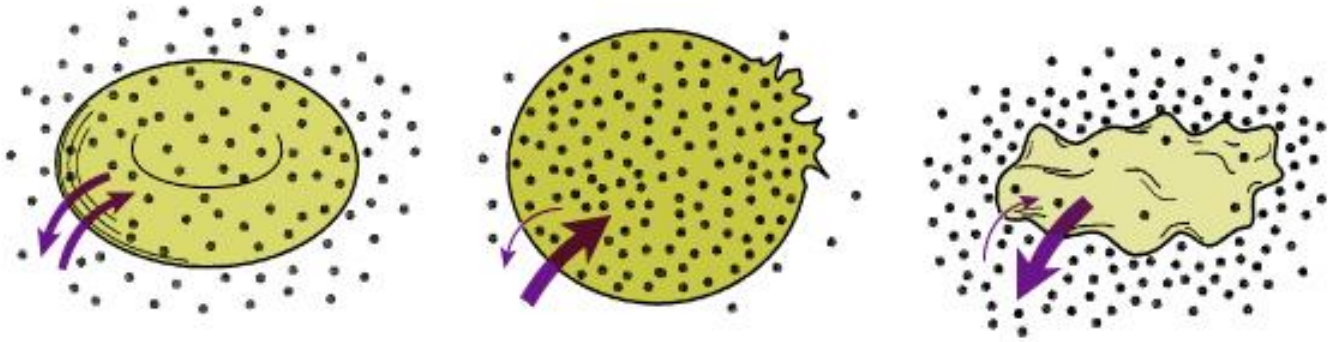


Cell in Hypotonic Solution



Cell in Hypertonic Solution





Isotonic Solution

↓

NO NET MOVEMENT OF H_2O (equal amounts entering & leaving)

