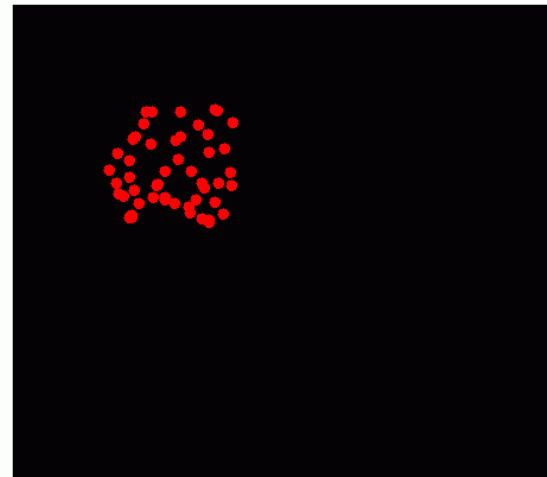


Objectives:

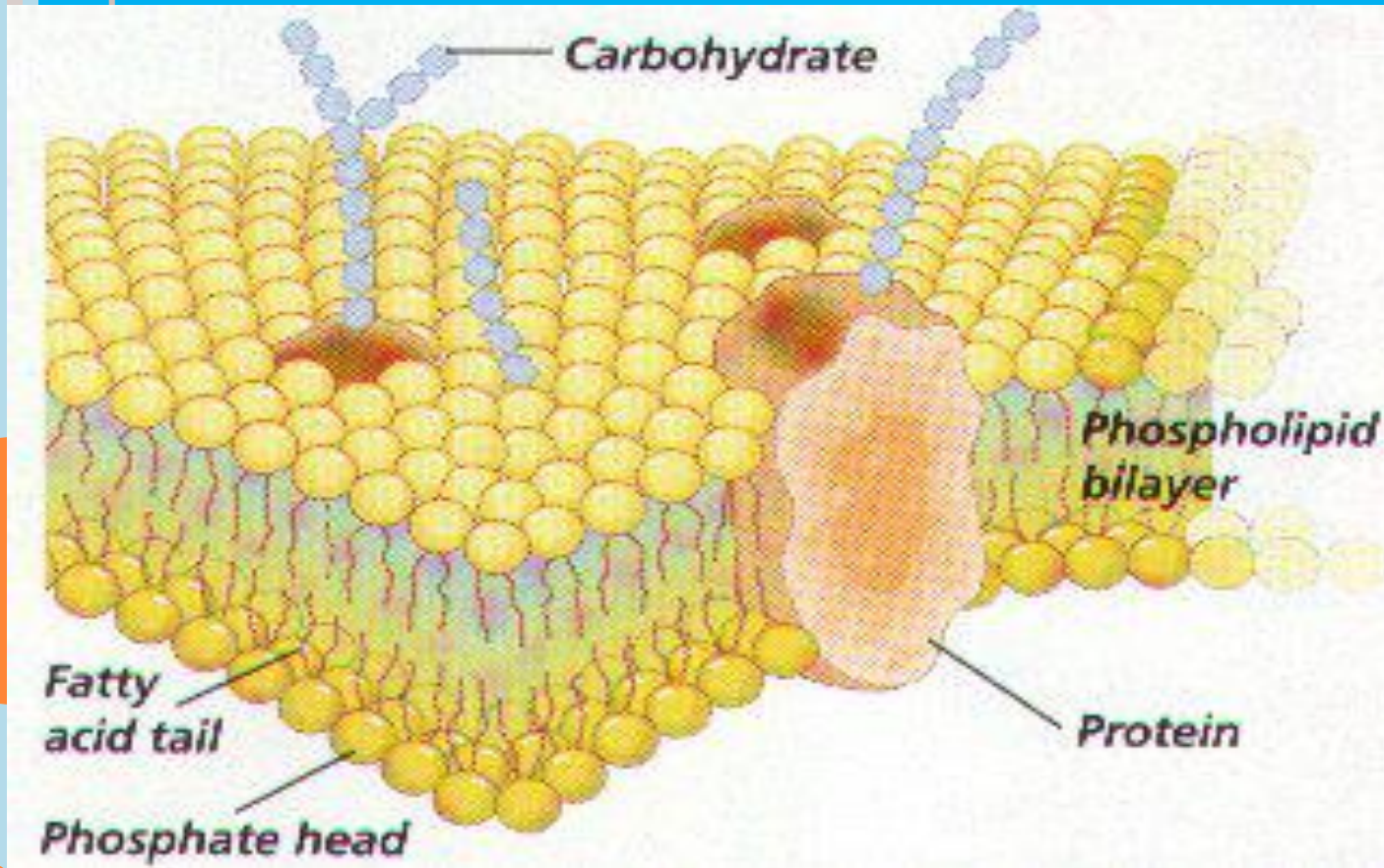
Explain how the structure of the plasma membrane allows material to move through.

Explain the processes of Passive Transport and Active Transport.

Predict whether active or passive transport is occurring.



THE PLASMA MEMBRANE -



- **Gateway to Cell**

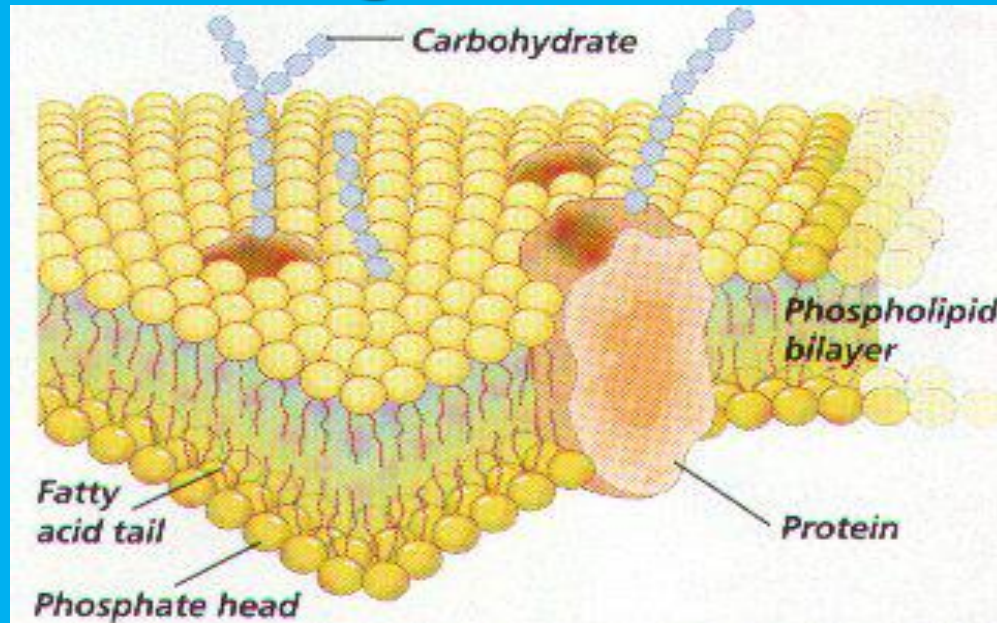
HOMEOSTASIS

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

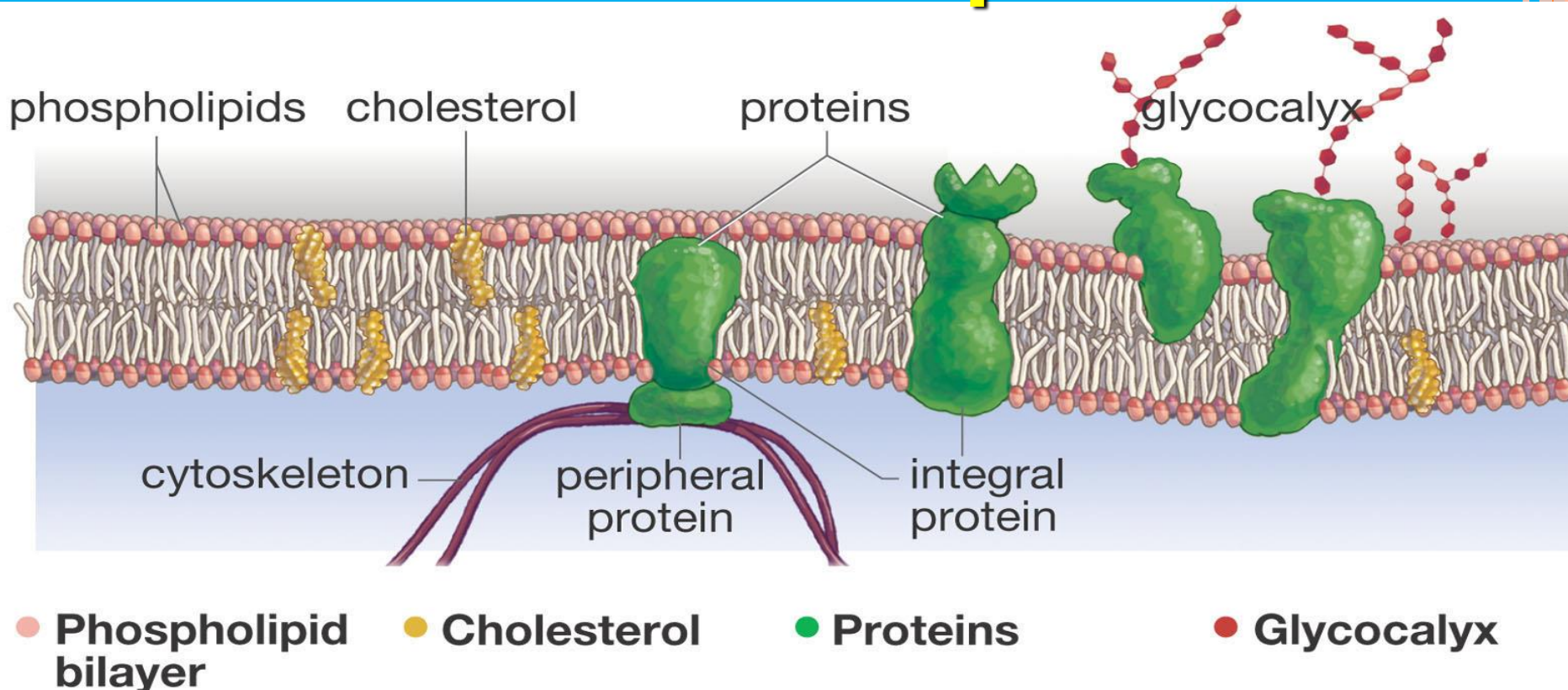


FUNCTIONS OF PLASMA MEMBRANE

- ✓ **Protective barrier**
- ✓ **Regulate transport in & out of cell
(selectively permeable)**
- ✓ **Allow cell recognition**

