

European folklore from the Middle Ages warned “woe is the child who tastes salty from a kiss on the brow, for he is cursed, and soon must die.”

The child would not fare well, would not gain weight and have constant coughs and respiratory problems. In the Middle Ages, the child would not survive.



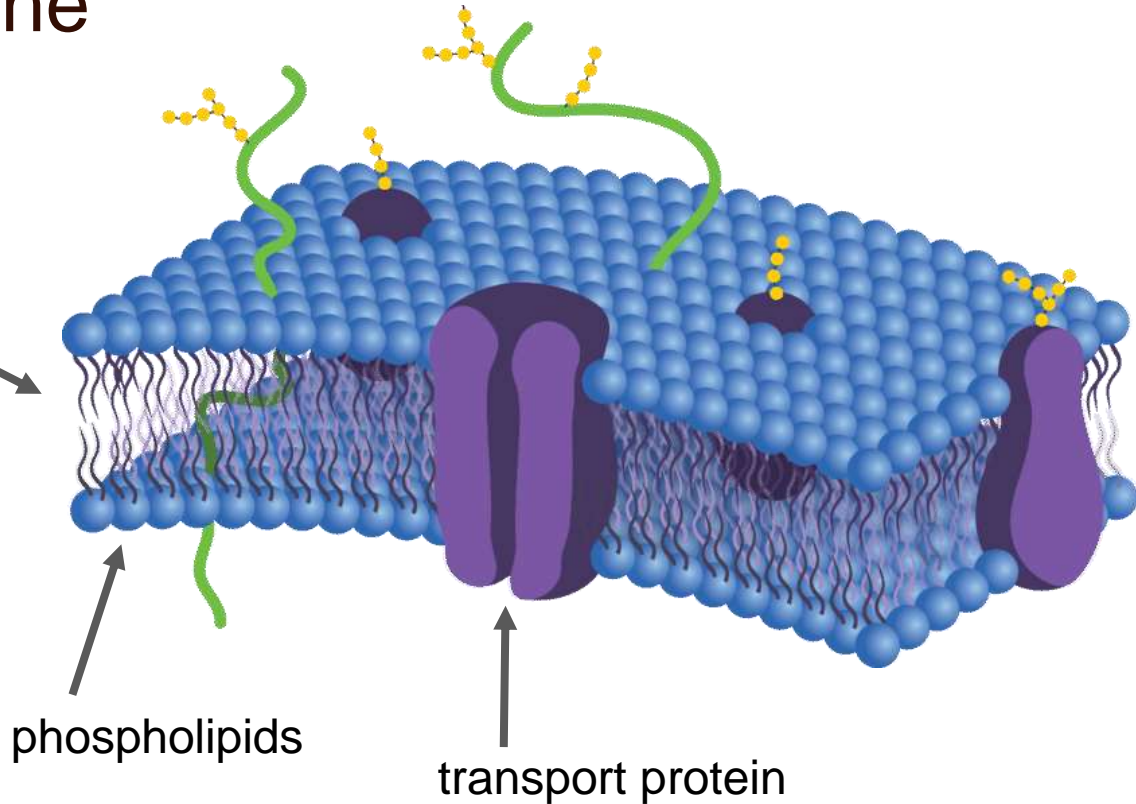
In modern times, we have a name for this disorder: **CYSTIC FIBROSIS**.

In this lesson we will examine the role of the cell membrane in this disease.

# 1. The Cell Membrane

Composed of individual phospholipids and transport proteins

Its function is to move things into the cell and out of the cell.

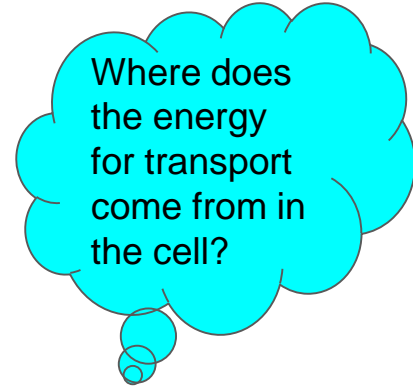
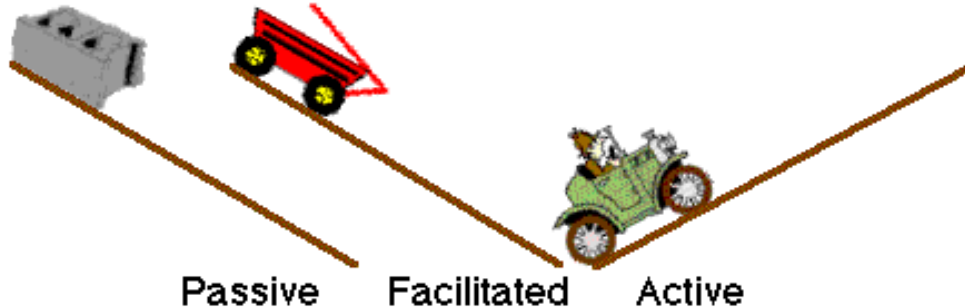