Hypotonic Solution

↓

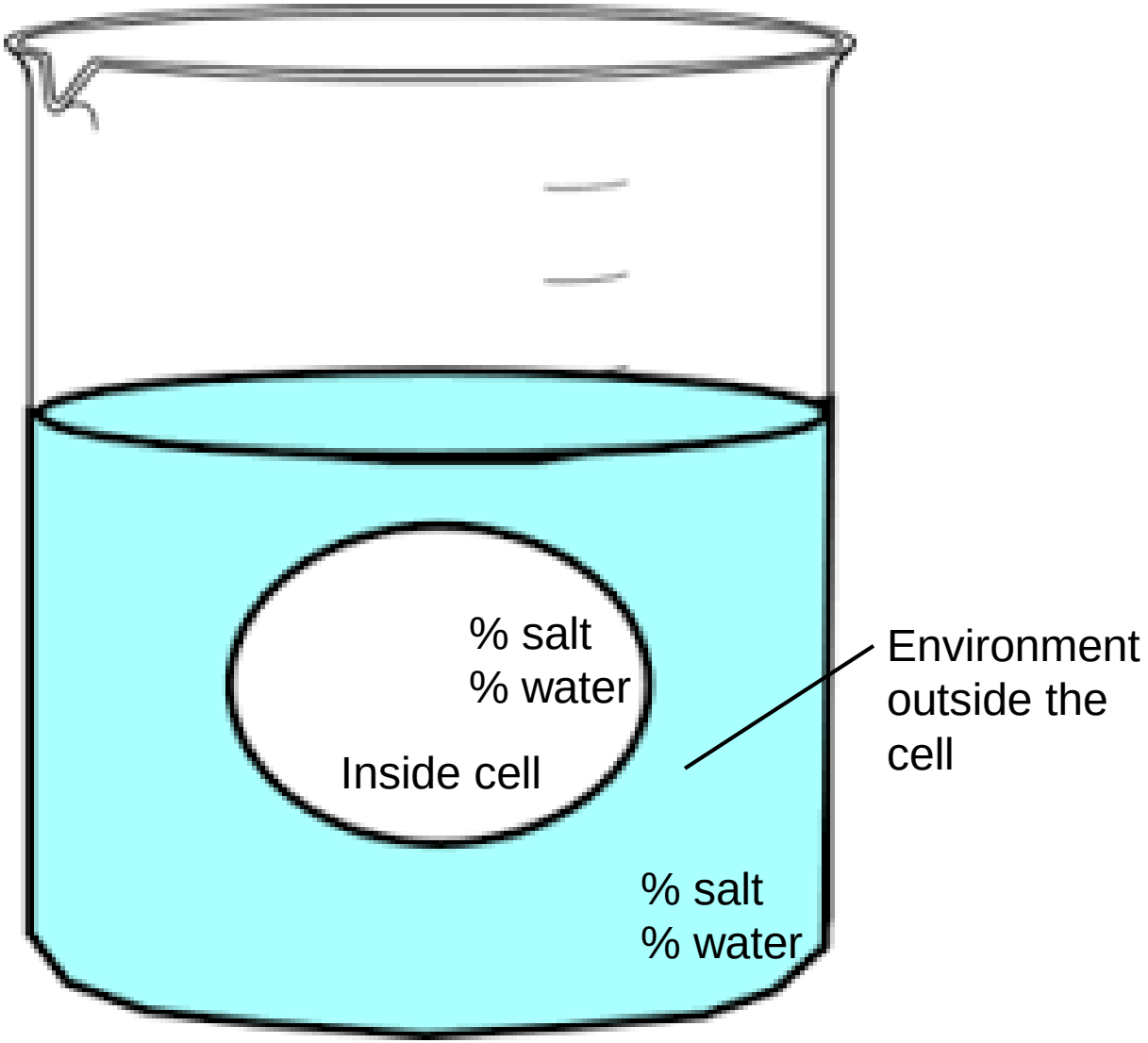
Cell will Burst

Hypertonic Solution

↓

Cell will Shrivel

osmosis


% salt
% water
Inside cell
Environment outside the cell
% salt
% water

Cell membrane Crossword Creation

- Start with a key
- Put your words in a crossword pattern
- Number across and down
- Write the clues
- Create a blank crossword

Front
Answer key

across

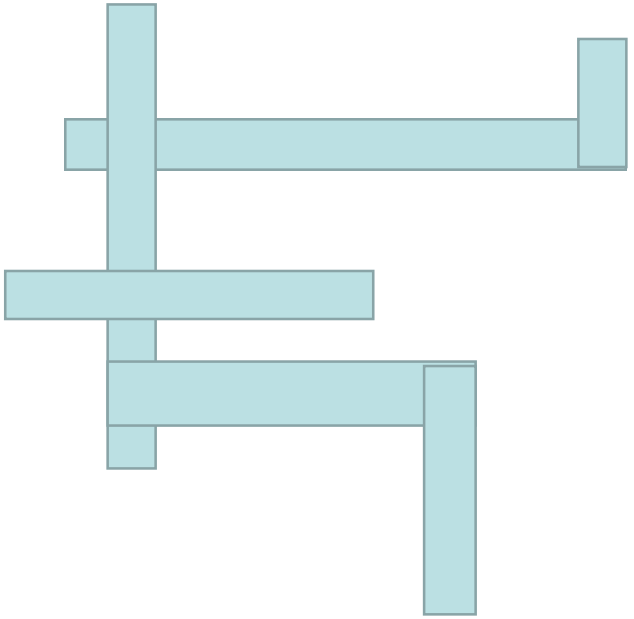
1.
2.
3.

down

1.
2.
3.

