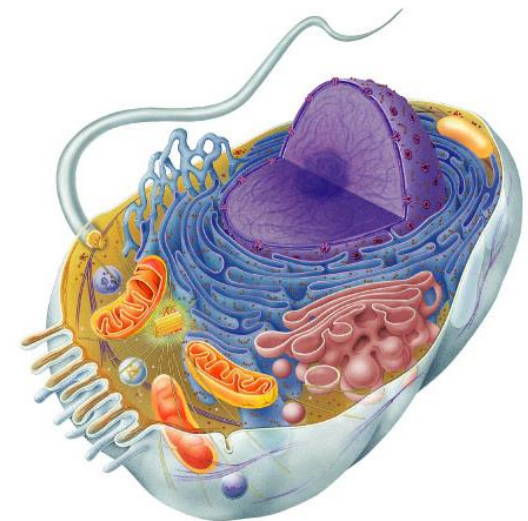


CELL MEMBRANES & MOVEMENT ACROSS THEM



CELL MEMBRANE

- Plasma Membrane
- Semi-permeable membrane

- Cells need an inside & an outside...
 - separate cell from its environment
 - cell membrane is the boundary
 - made up of a **phospholipid** bi-layer

IN

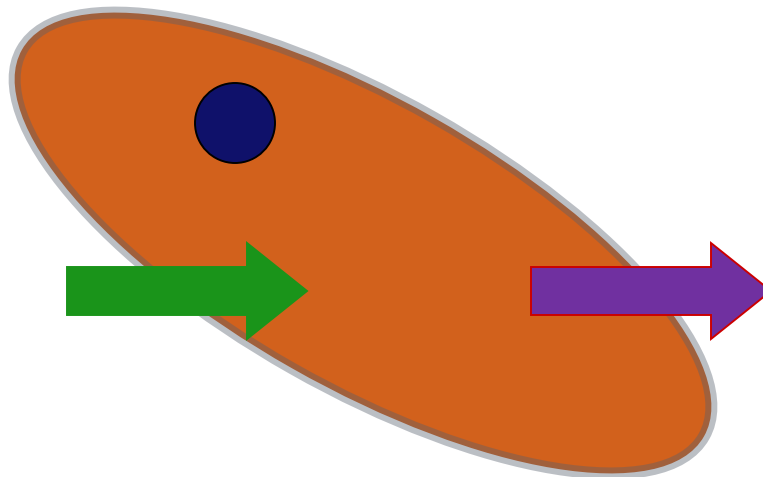
food

- sugars
- proteins
- fats

salts

O₂

H₂O



OUT

waste

- ammonia
- salts
- CO₂
- H₂O

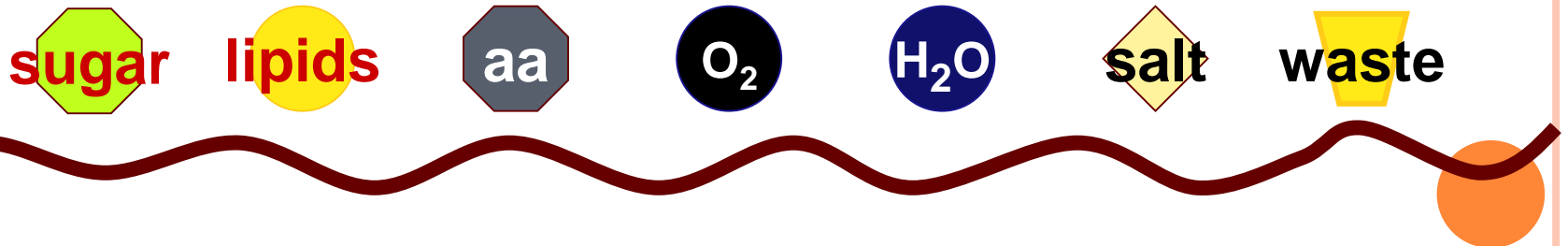
products

- proteins

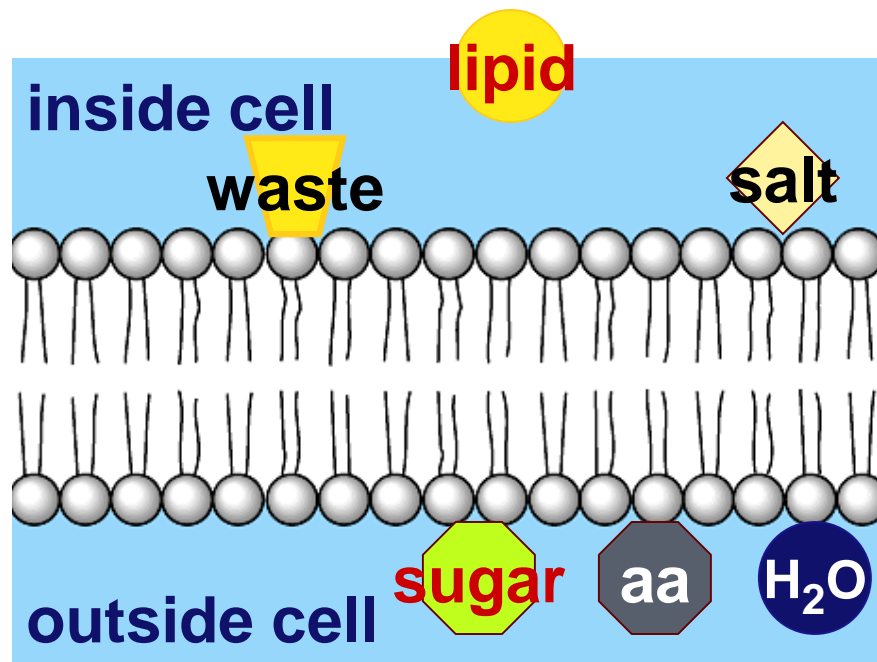
cell needs materials in & products or waste out

- Cell membrane controls what gets in or out
- Need to allow some materials — but not all — to pass through the membrane
 - **semi-permeable**
 - only some material can get in or out

So what needs to get across the membrane?



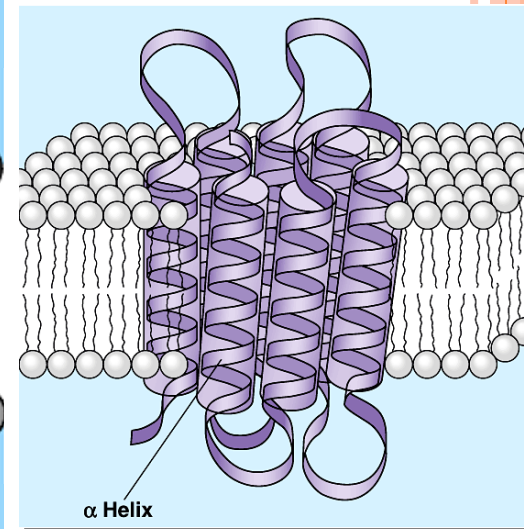
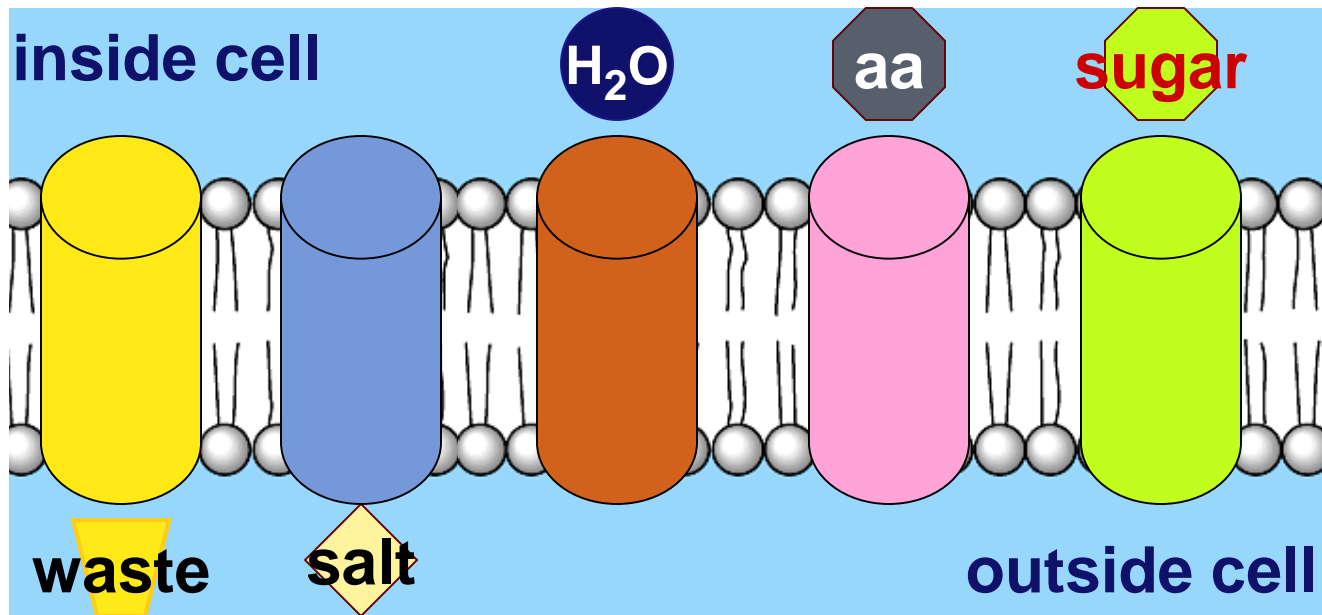
- What molecules can get through the cell membrane directly?
 - fats and oils can pass directly through



but...
what about
other stuff?