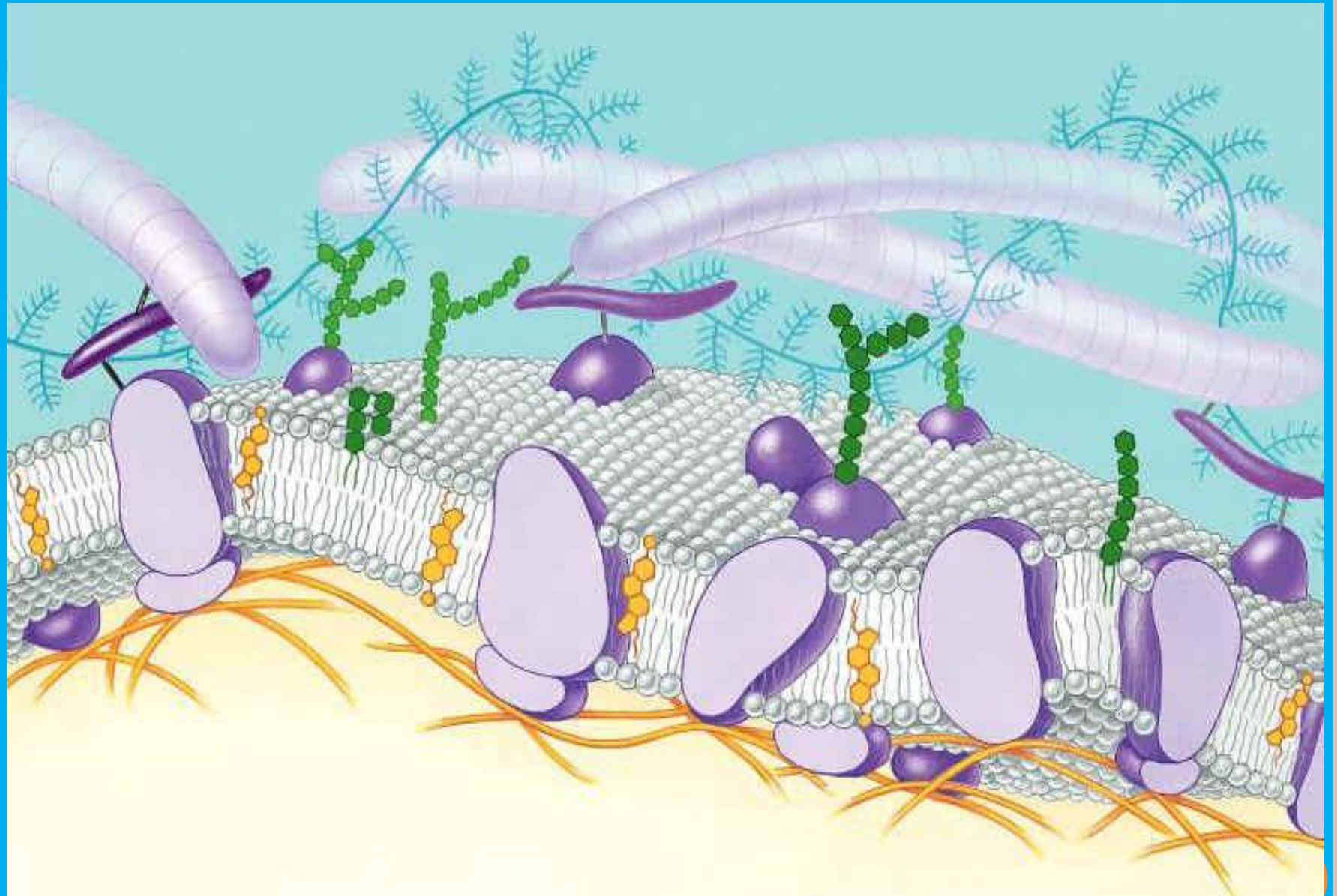


Membrane Components

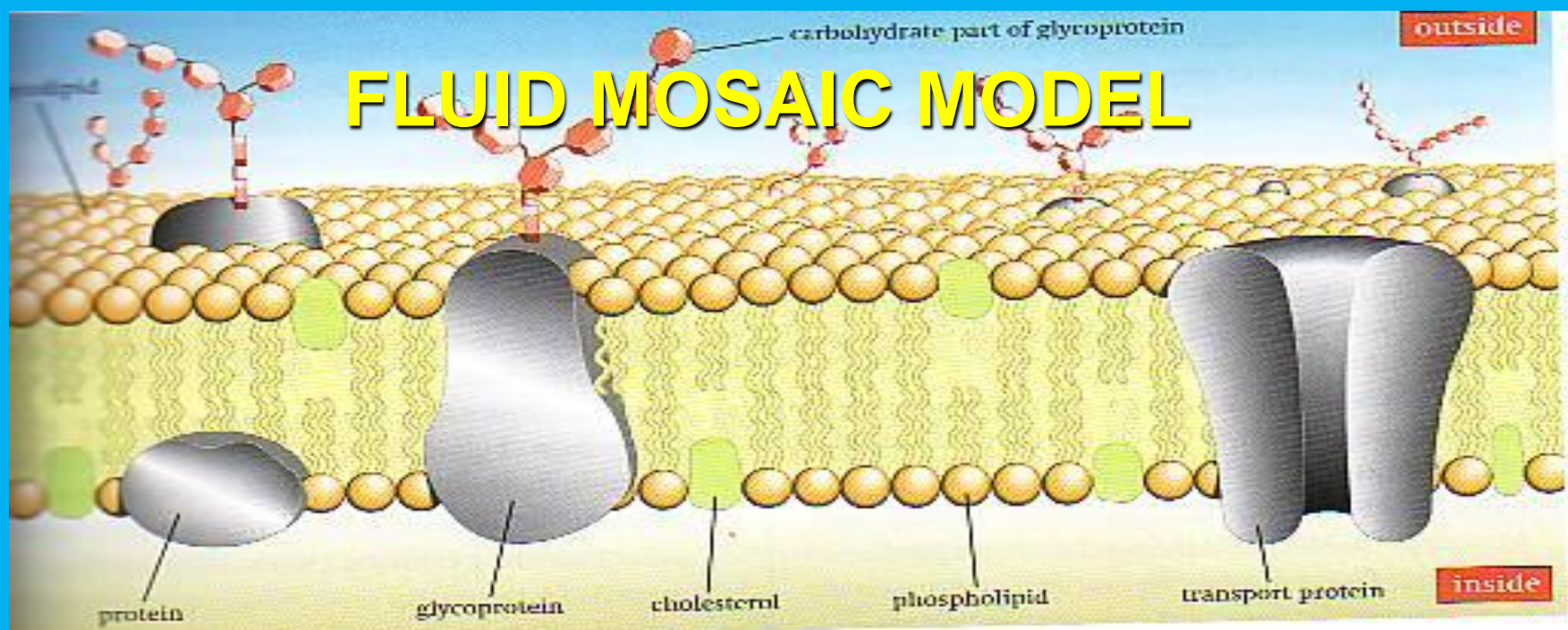


Know the membrane contains:

lipid bilayer	carbohydrates
proteins	cholesterol



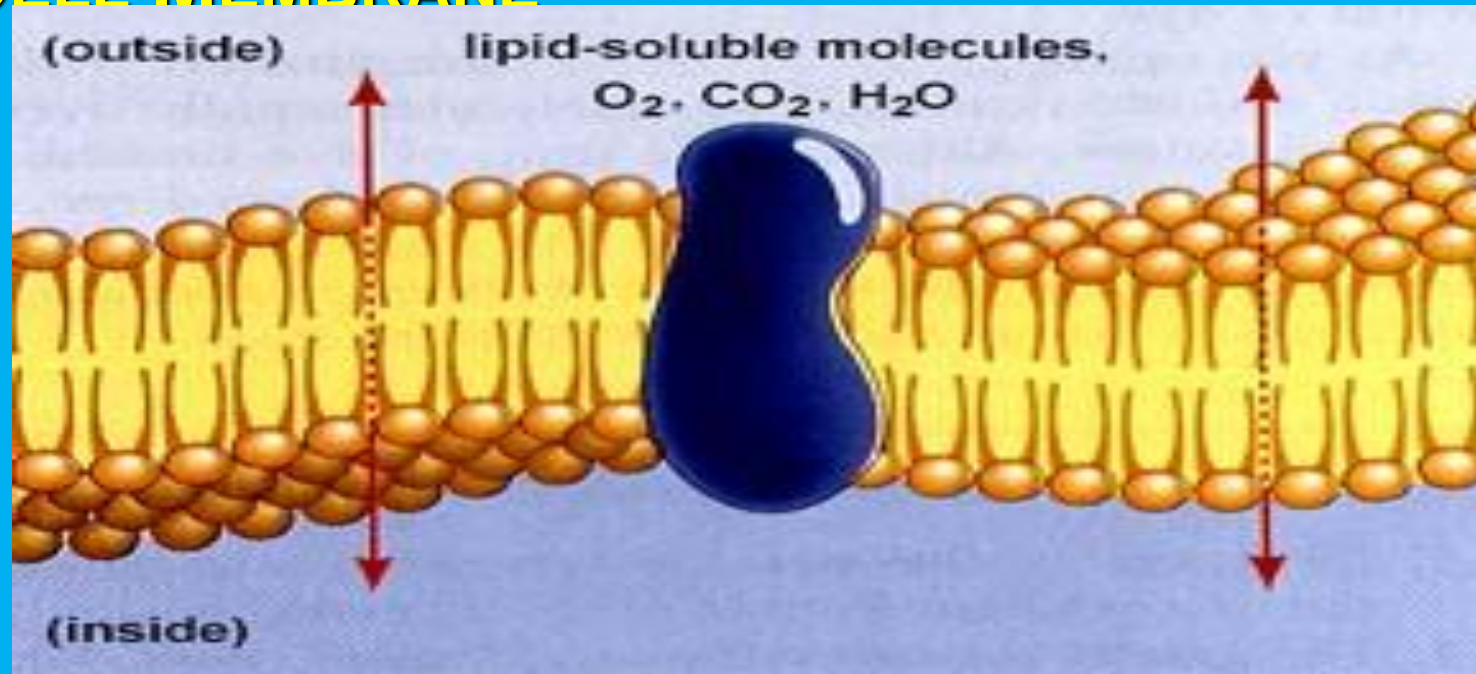
FLUID MOSAIC MODEL



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.