Back

Blank crossword



across

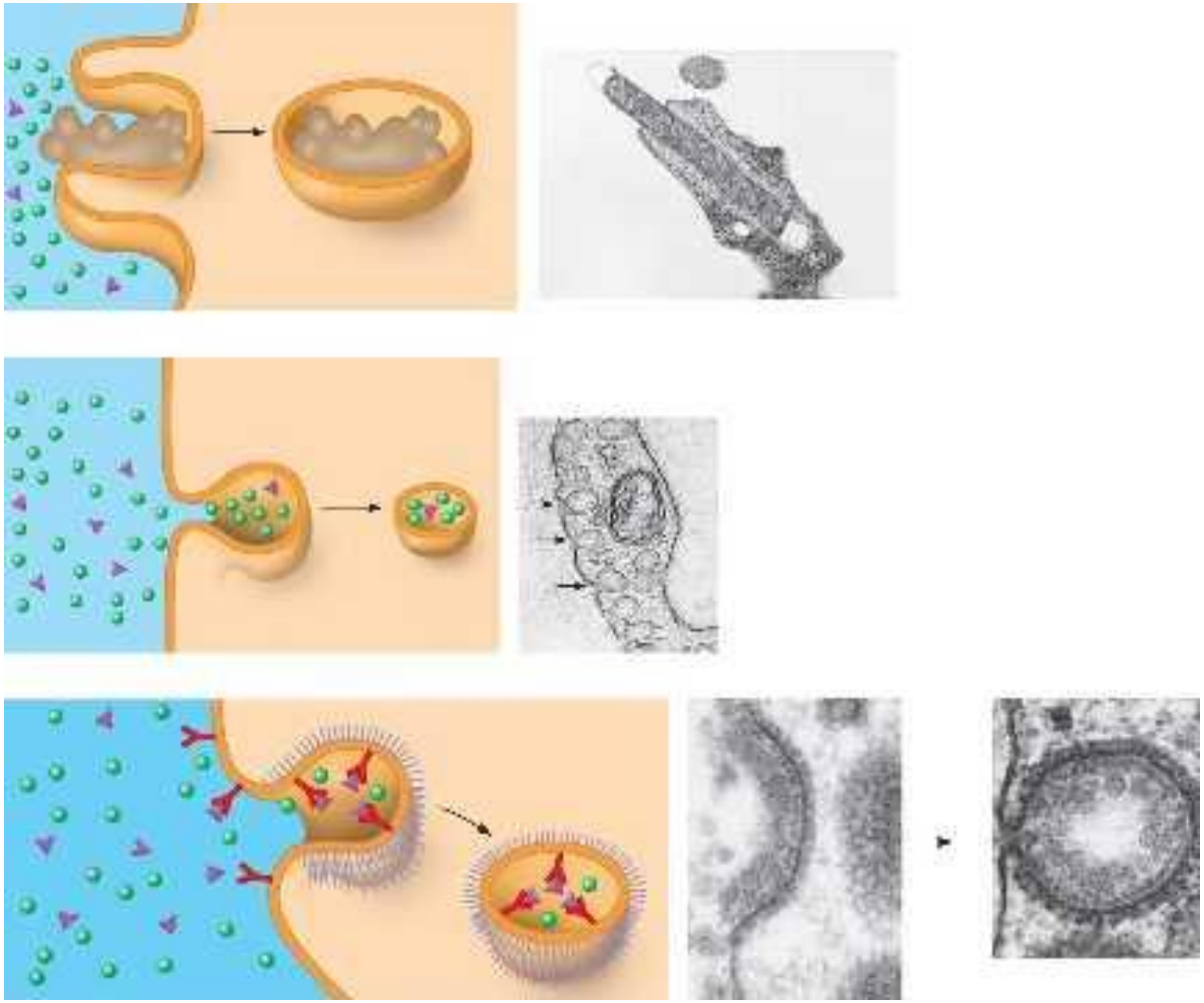
1.
2.
3.