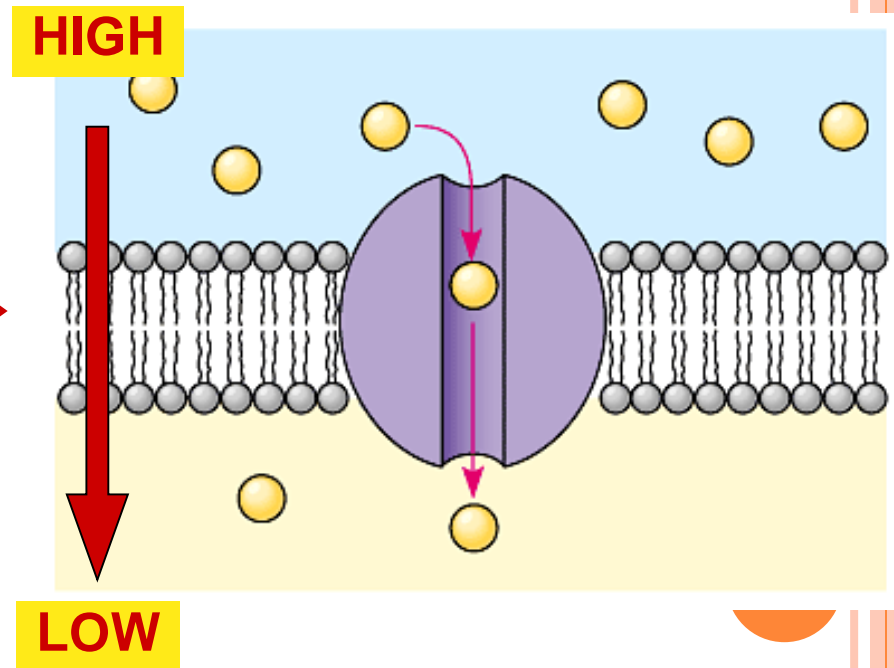
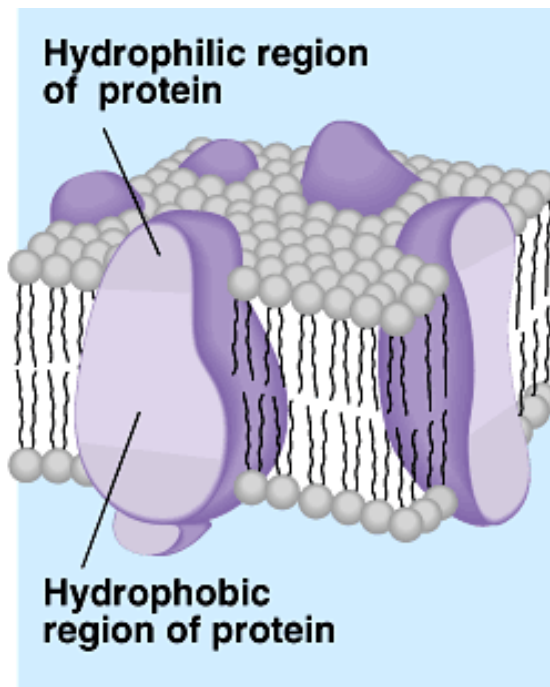
NOT EVERYTHING CAN PASS DIRECTLY THROUGH THE MEMBRANE...

- Need to make “doors” through membrane
 - protein channels allow substances in & out
 - specific channels allow specific material in & out
 - H₂O channel, salt channel, sugar channel, etc.
 - Water uses proteins called aquaporins
 - REMEMBER- proteins are shape specific. Molecule shape = protein channel shape



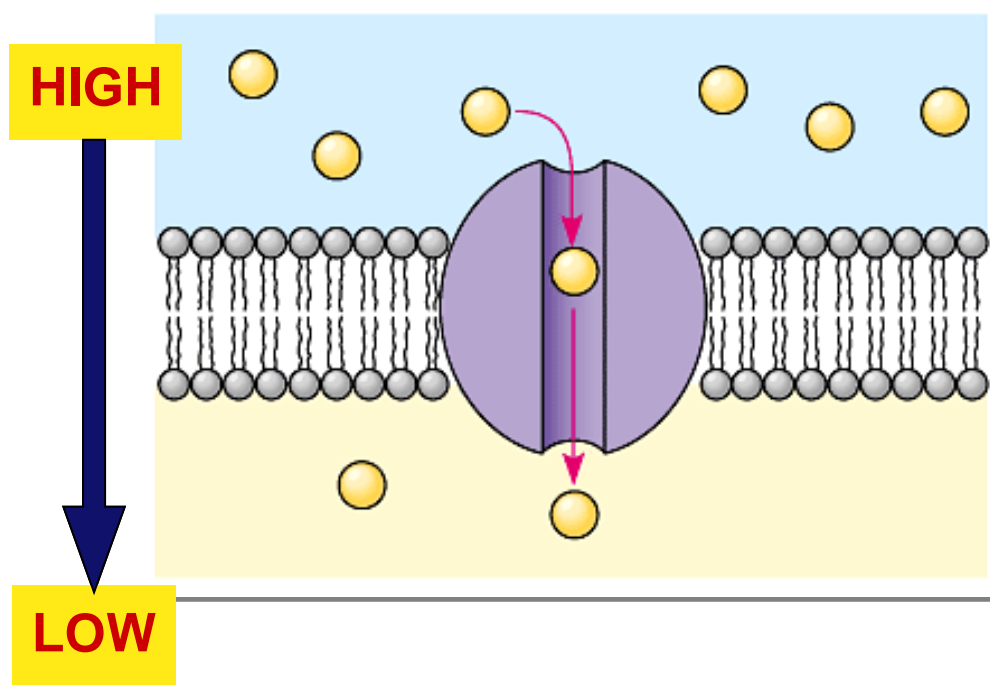
PROTEIN CHANNELS

- Proteins act as doors in the membrane
 - channels to move specific molecules through cell membrane



MOVEMENT THROUGH THE CHANNEL

- Why do molecules move through membrane if you give them a channel?



Cells are trying to maintain homeostasis = balance

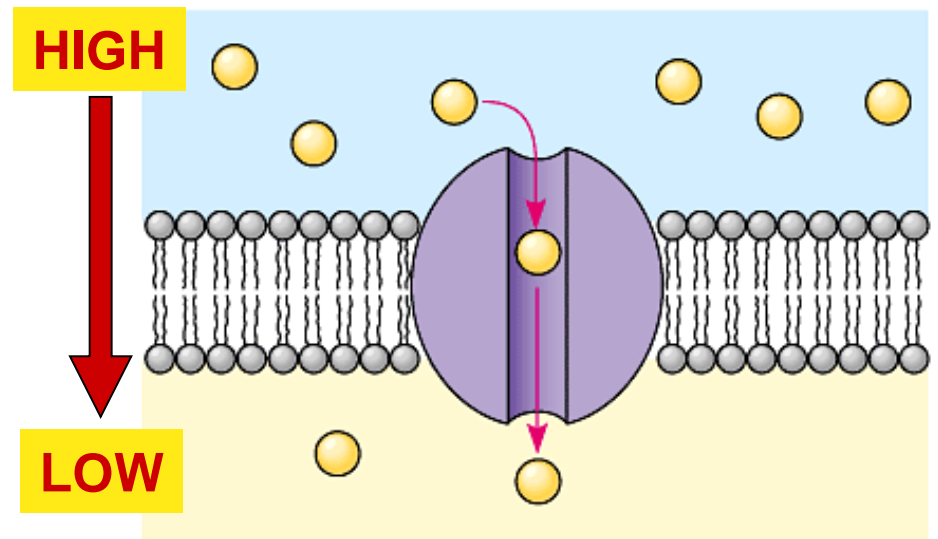
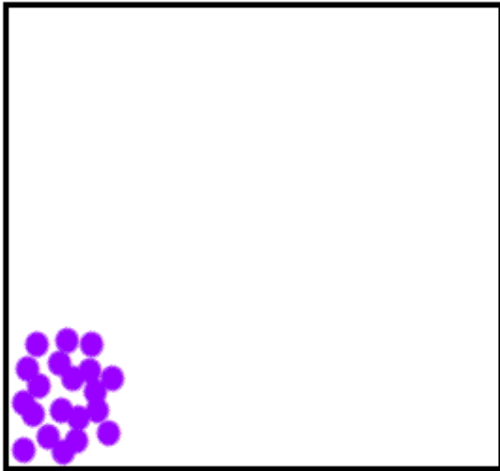