*Remember: all cells have a cell membrane!*

2. The movement of substances across the membrane occurs through two methods:

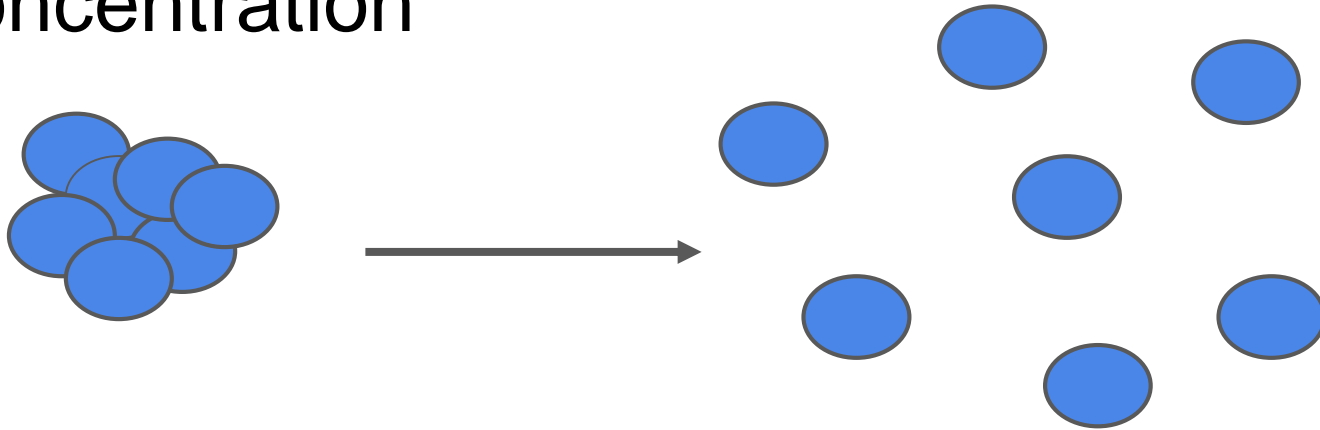
PASSIVE TRANSPORT - requires NO energy  
(it just happens)

ACTIVE TRANSPORT - requires energy



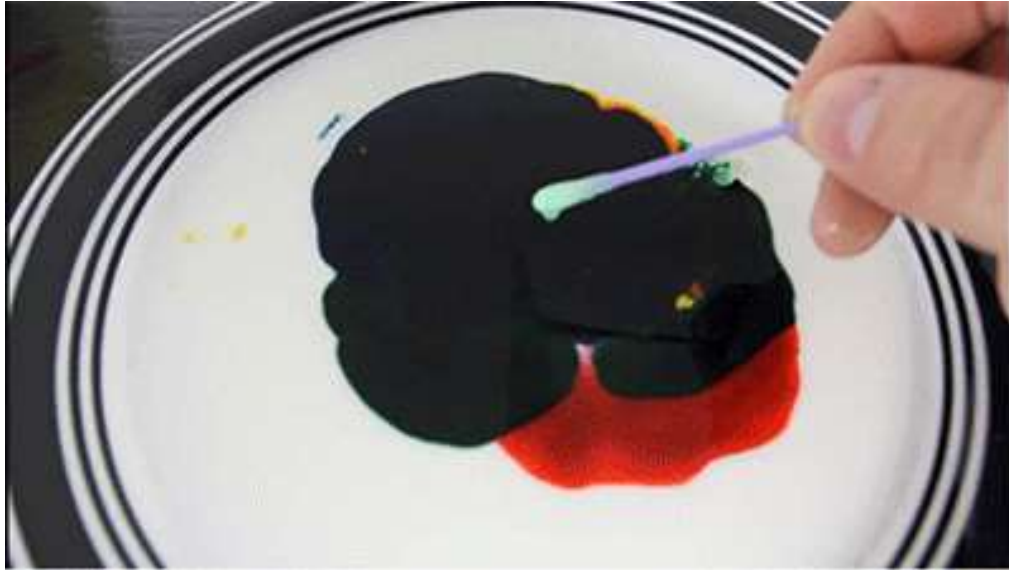
# DIFFUSION

The movement of molecules from an area of high concentration to an area of low concentration



Molecules tend to spread out

Diffusion can occur in the AIR, or in the WATER, or across MEMBRANES.