down

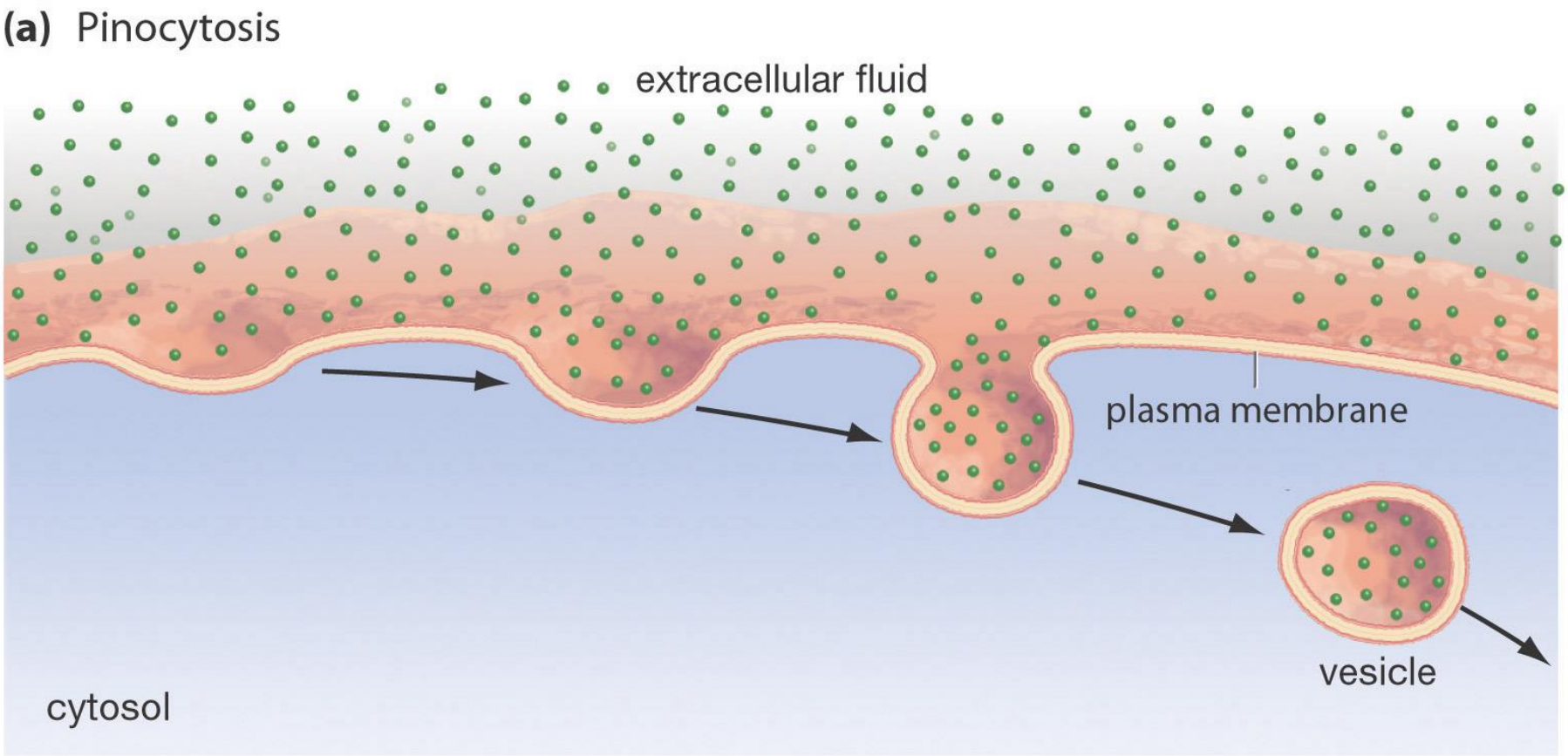
1.
2.
3.

Endocytosis-move things into the cell

(Pinocytosis and Phagocytosis)