PASSIVE TRANSPORT
DIFFUSION
FACILITATED DIFFUSION



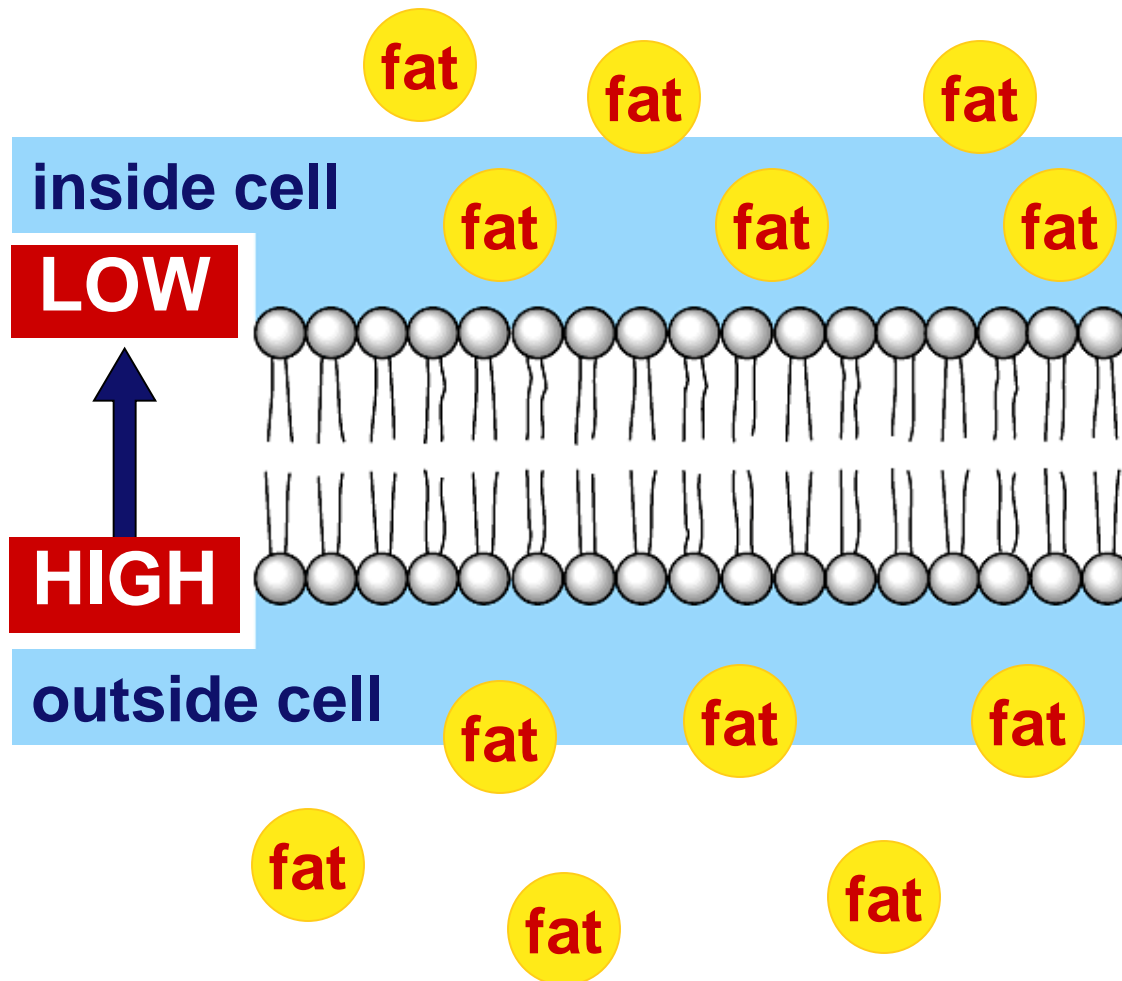
DIFFUSION

- Movement of molecules from HIGH to LOW concentration gradient



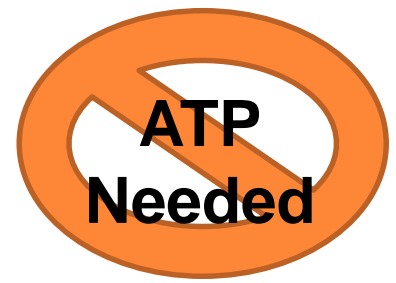
DIFFUSION

- Molecules move from HIGH to LOW



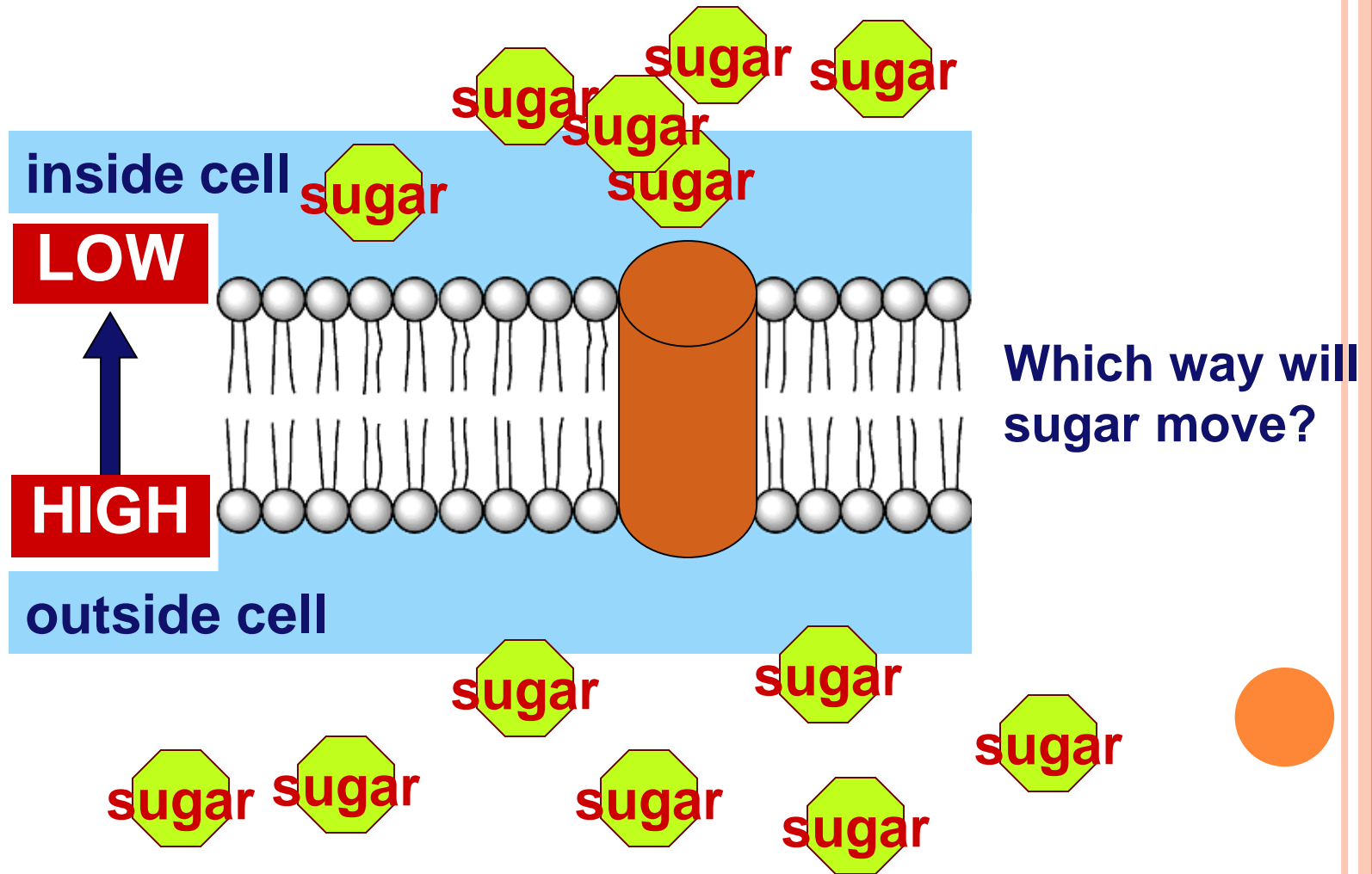
Which way will fat move?





FACILITATED DIFFUSION

- Move from HIGH to LOW through a protein channel



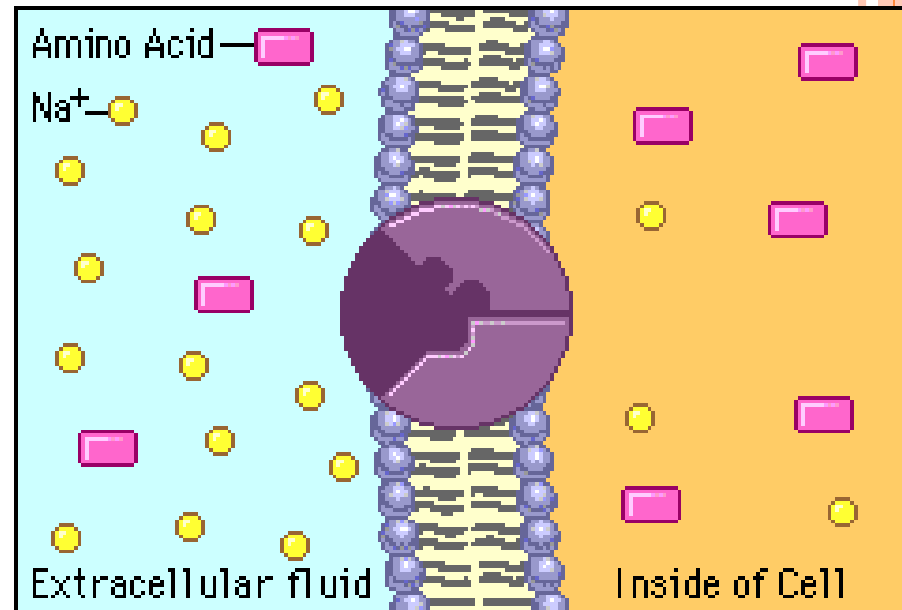
ACTIVE TRANSPORT



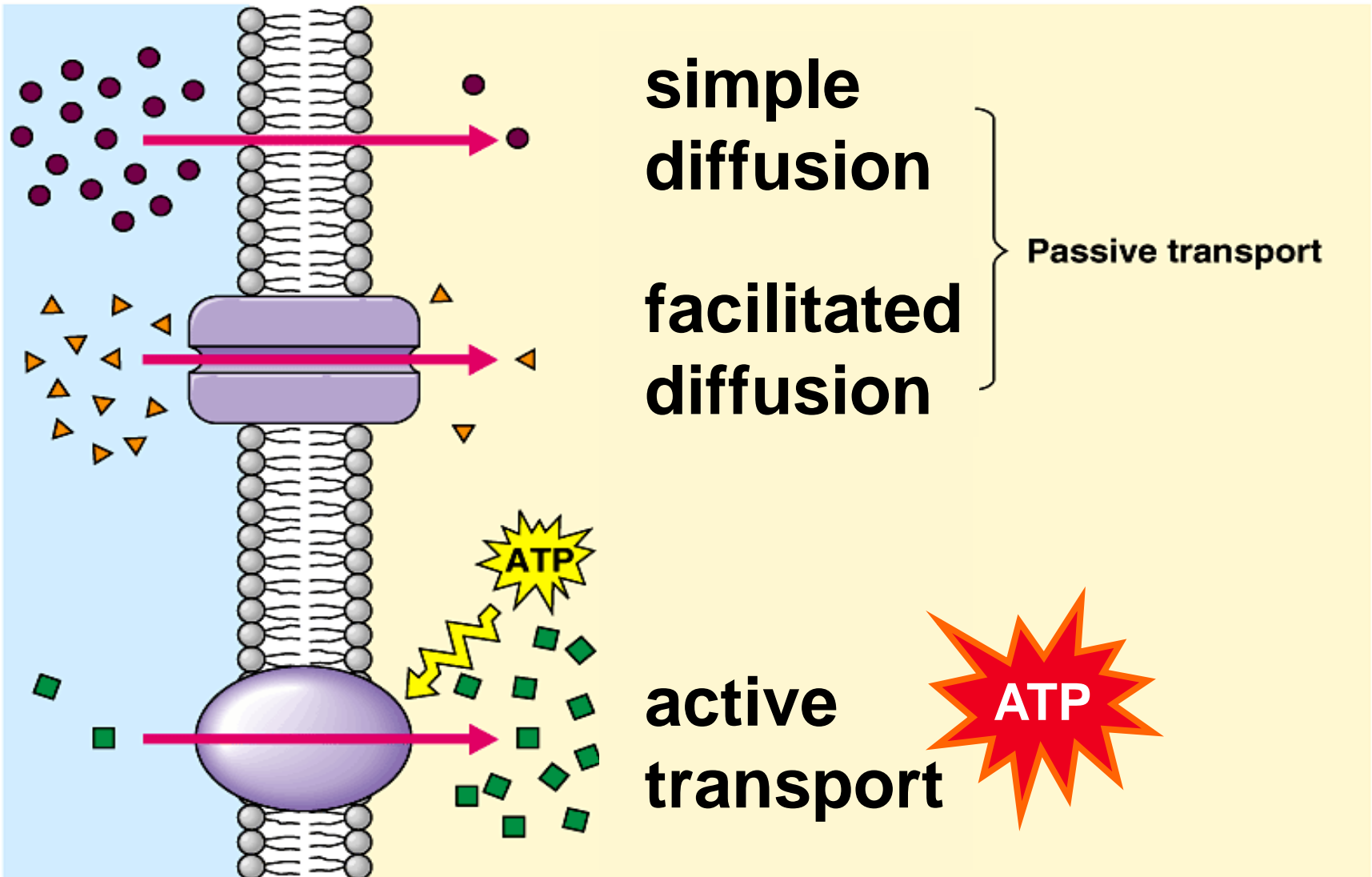
ACTIVE TRANSPORT

○ Cells may need molecules to move against concentration gradient

- need to pump from LOW to HIGH using energy
- protein pump
- Requires ATP (energy)