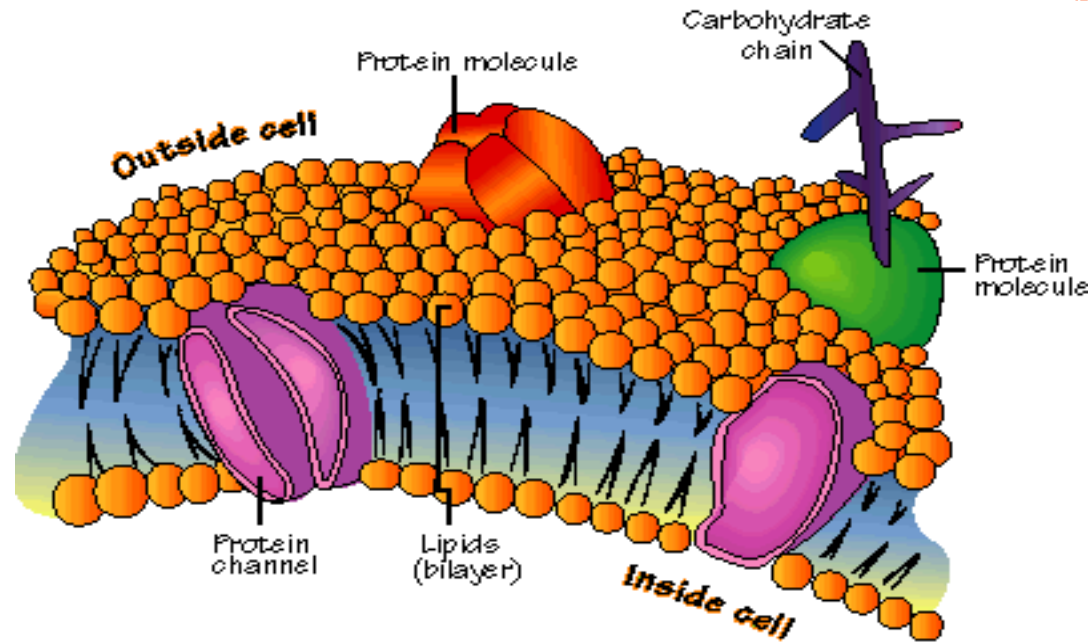
CELL MEMBRANE



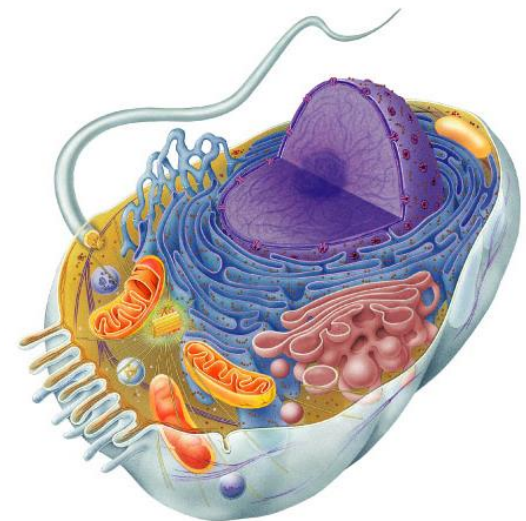
Polar heads are **hydrophilic** “water loving”

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

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



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

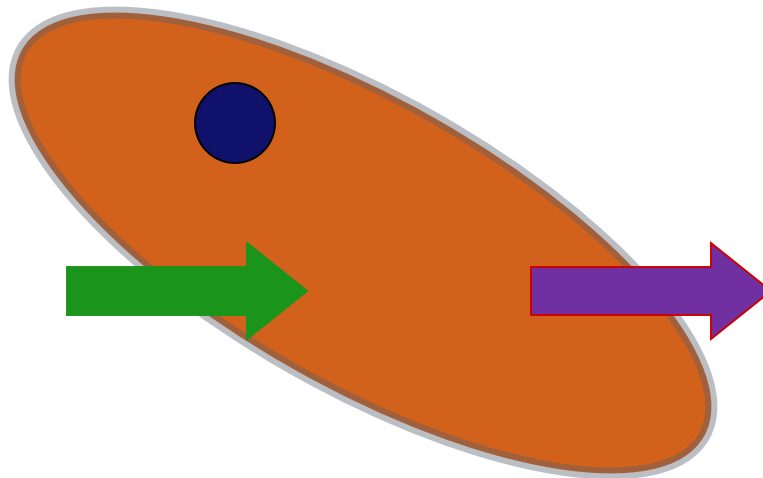
food

- sugars
- proteins
- fats

salts

O₂

H₂O



OUT

waste

- ammonia
- salts
- CO₂
- H₂O

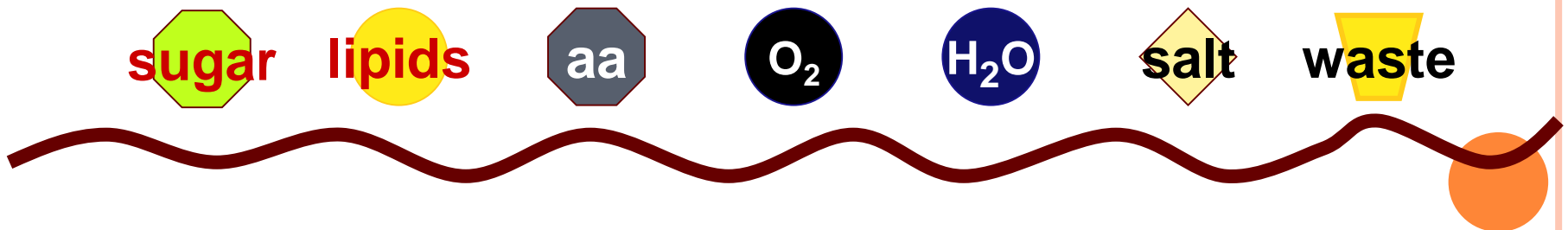
products

- proteins

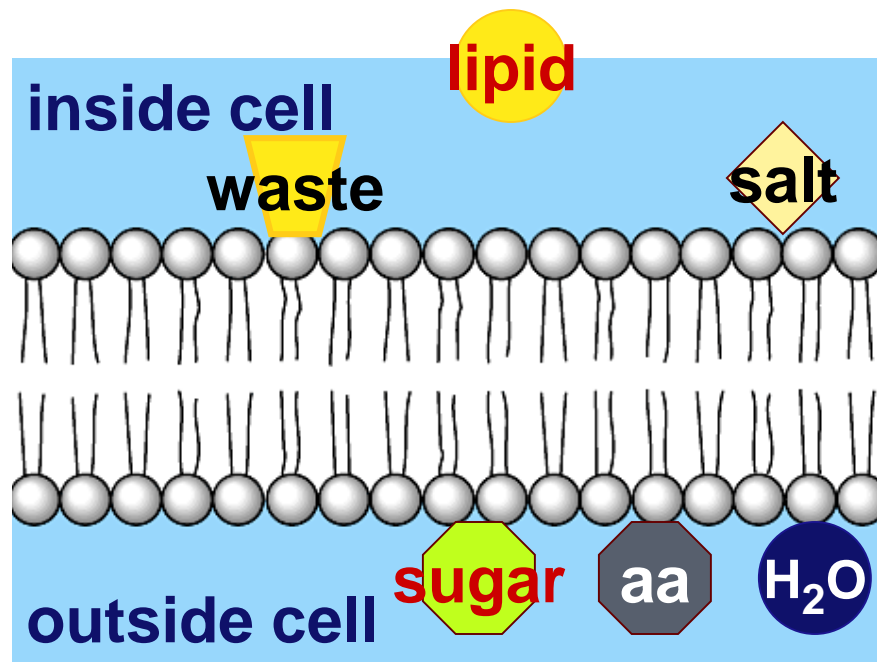
cell needs materials in & products or waste out

- 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?



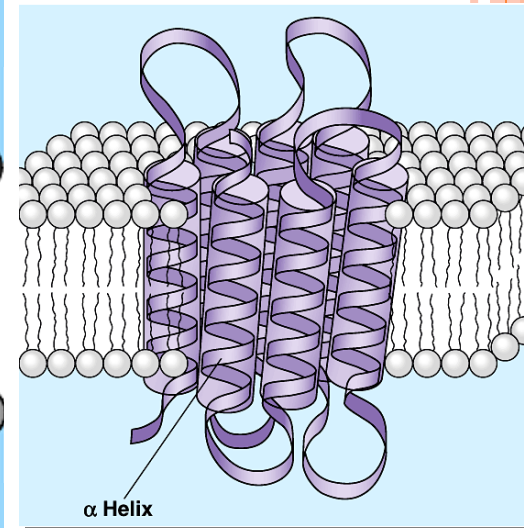
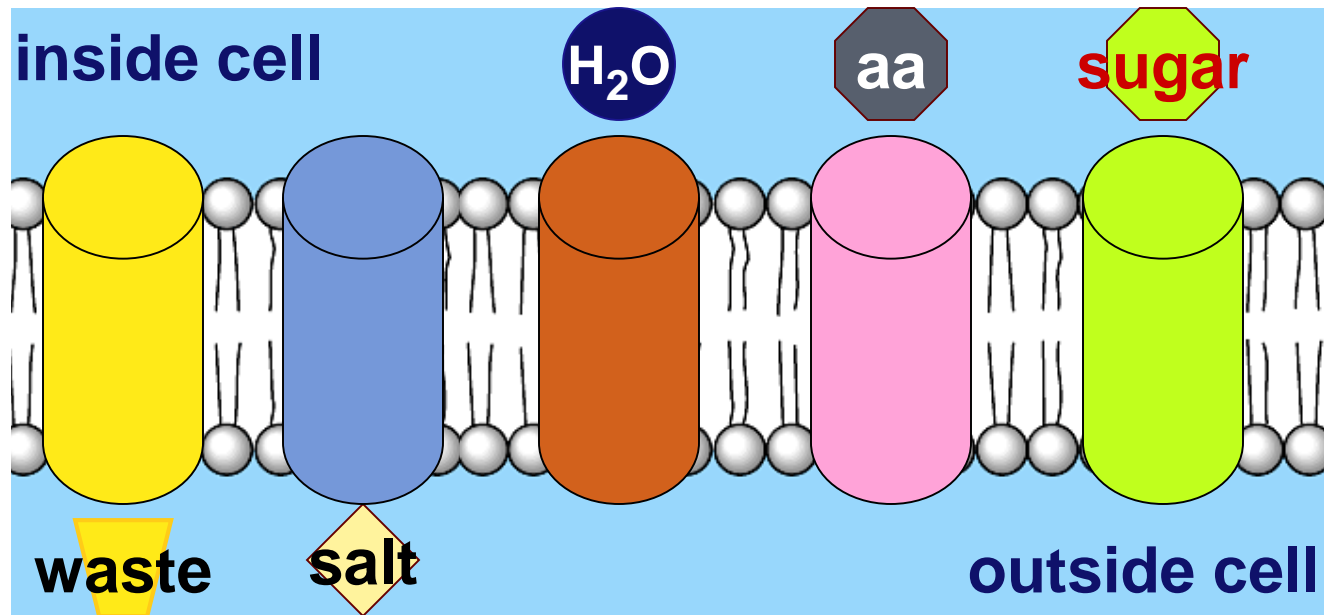
- What molecules can get through the cell membrane directly? (question in side margin)
 - fats and oils can pass directly through



but...
what about
other stuff?