Examples:

Food coloring in water

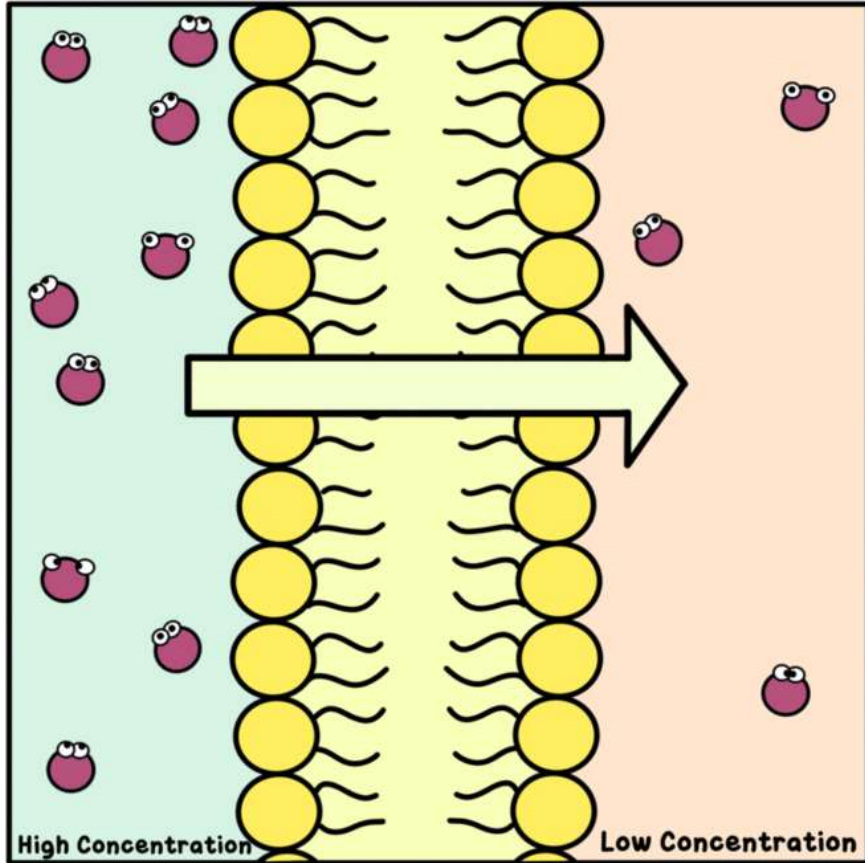
Perfume in the air

The cell membrane is SEMIPERMEABLE - some stuff can pass through it but not others. Imagine it like a screen door.