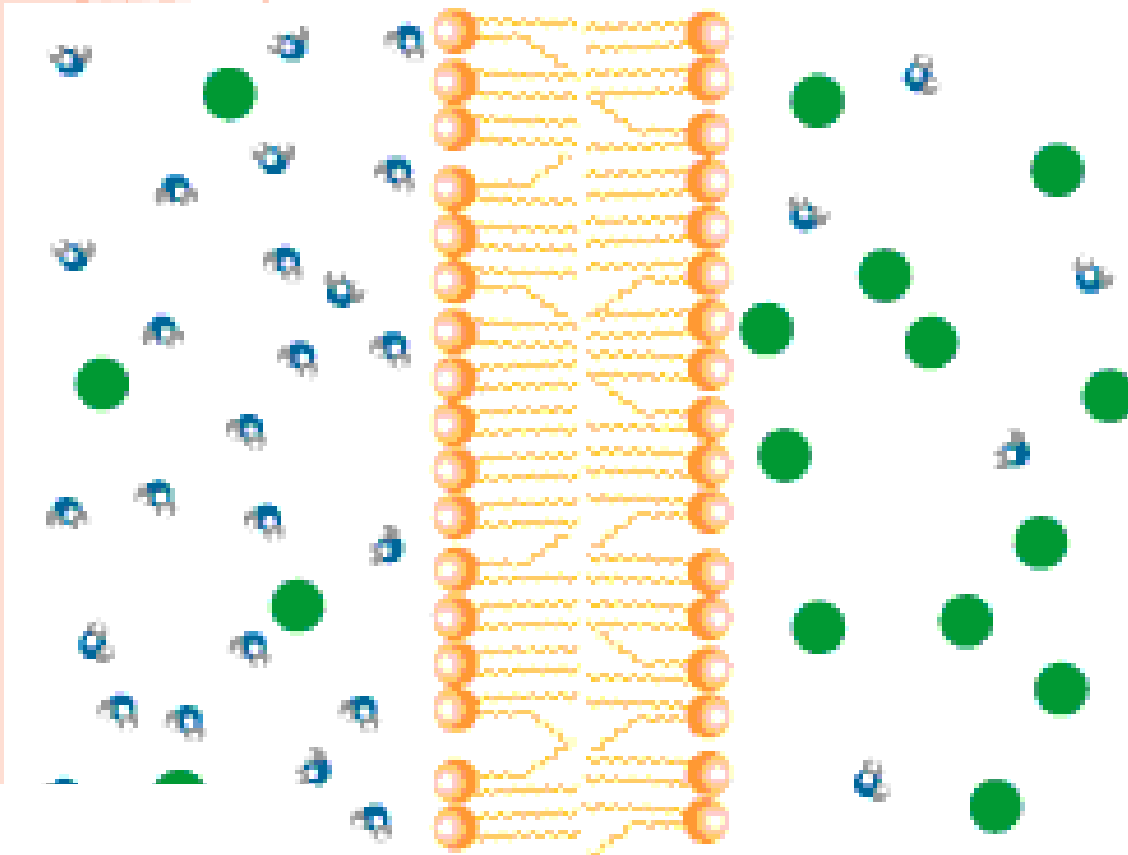
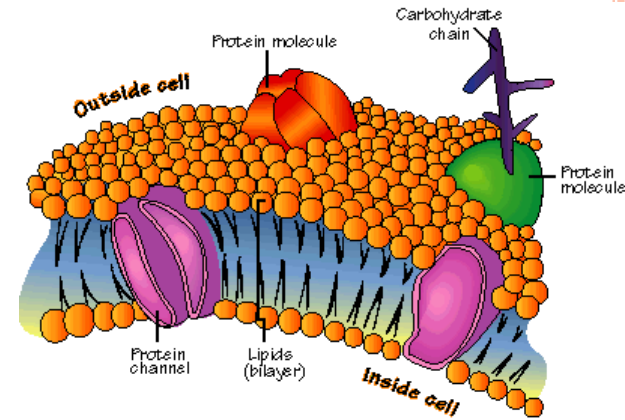


TRANSPORT SUMMARY



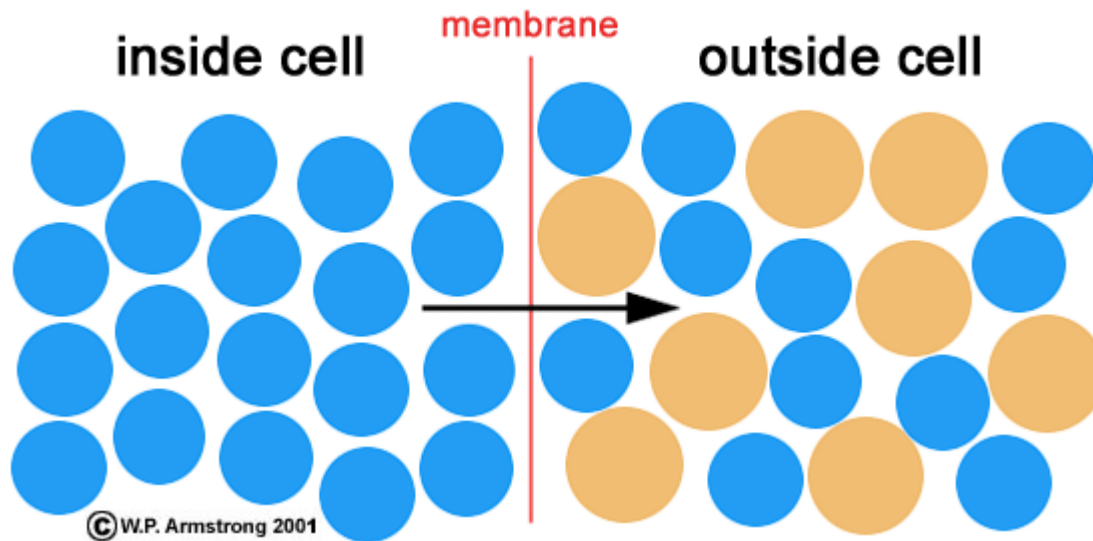
OSMOSIS

DIFFUSION OF WATER ACROSS CELL MEMBRANE



OSMOSIS

- diffusion of water from HIGH concentration of water to LOW concentration of water molecules
 - no energy required
 - cell survival depends on balancing water uptake and water loss
 - homeostasis



TERMS TO KNOW

- SOLUTION- mixture of two parts; solute and solvent
- SOLUTE- what gets dissolved
- SOLVENT- what does the dissolving

For example:

If we made Koolaid, what would be the solution, solute, and solvent?