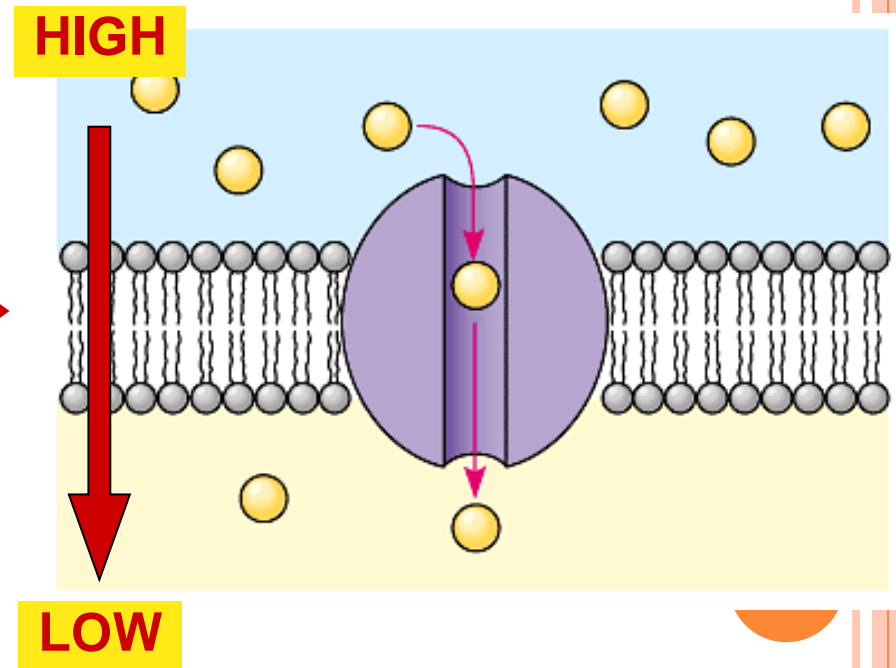
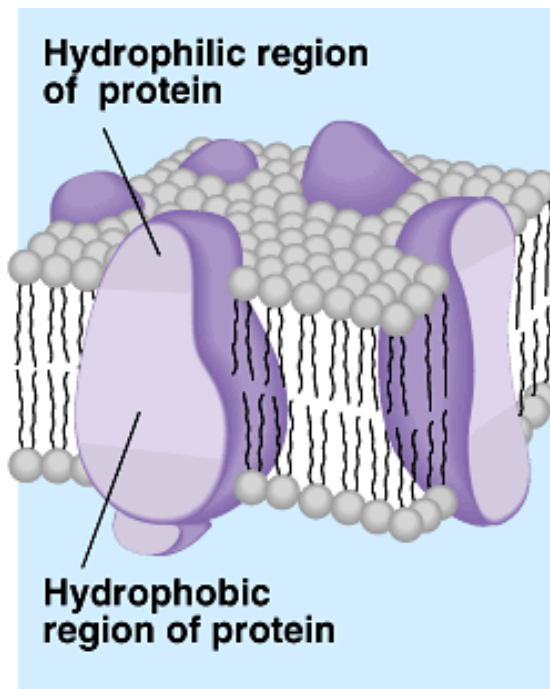
NOT EVERYTHING CAN PASS DIRECTLY THROUGH THE MEMBRANE...

- 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



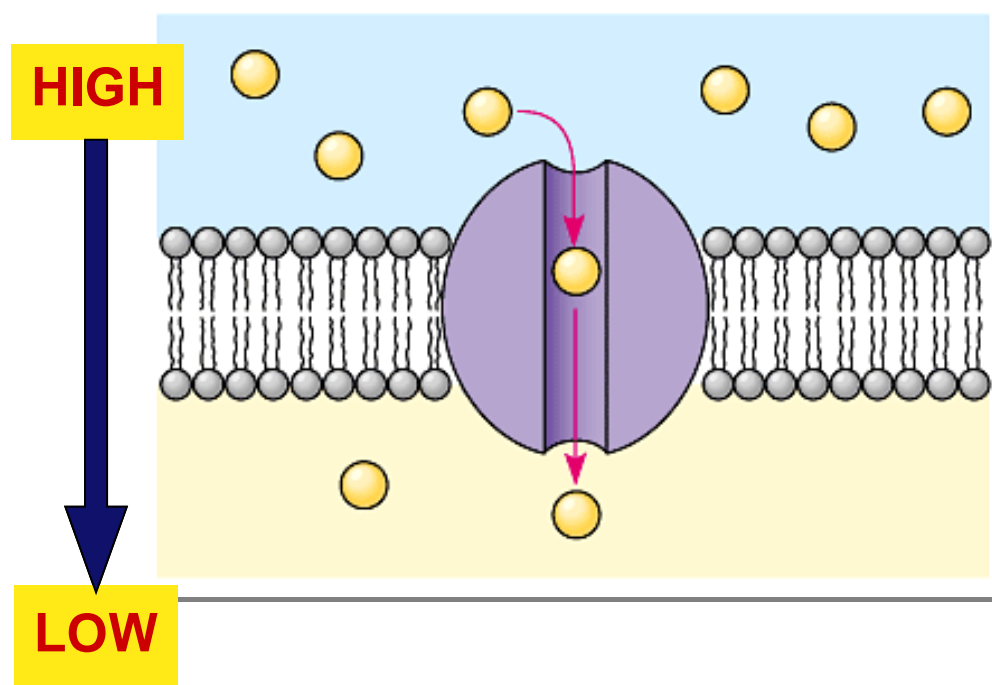
PROTEIN CHANNELS

- 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

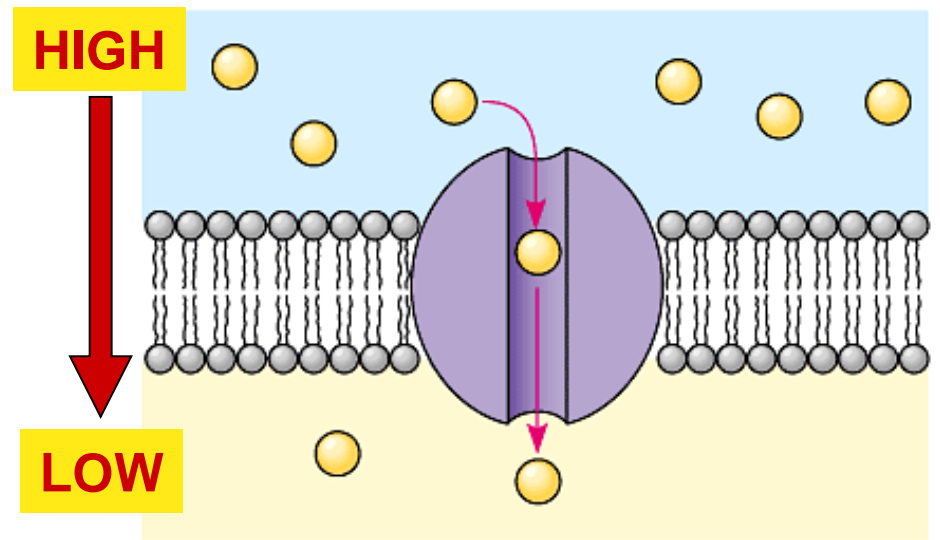
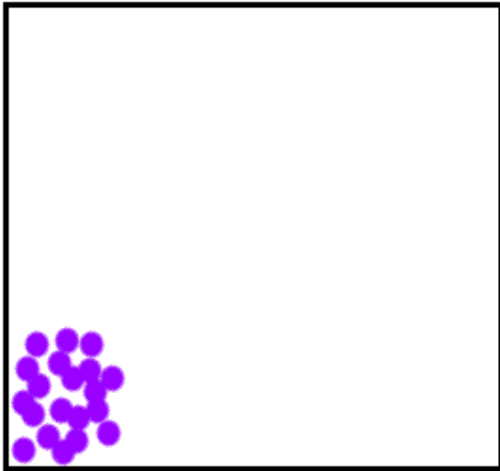


PASSIVE TRANSPORT
NO ENERGY!