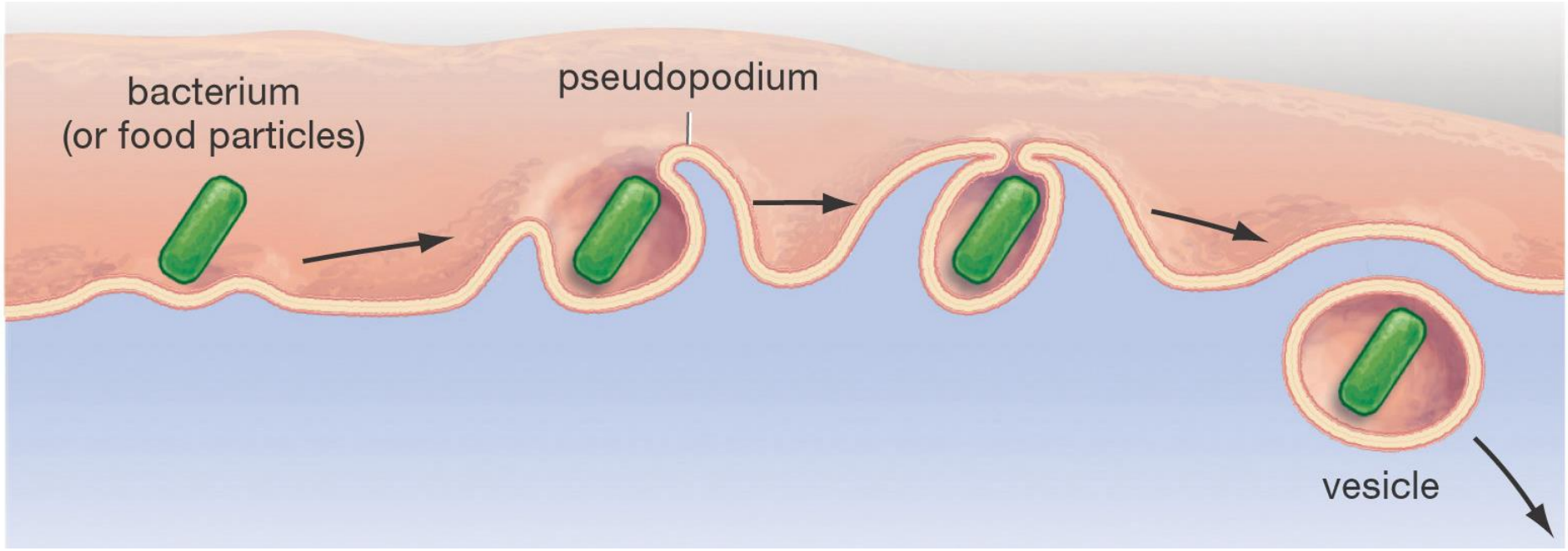
Pinocytosis – "Cell drinking"



Most common form of endocytosis.

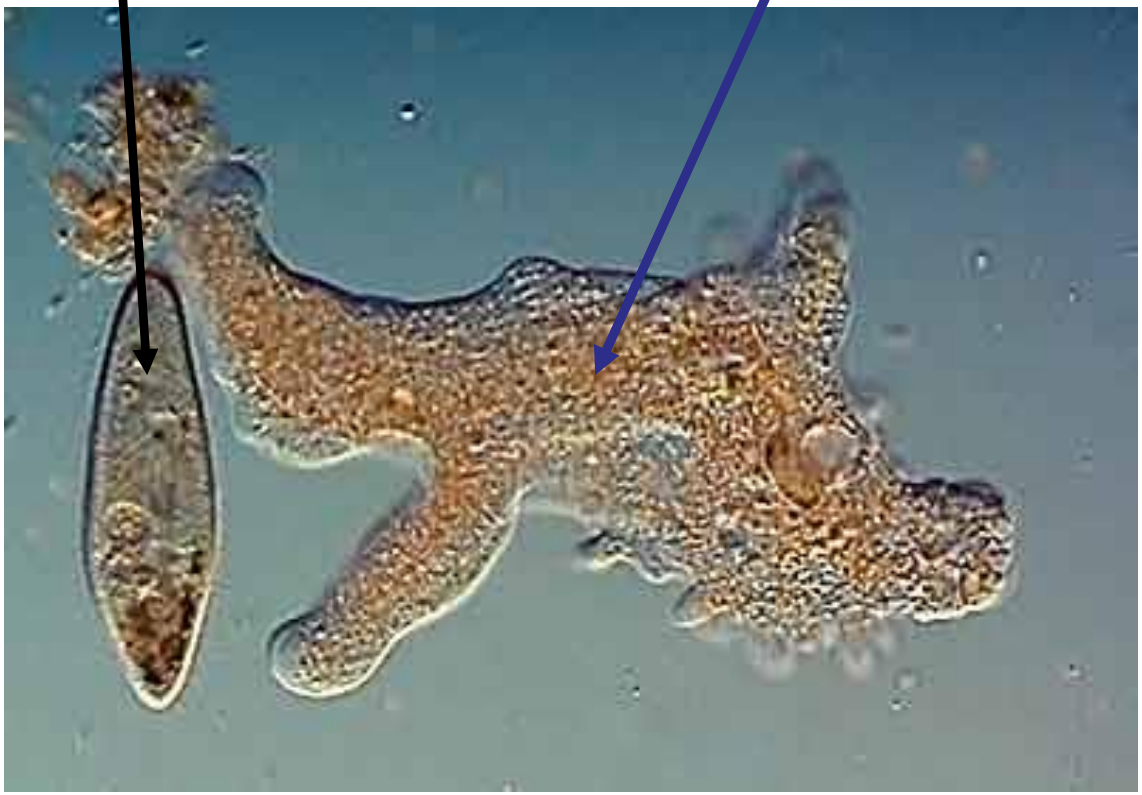
Takes in dissolved molecules as a vesicle.