TYPES OF SOLUTIONS

- There are 3 types of solutions
 - HYPERTONIC
 - HYPOTONIC
 - ISOTONIC



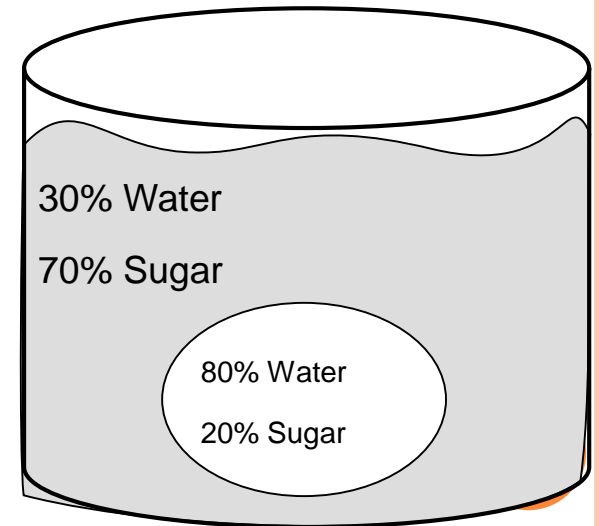
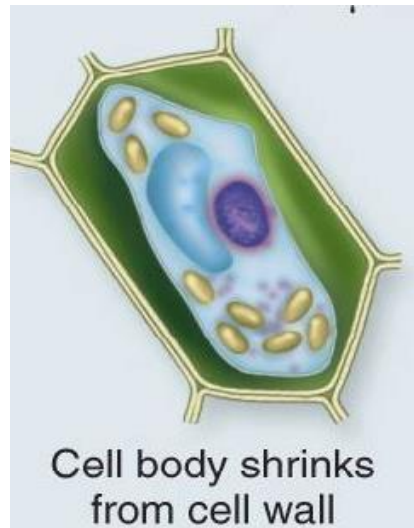
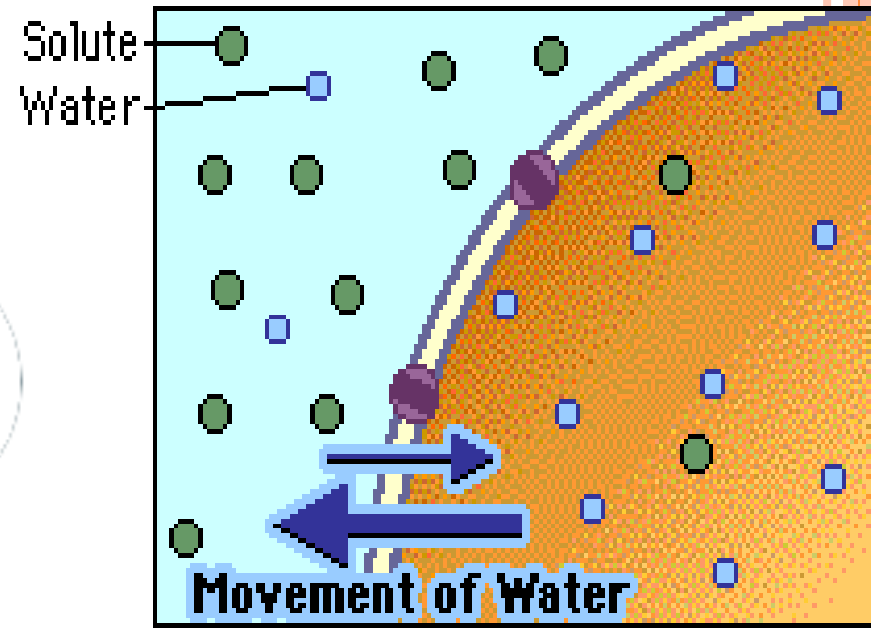
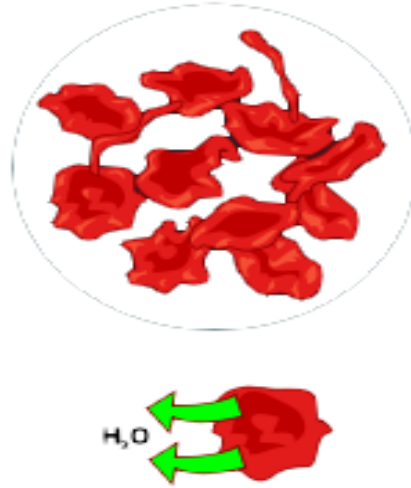
WHICH WAY WILL THE WATER GO?
KEEP IN MIND....

- SOLUTES SUCK **WATER!!!!**
- This means that wherever the concentration of solute is the greatest, that **water** will move that direction



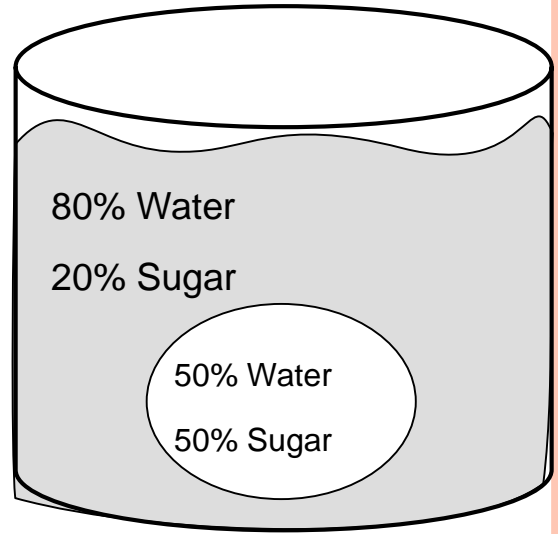
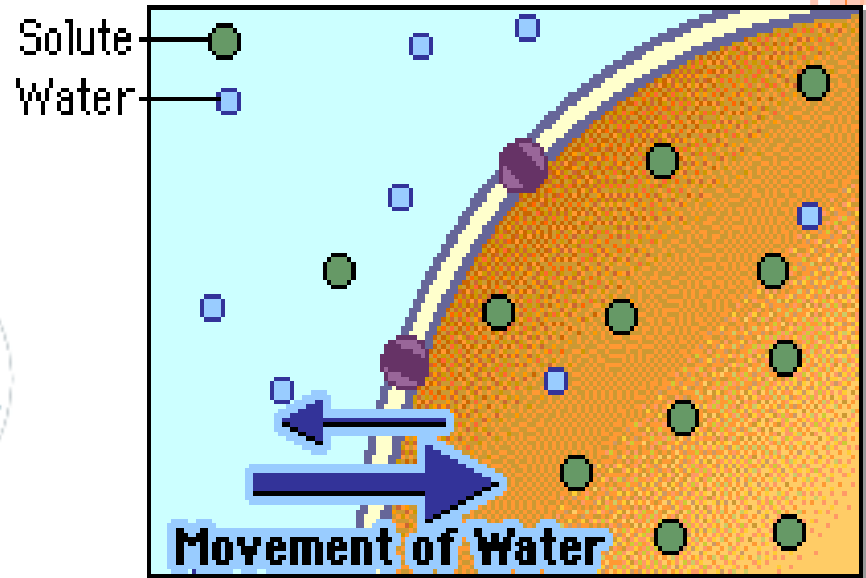
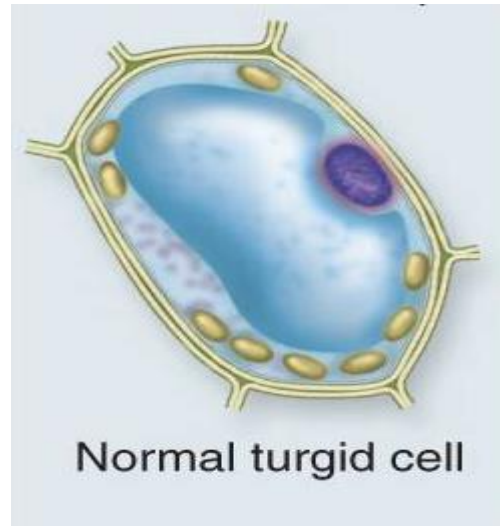
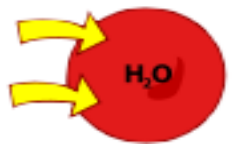
HYPERTONIC SOLUTION

- The concentration of a solute is greater outside the cell than inside
- Water will leave the cell, causing it to shrink or crenate.



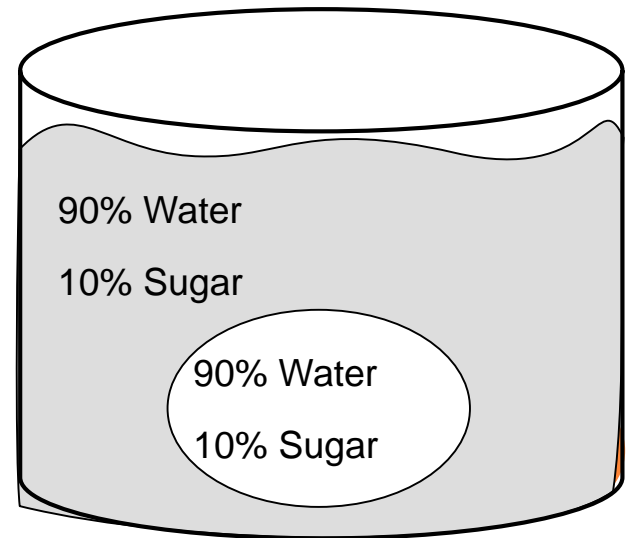
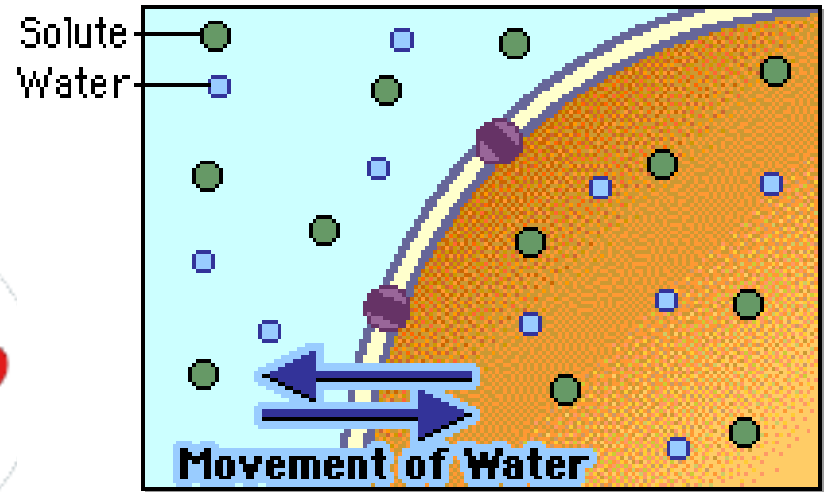
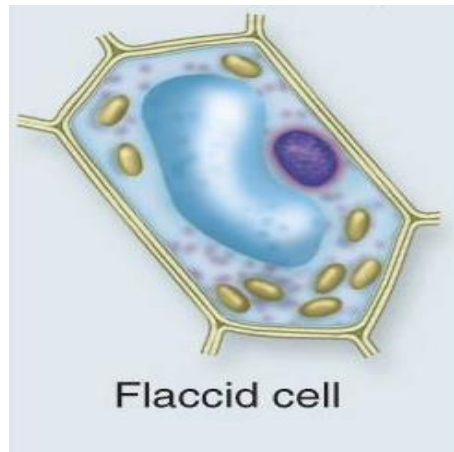
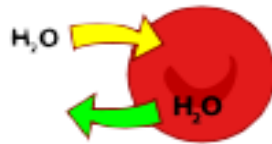
HYPOTONIC SOLUTION

- The concentration of a solute is greater inside the cell than outside the cell
- Water will rush into the cell causing it to swell, or lyse!