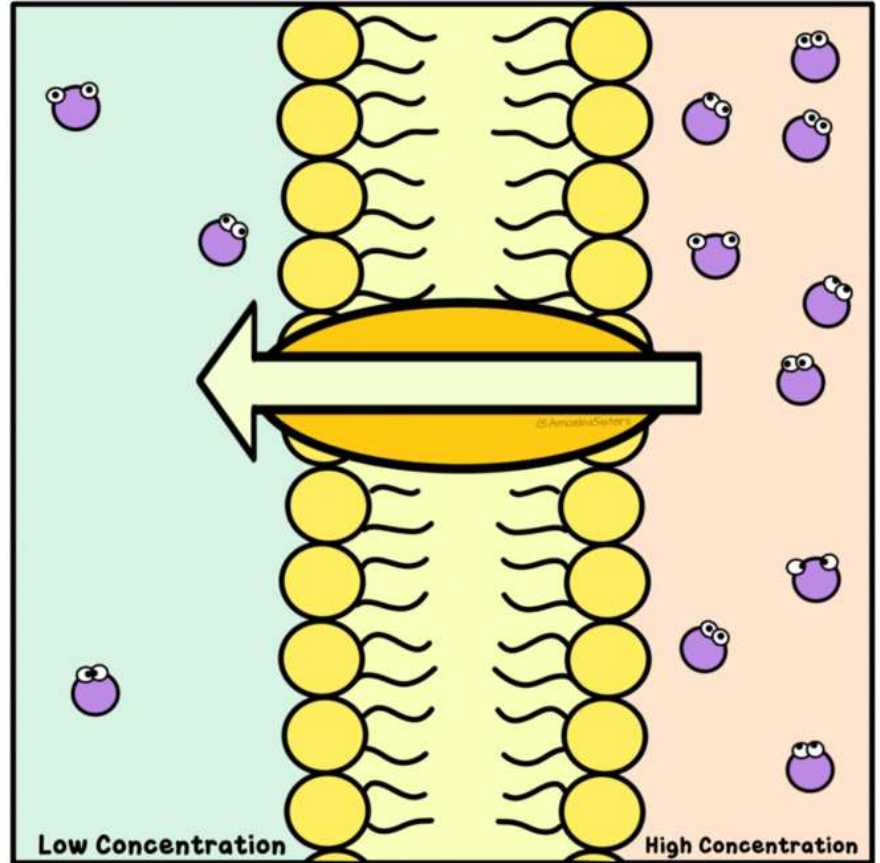
# Passive Transport

©AmoebaSisters

## Diffusion

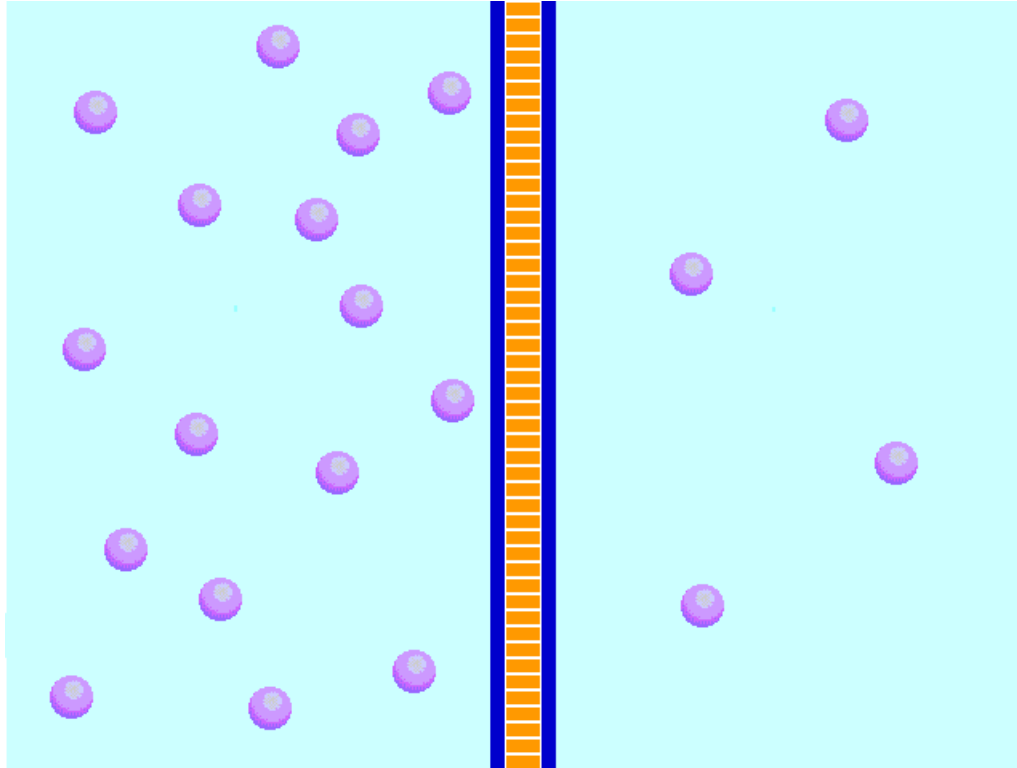


## Facilitated Diffusion



# EQUILIBRIUM

When molecules are evenly spread throughout a space.