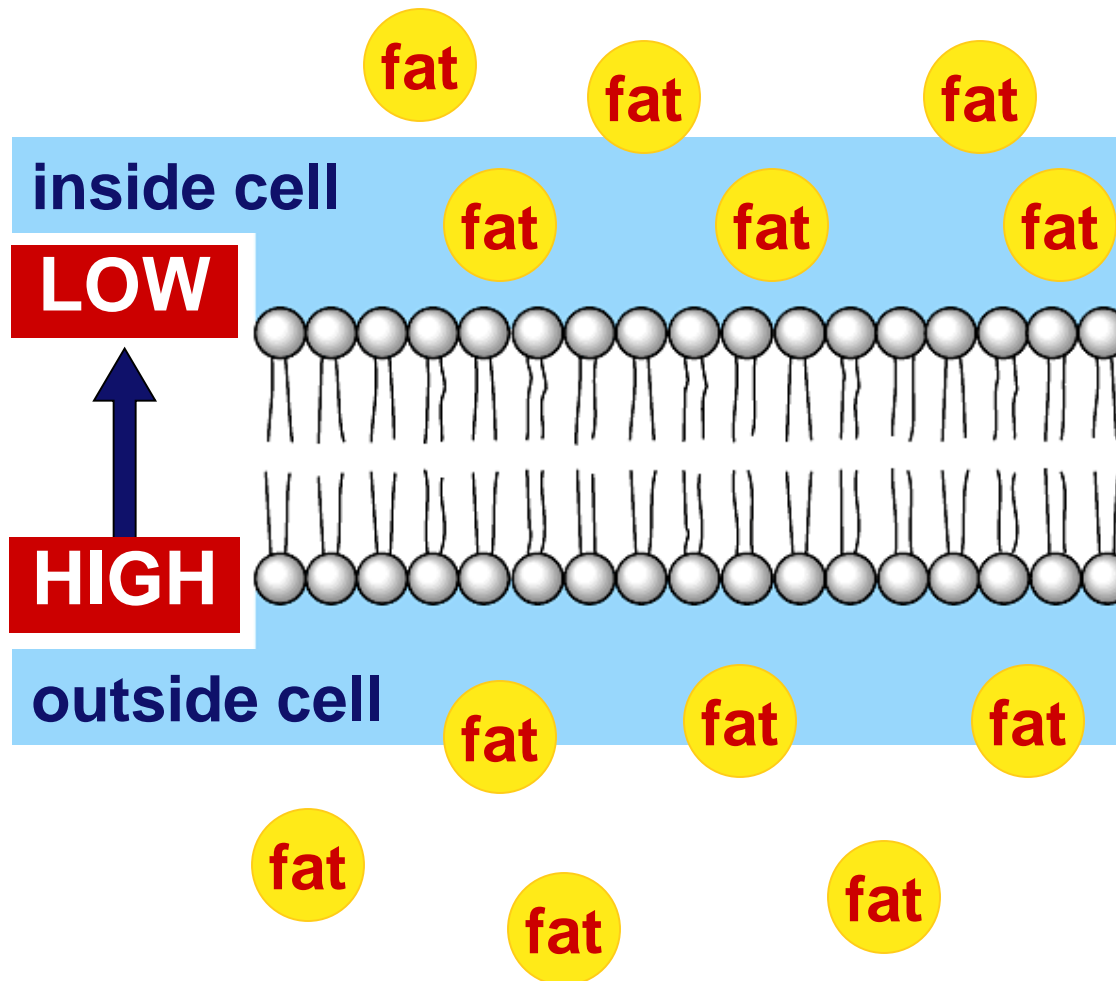
PASSIVE TRANSPORT - DIFFUSION

- Movement of molecules from HIGH to LOW concentration gradient



DIFFUSION

- Molecules move from HIGH to LOW

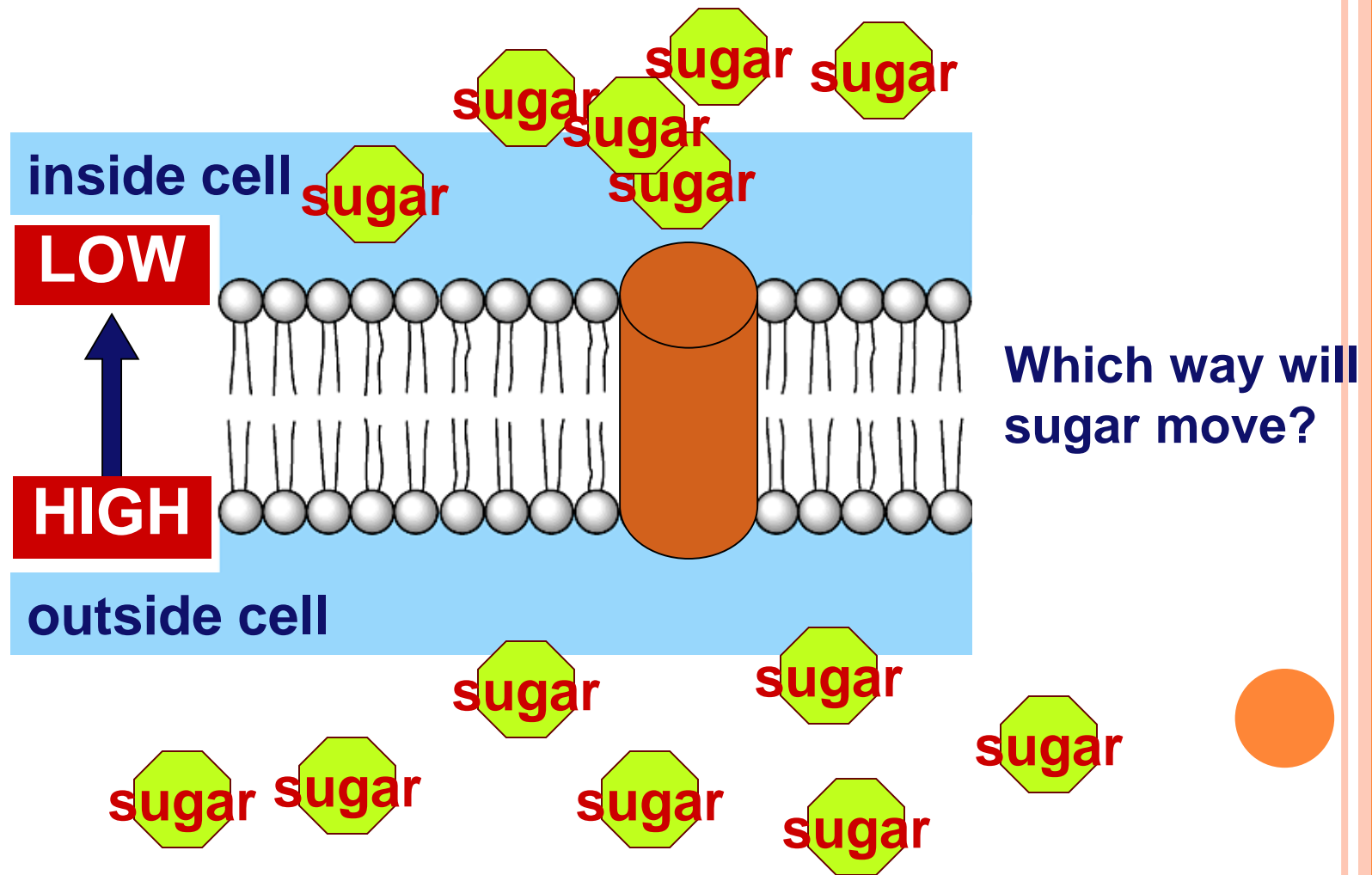


Which way
will fat move?



FACILITATED DIFFUSION

- Move from HIGH to LOW through a protein channel



ACTIVE TRANSPORT
ENERGY USED!

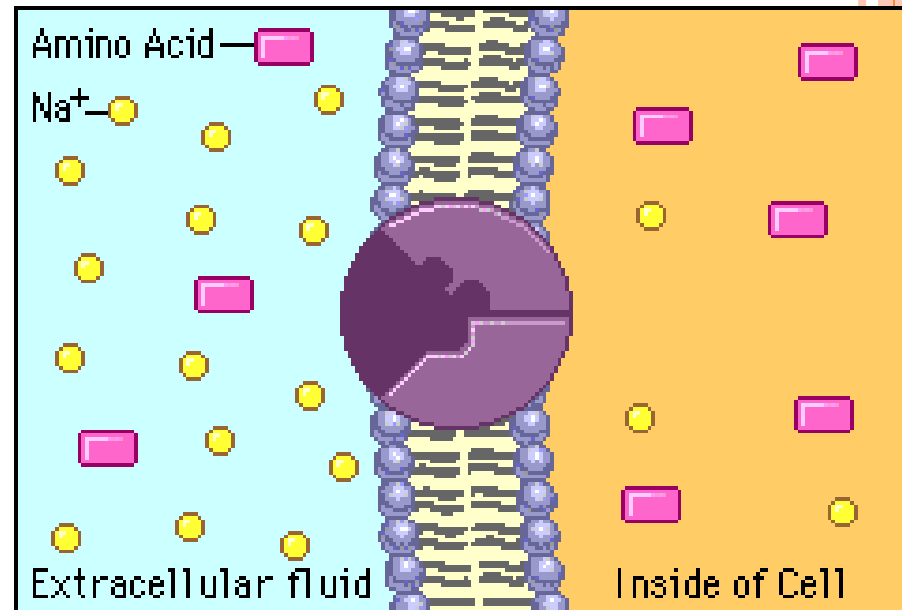


ACTIVE TRANSPORT

○ Cells may need molecules to move against concentration gradient

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

<https://www.youtube.com/watch?v=5a15tVnqITl>

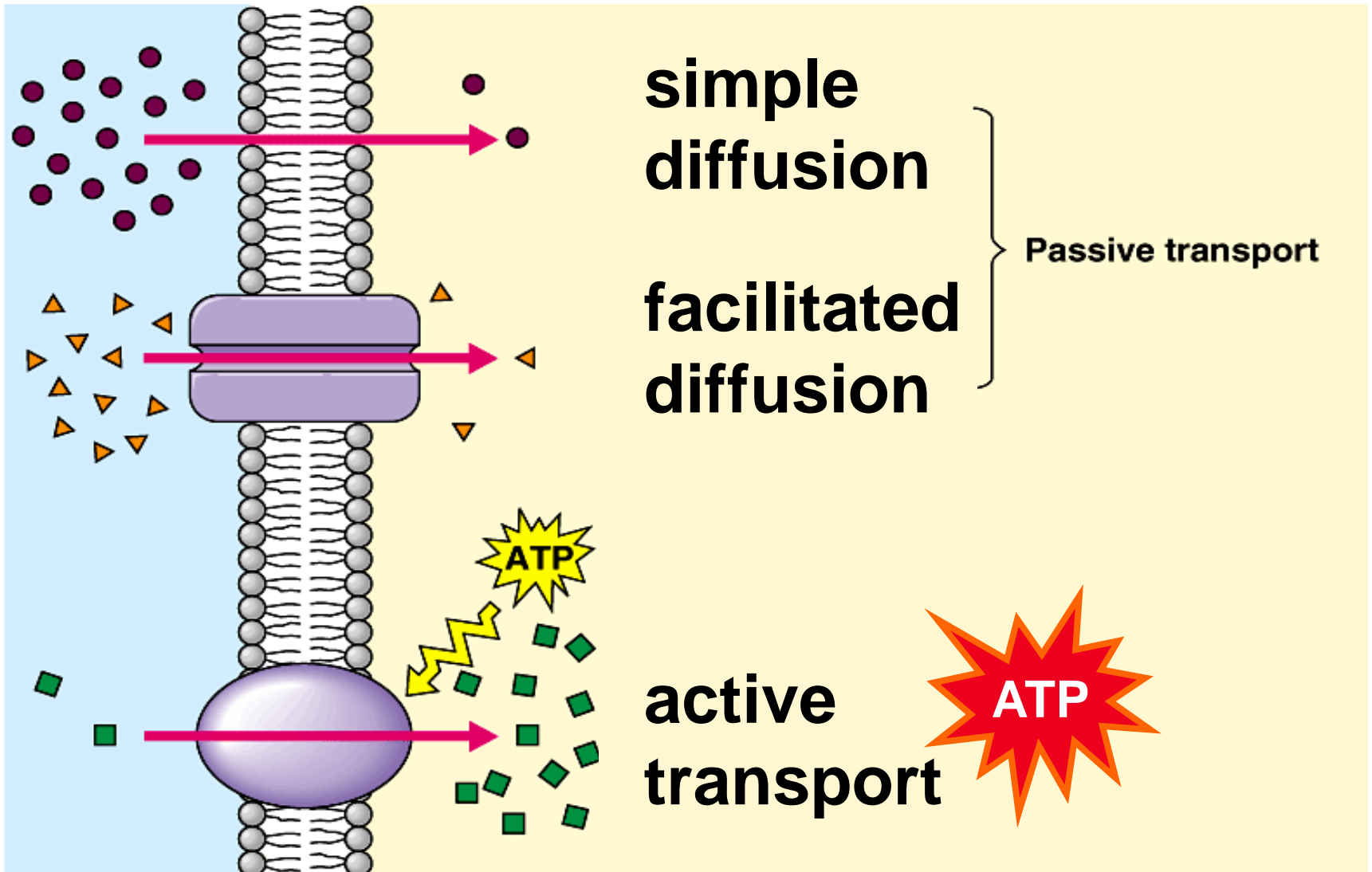


LET'S REVIEW:

- What is the difference between the following:
 - Passive Transport and Active Transport
 - Diffusion and Facilitated Diffusion
 - Facilitated Diffusion and Active Transport
- Which type of transport uses energy?
- Which types of transport use proteins?