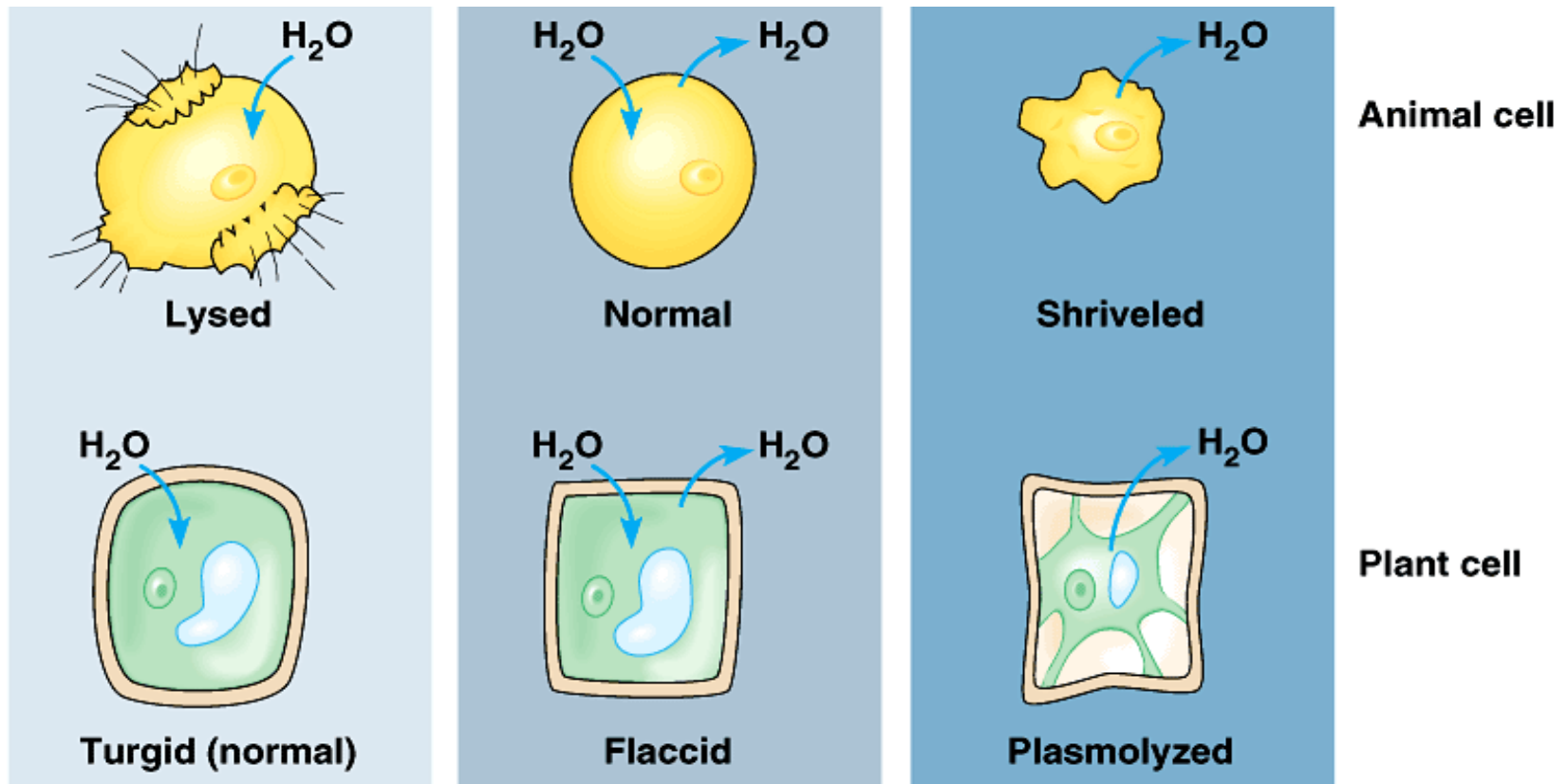


ISOTONIC SOLUTION

- The concentration of solute is the **EQUAL** both inside and outside the cell.
- There is **NO CHANGE** in the cell since equal amounts of water are moving in and out

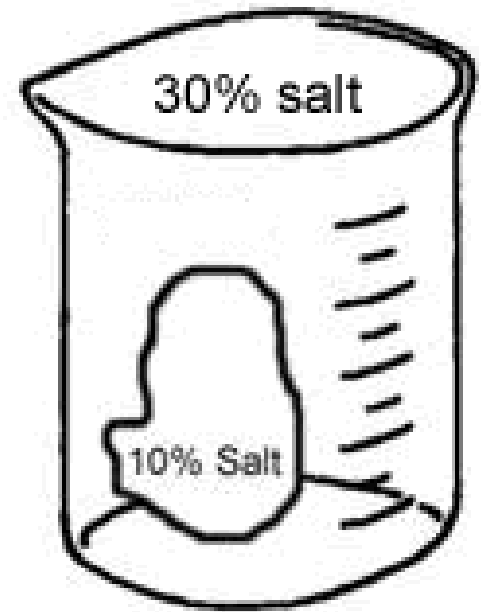
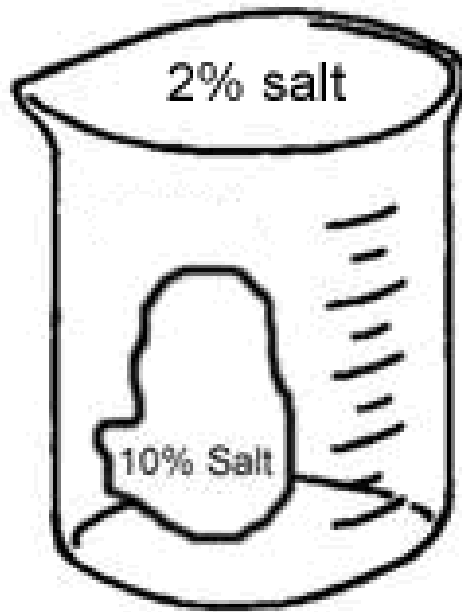
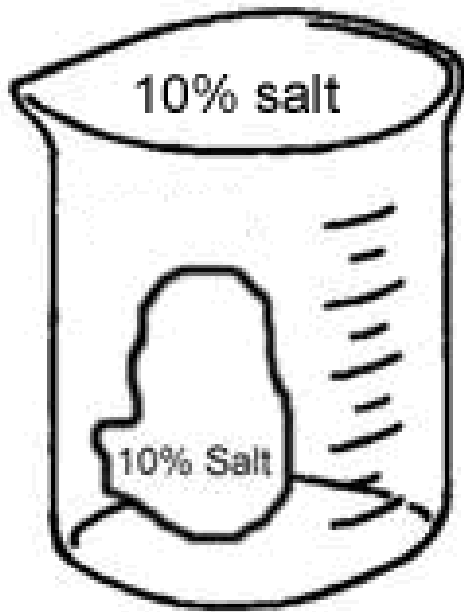


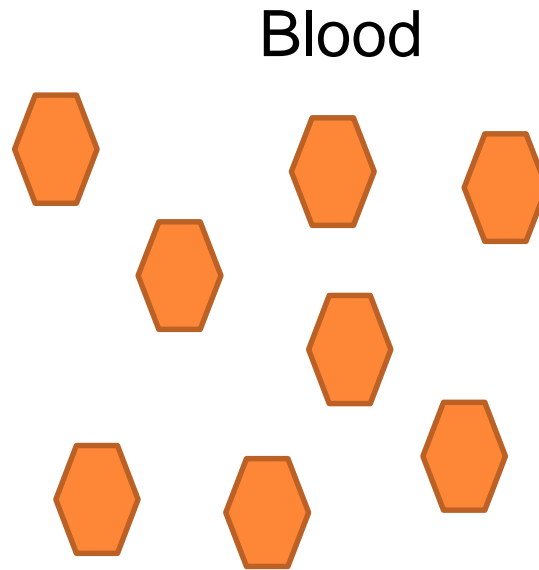
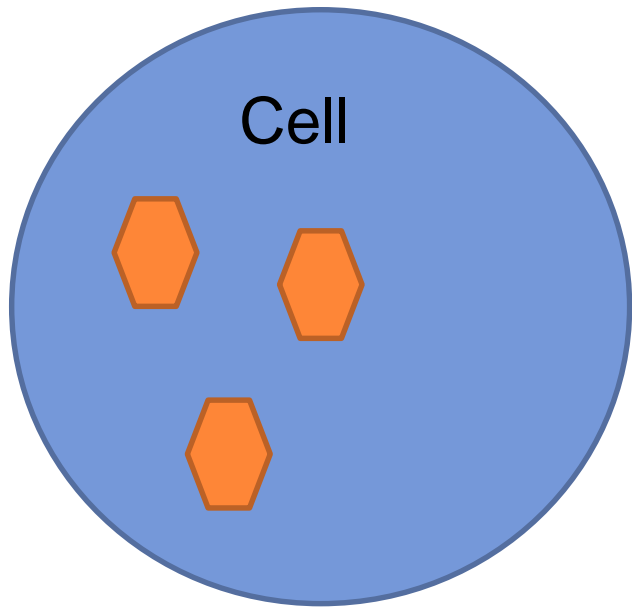
- Which solution below would you want to expose fruits and vegetables to at the grocery store? WHY??




NOW LET'S PRACTICE...

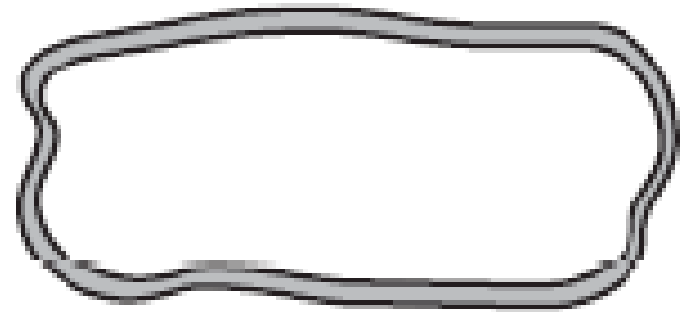
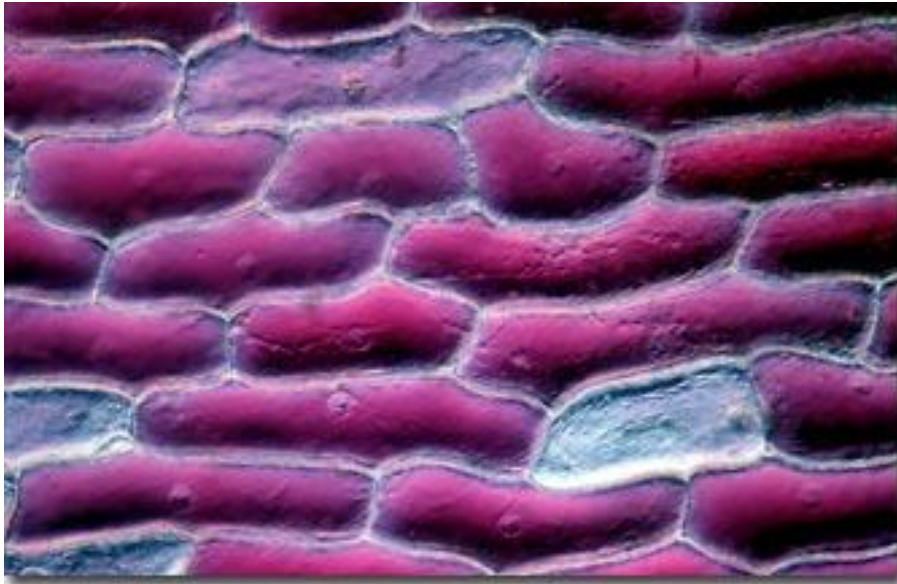