Phagocytosis "Cell Eating"



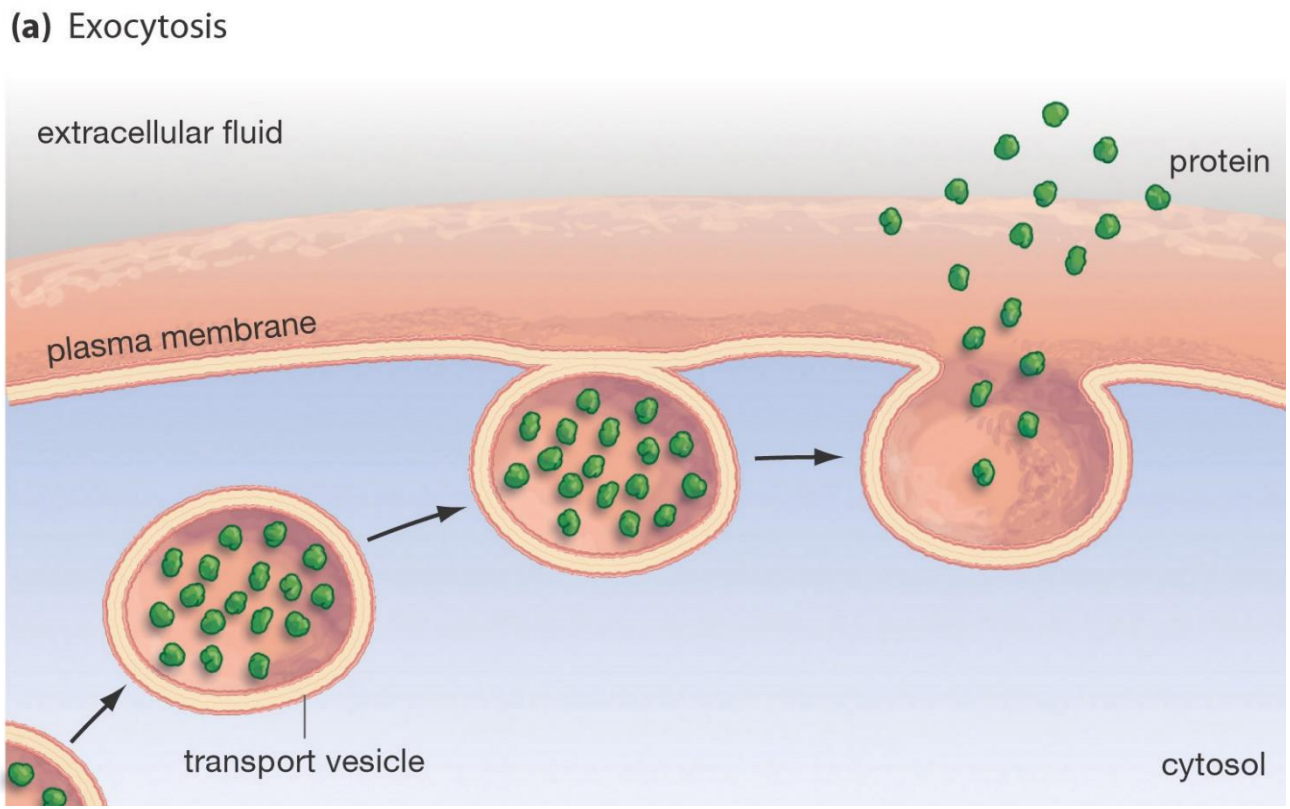
The cell does this to engulf large particles such as food, bacteria, etc. into vesicles