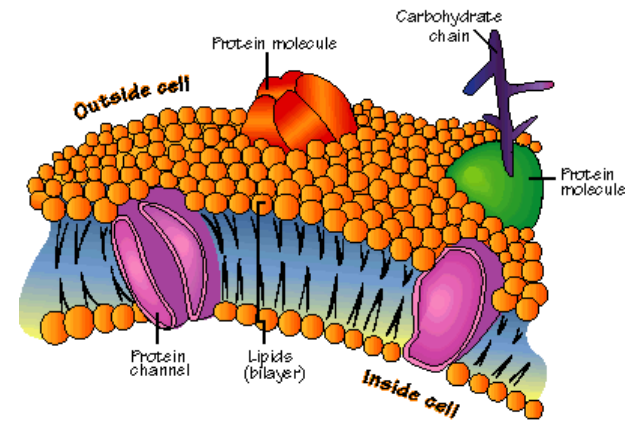
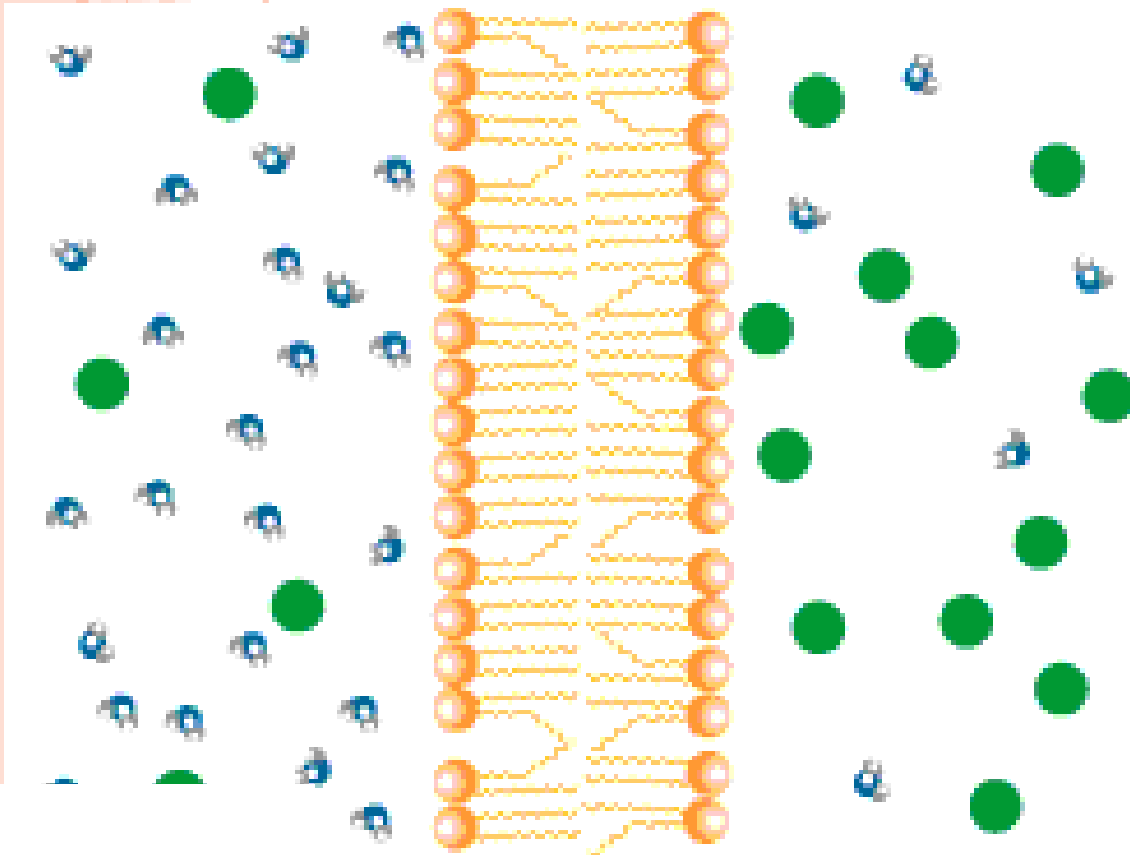


TRANSPORT SUMMARY



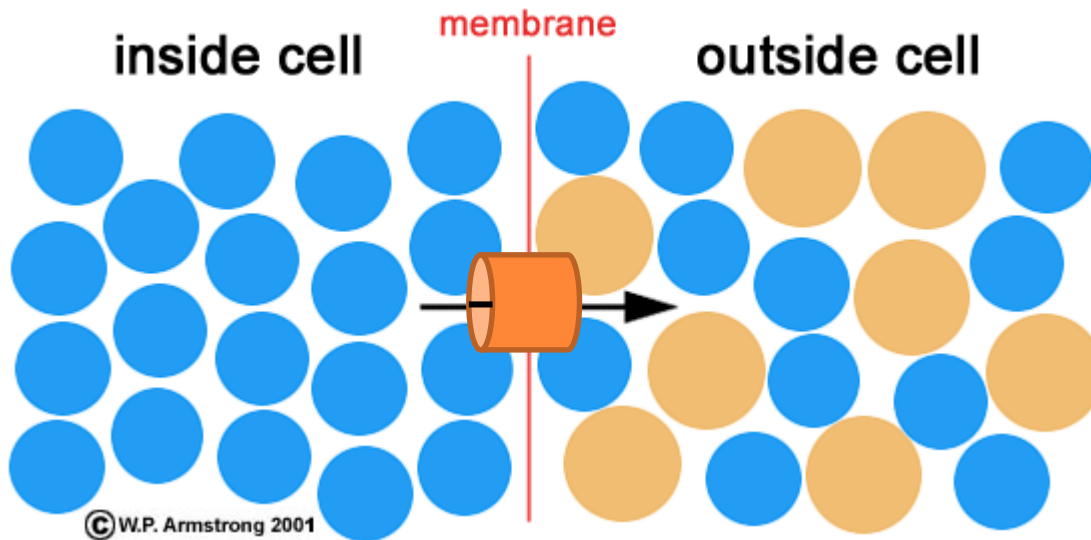
OSMOSIS (PASSIVE TRANSPORT)

DIFFUSION OF WATER ACROSS CELL MEMBRANE – USUALLY REQUIRES A PROTEIN (AQUAPORIN)



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:

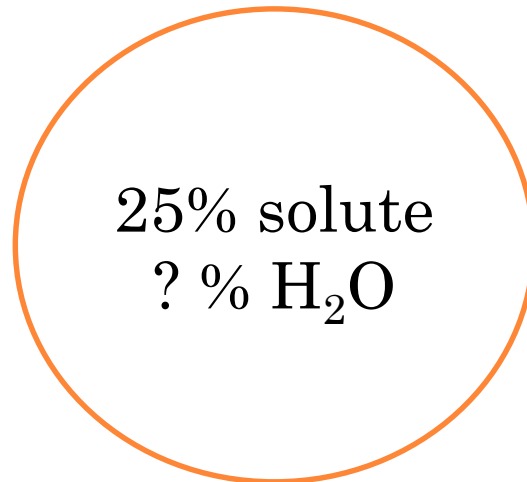
If we made Koolaid, what would be the solution, solute, and solvent?



WHICH WAY WILL THE WATER GO?

KEEP IN MIND....

- Water always travels from the highest concentration to the lowest concentration (WITH the concentration gradient).
- Water is HIGHER where Solute is LOWER:

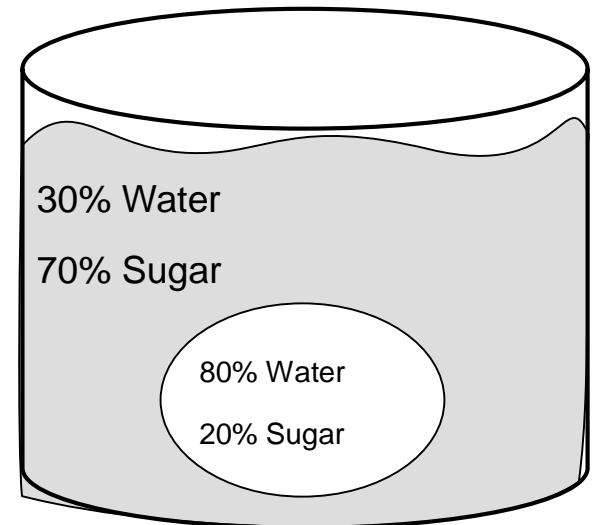
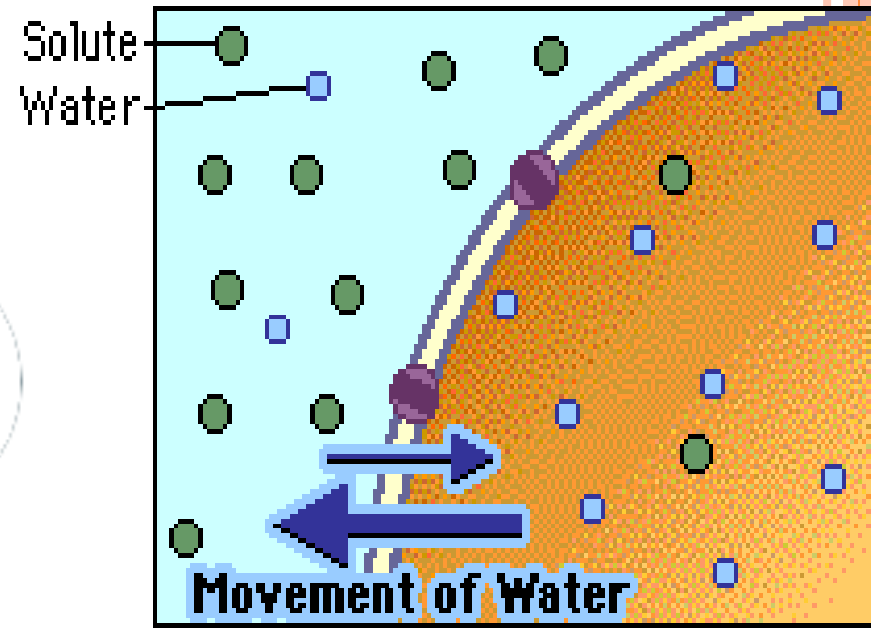
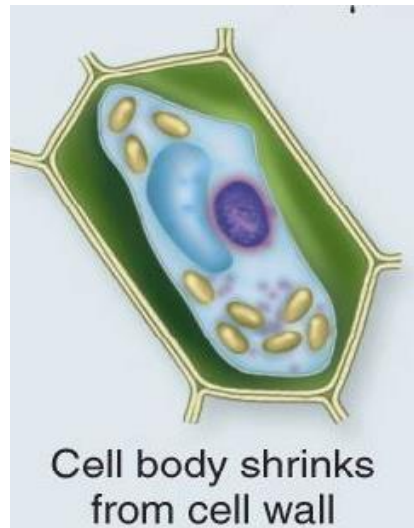
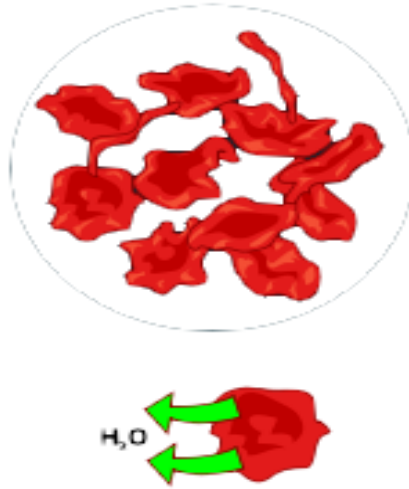