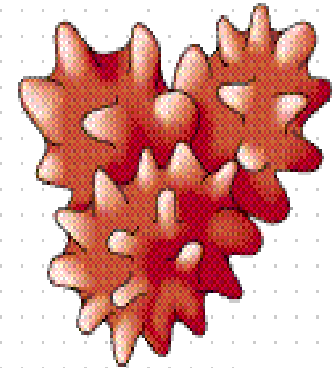
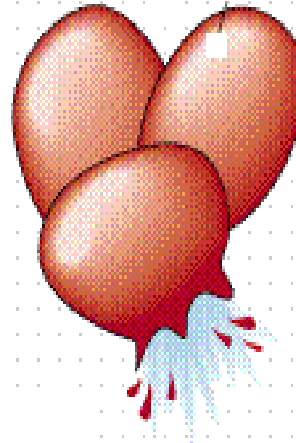
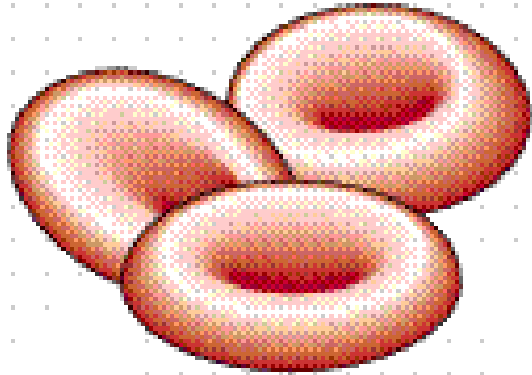


 = glucose

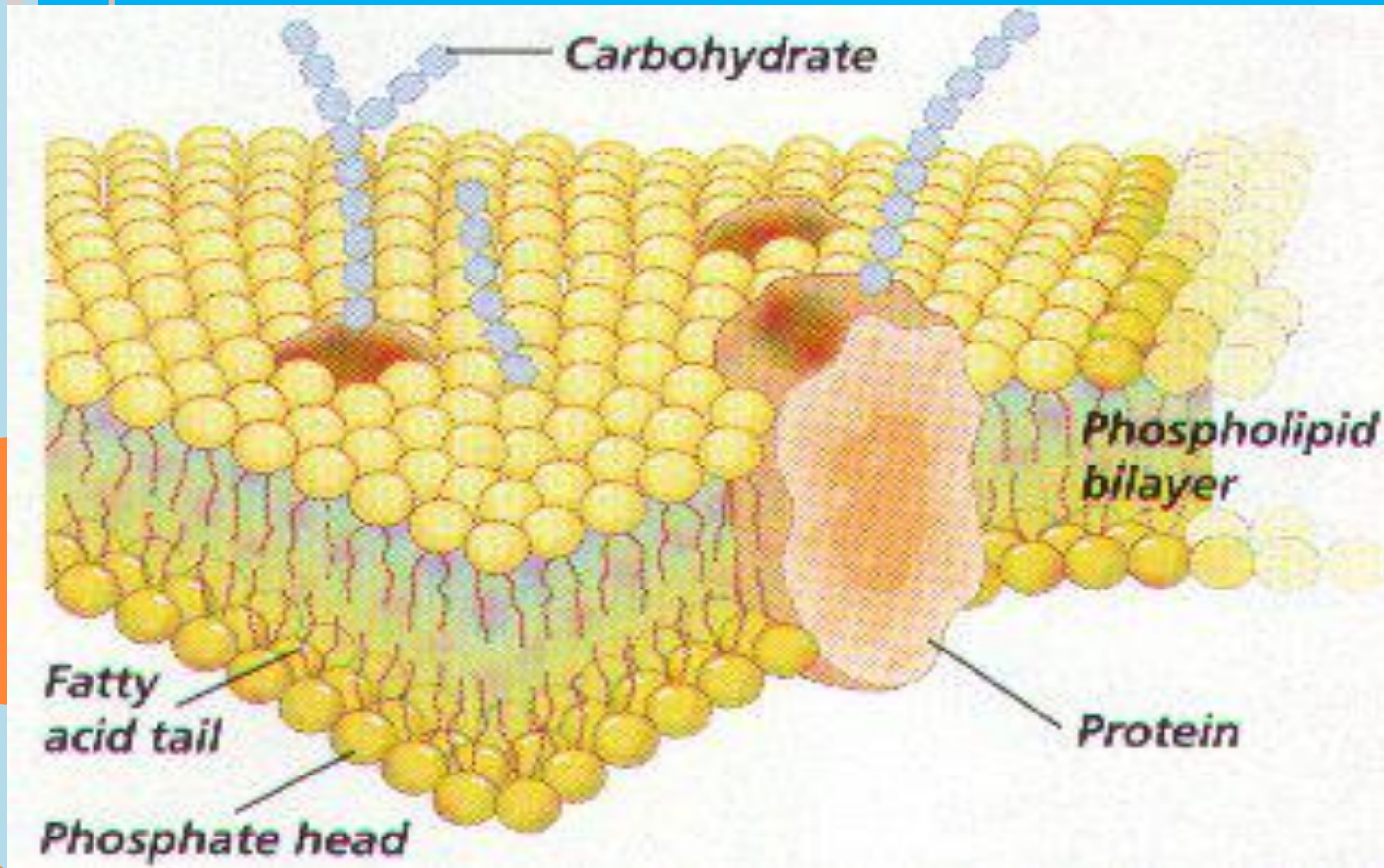




Isotonic



THE PLASMA MEMBRANE -



- Gateway to Cell

HOMEOSTASIS

- **Balanced** internal condition of cells
- Also called **equilibrium**
- Maintained by plasma membrane controlling what enters & leaves the cell

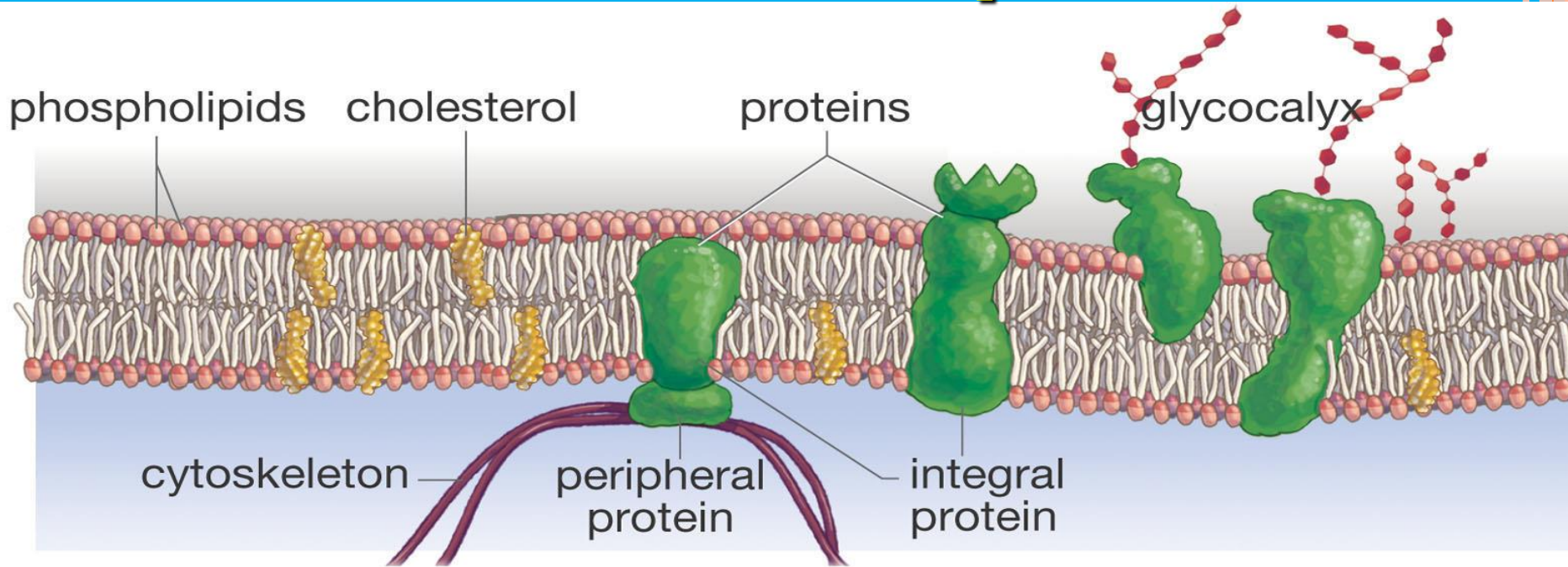


FUNCTIONS OF PLASMA MEMBRANE

- ✓ **Protective barrier**
- ✓ **Regulate transport in & out of cell
(selectively permeable)**
- ✓ **Allow cell recognition**
- ✓ **Provide anchoring sites for filaments
of cytoskeleton**