Paramecium vs Amoeba



Amoeba vs Paramecium

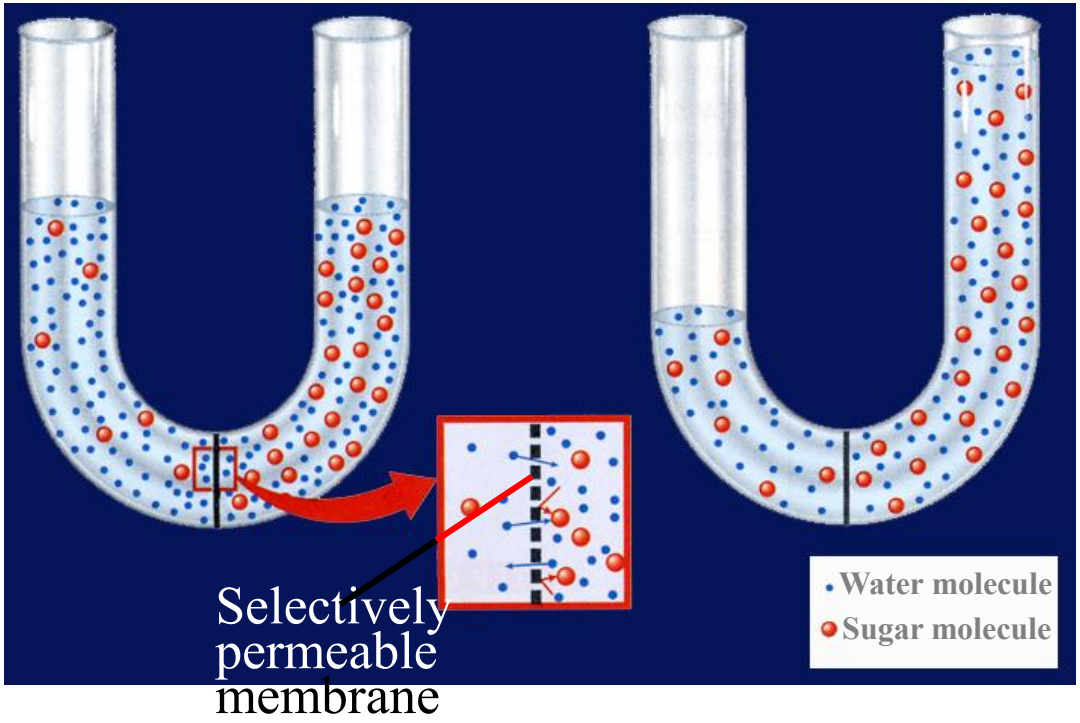
Exocytosis- moving things out of the cell



Molecules are moved out of the cell by vesicles that fuse with the plasma membrane.