55% solute
? % H₂O



THE CELL SHRINKS

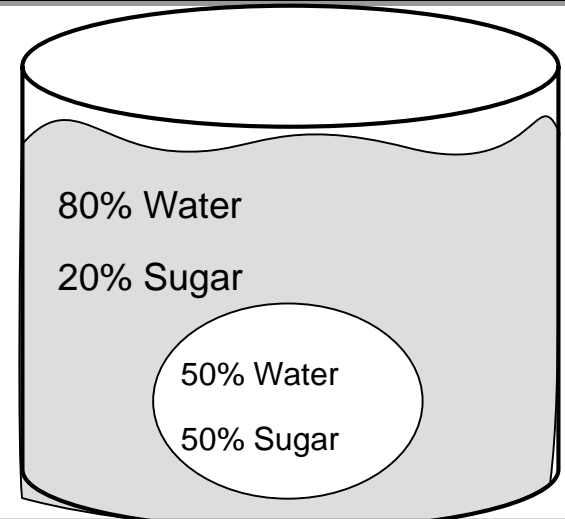
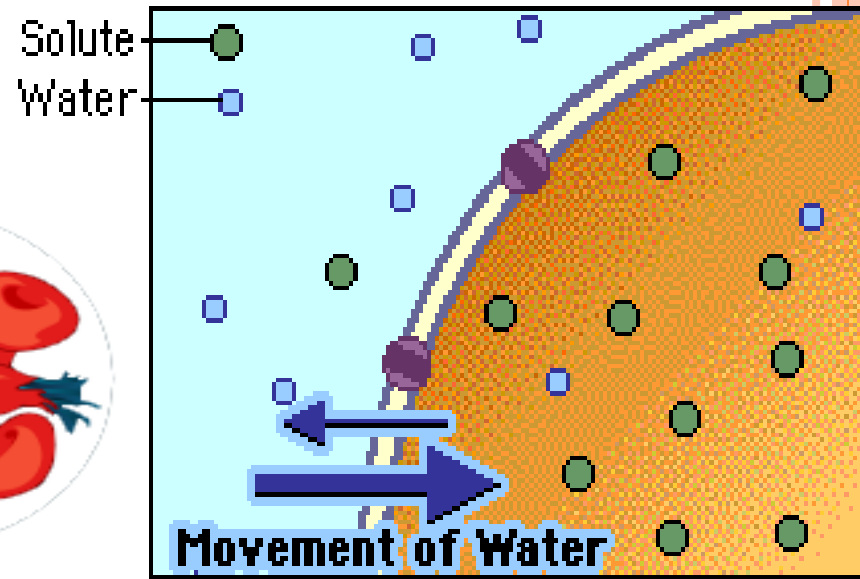
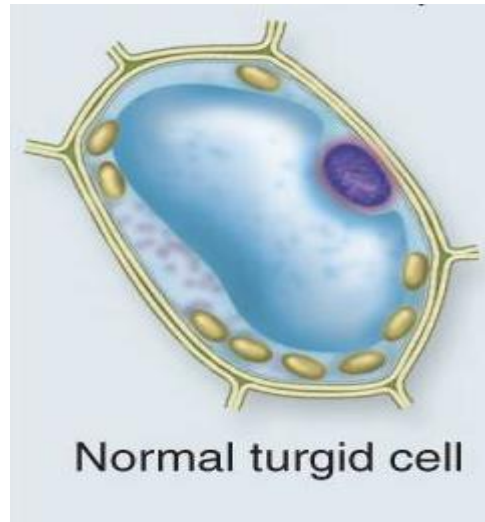
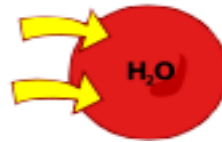
- When water concentration is higher inside the cell than outside the cell, the cell will shrink due to loss of water.
- Water will leave the cell, causing it to shrink.
- The cell loses mass and is no longer in homeostasis



Example: Putting salt on a slug (snail would kill it by drawing water out of the slug (dehydrating the slug).

THE CELL SWELLS

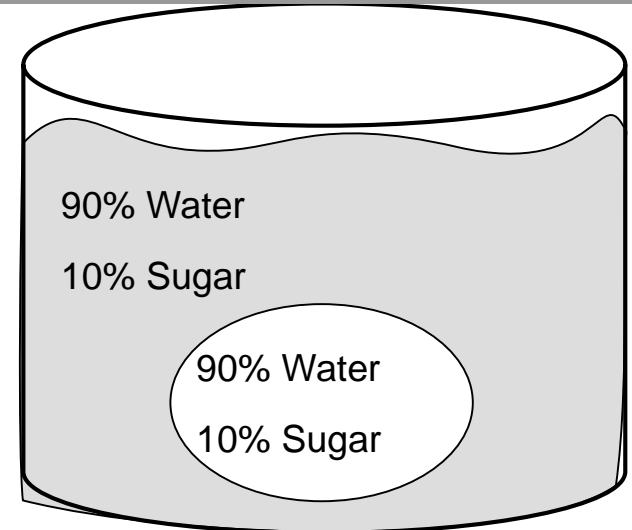
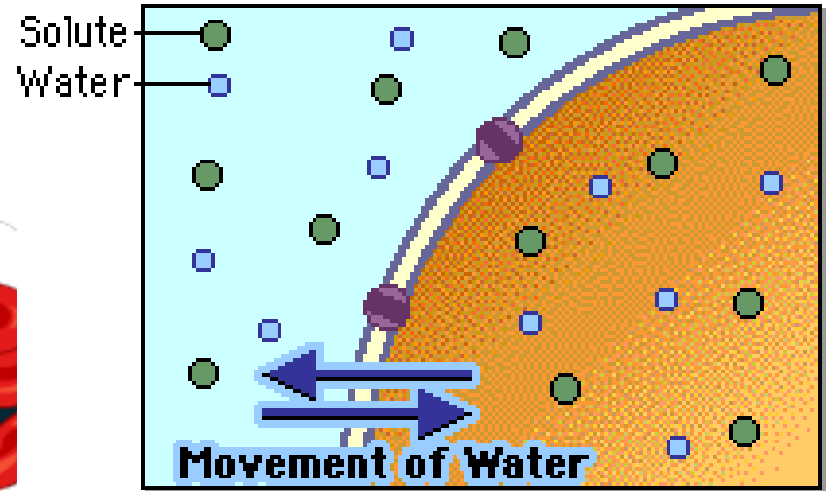
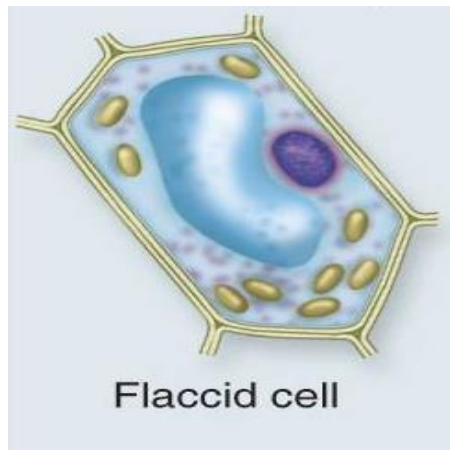
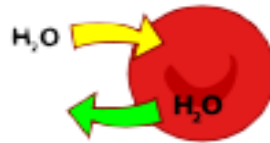
- When water concentration is higher outside the cell than inside the cell, the cell will swell due to gaining water.
- Water will enter the cell, causing it to swell.
- The cell gains mass and is no longer in homeostasis



Example: Putting saltwater fish in freshwater would cause the fish cell's to swell. This is because the fish cells have a higher salt concentration than the freshwater and water would enter the cell.

CELL REMAINS SAME

- When water concentration is equal inside and outside the cell, the cell will not change.
- Water will flow back and forth in equal amounts, not changing concentration.
- The cell stays in homeostasis



Example: When you get an IV, the saline solution contains a salt concentration equal to your cell's salt concentration. This prevents the cells from swelling and shrinking.

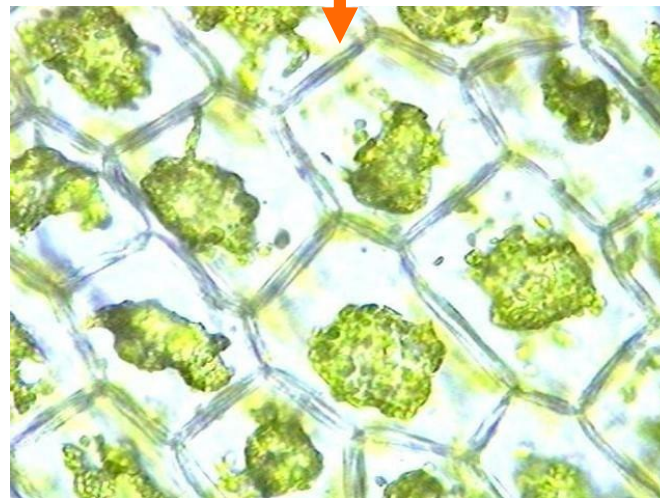
Elodea is a plant that lives in fresh water.