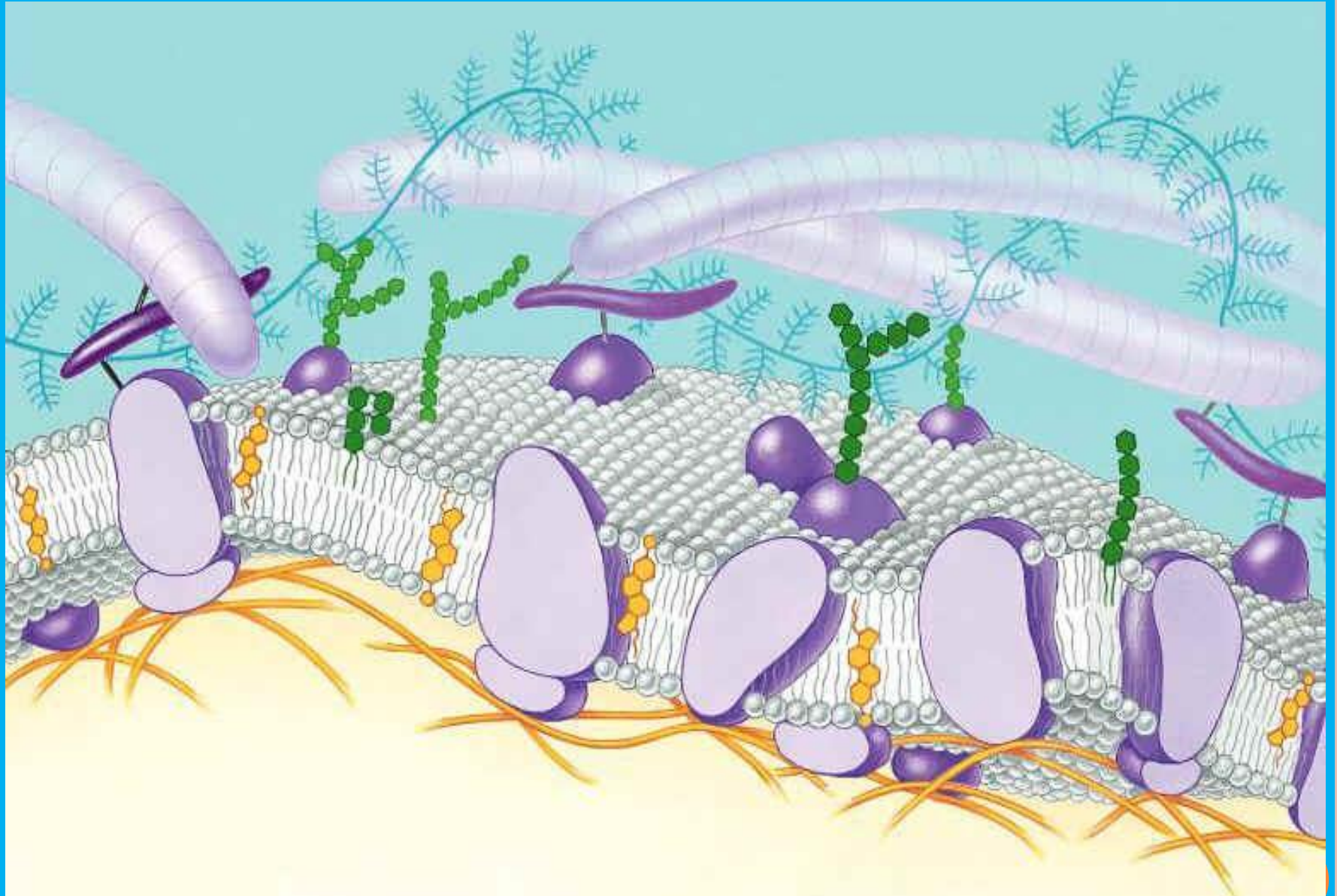


Membrane Components

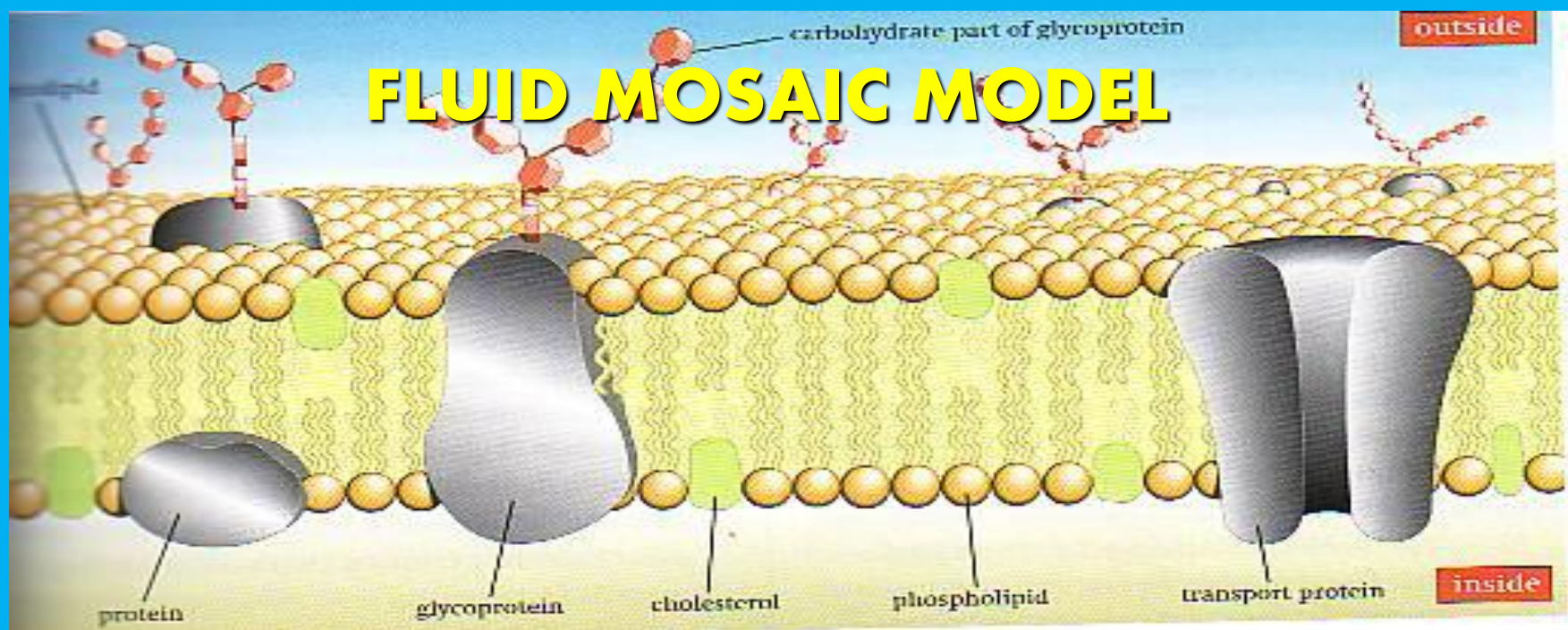


- Phospholipid bilayer
- Cholesterol
- Proteins
- Glycocalyx

Know the membrane contains:
lipid bilayer
proteins
cholesterol



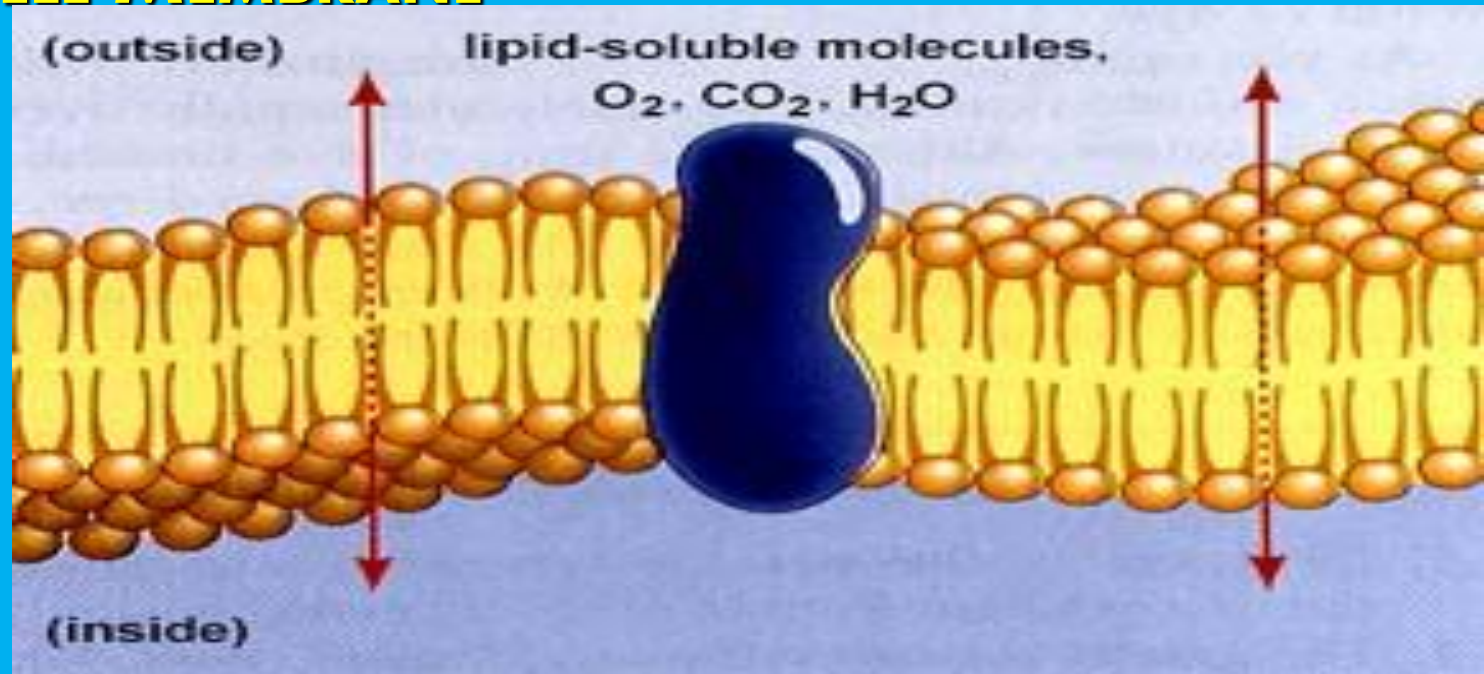
FLUID MOSAIC MODEL



FLUID- because individual phospholipids and proteins can move side-to-side within the layer, like it's a liquid.

MOSAIC- because of the pattern produced by the scattered protein molecules when the membrane is viewed from above.

CELL MEMBRANE



Polar heads are **hydrophilic** “water loving”

Nonpolar tails are **hydrophobic** “water fearing”

Makes membrane “**Selective**” in what crosses

LETS MAKE ONE!
YOU ARE ALL
PHOSPHOLIPIDS!