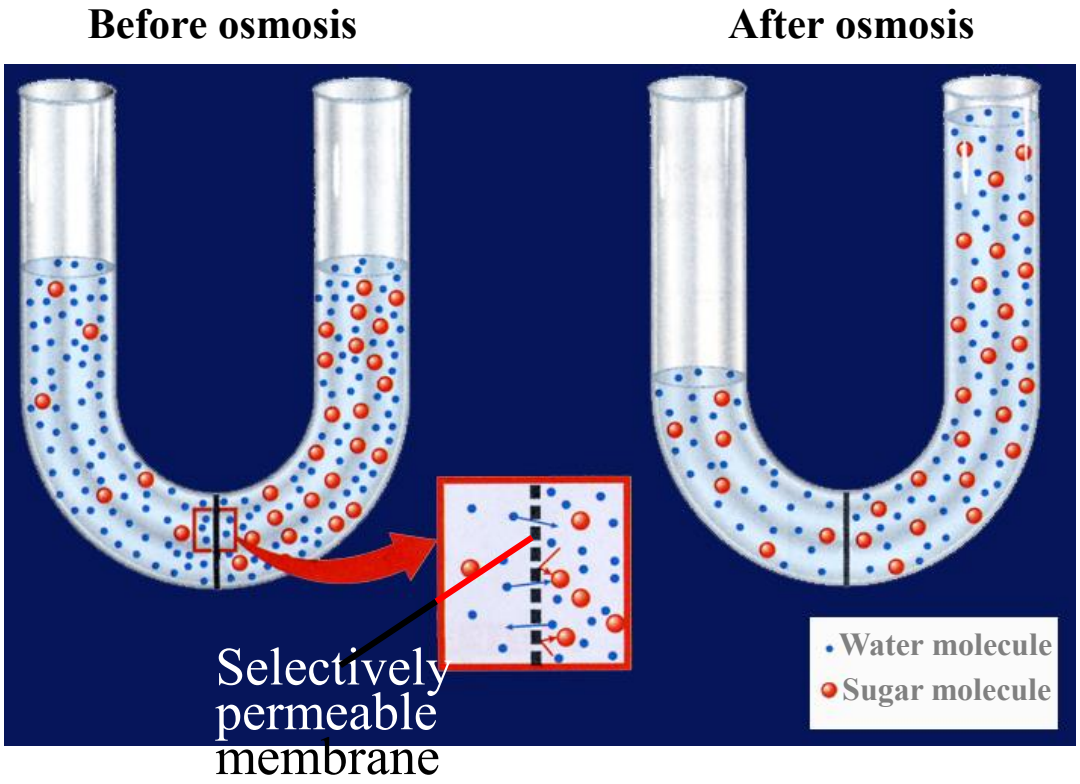
Question 1

The diffusion of water across a selectively permeable membrane is called _____.



A. active transport
B. endocytosis
C. exocytosis
D. osmosis

The answer is D, osmosis. Regulating the water flow through the plasma membrane is an important factor in maintaining homeostasis within the cell.



Question 2

What is the expected result of having an animal cell in a hypertonic solution?

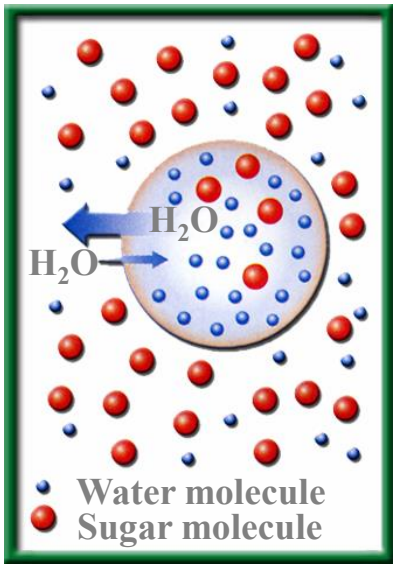
A. The cell shrivels up.

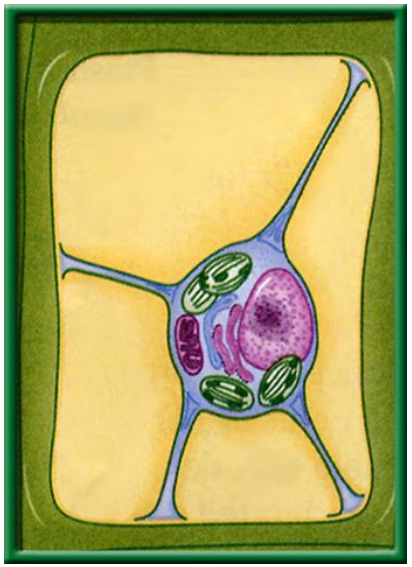
B. The plasma membrane shrinks away from the cell wall.

C. The cell swells up.

D. The cell retains its normal shape.

The answer is A. In a hypertonic solution, cells experience osmosis of water out of the cell. Animal cells shrivel because of decreased pressure in the cells.





Question 3

A grocer mists the celery display with water to keep it looking fresh. What type of solution is the celery now in?

A. isotonic

B. hypotonic

C. hypertonic

D. exotonic

The answer is B. Plant cells contain a rigid cell wall and do not burst even in a hypotonic solution.