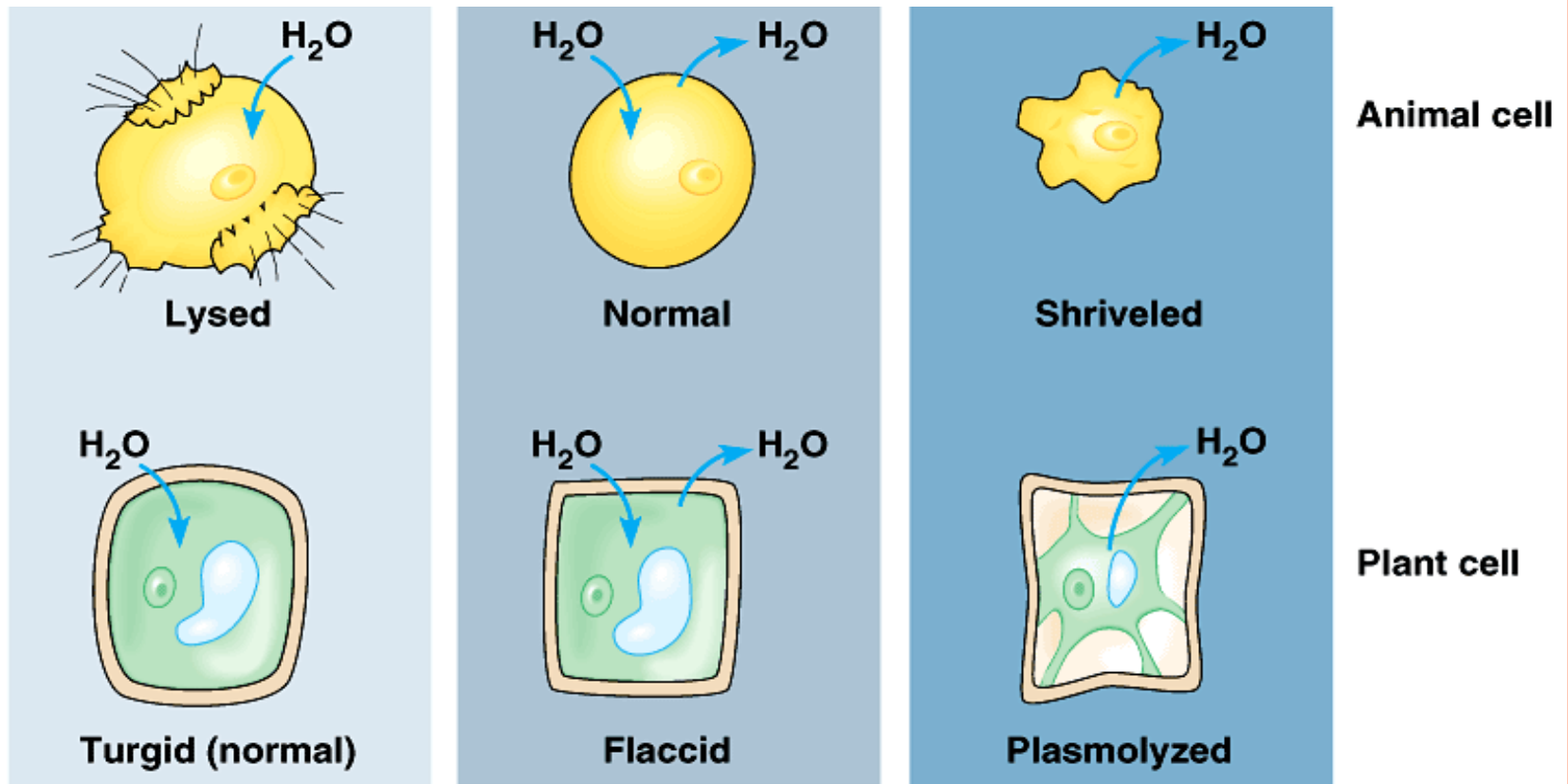
This is an elodea leaf under a microscope.



This is an elodea leaf that has been in salt water. What happened? Is it in a Did water enter, leave or neither?

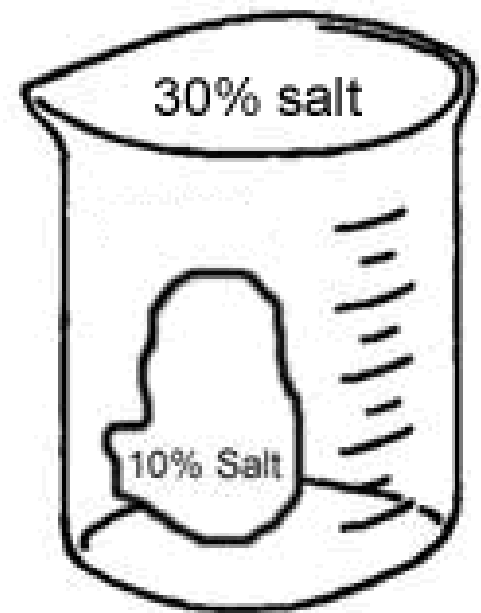
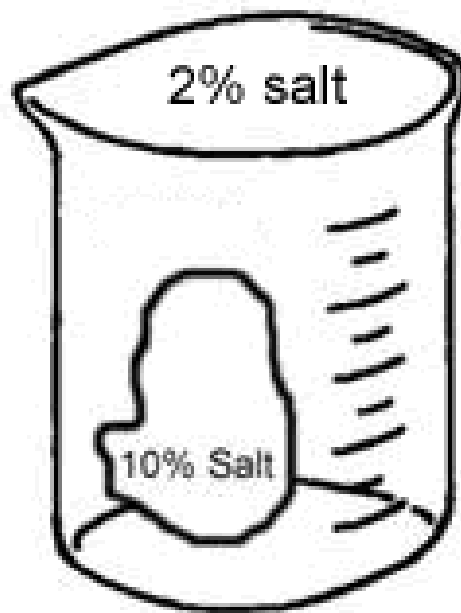
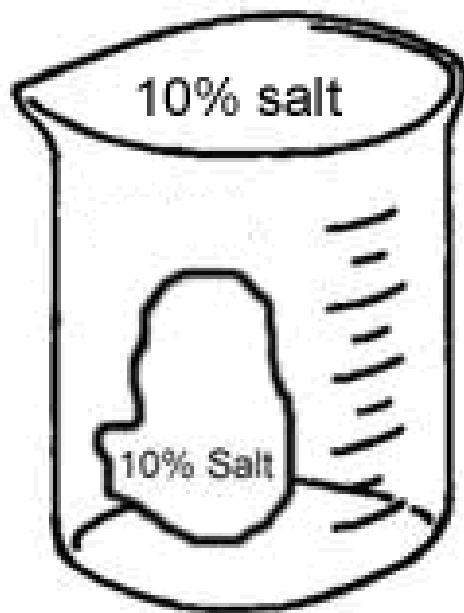


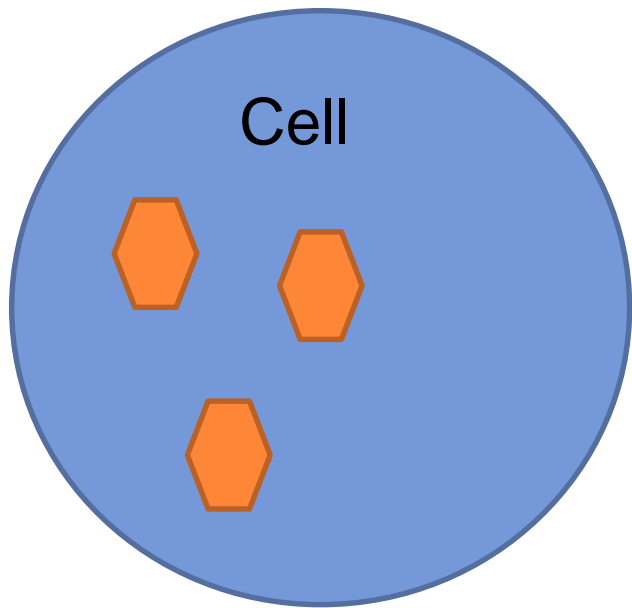
- Which solution below would you want to expose fruits and vegetables to at the grocery store? WHY??



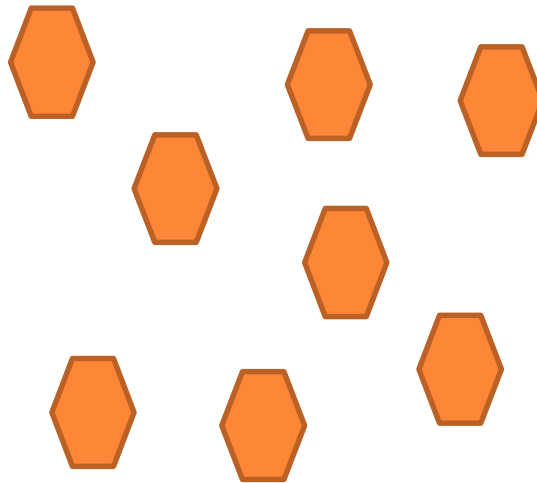
NOW LET'S PRACTICE...






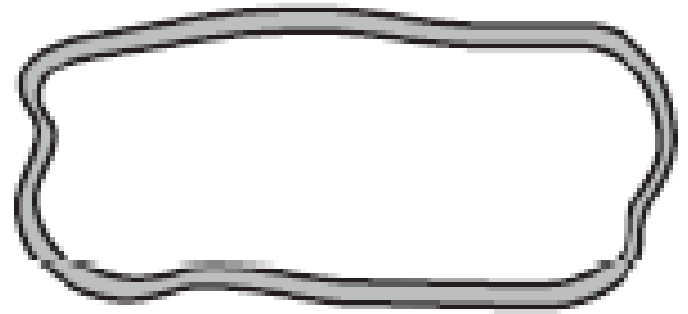
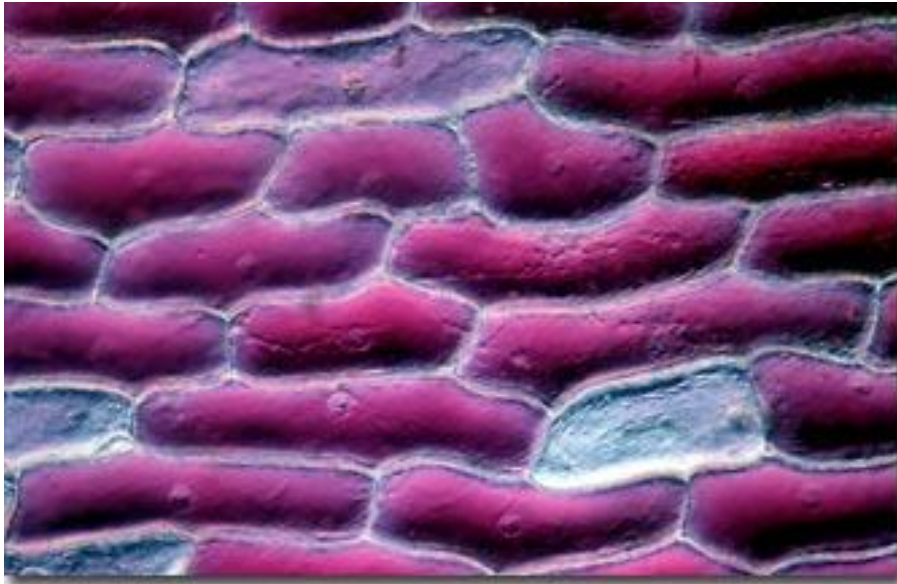


Blood



 = glucose





Isotonic