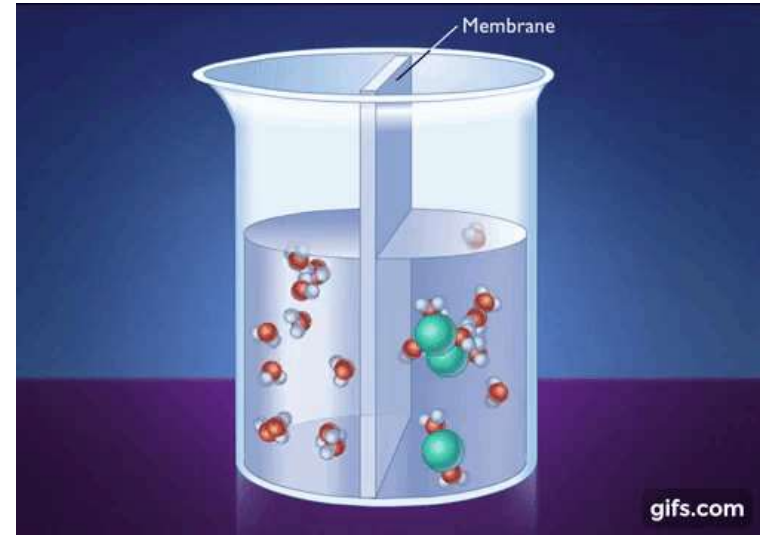


# OSMOSIS

The diffusion of **water** across a membrane

Things that can cross the cell membrane - water, oxygen, and other small molecules

Large molecules, like salt and sugar cannot easily pass through the cell membrane





# Rule for Osmosis

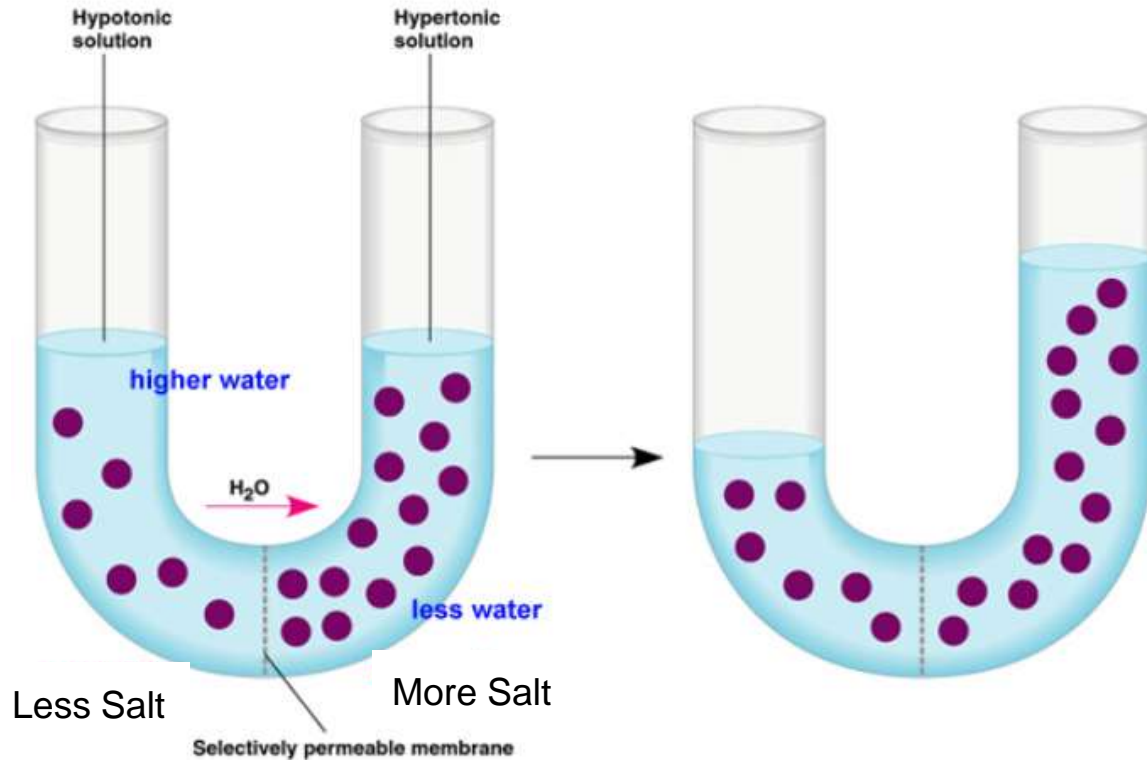
**SALT SUCKS**

*SAL CHUPA (AGUA)*

If the area outside the cell has more salt –  
then water will be sucked out of the cell  
(toward the salt)

# U - Tubes

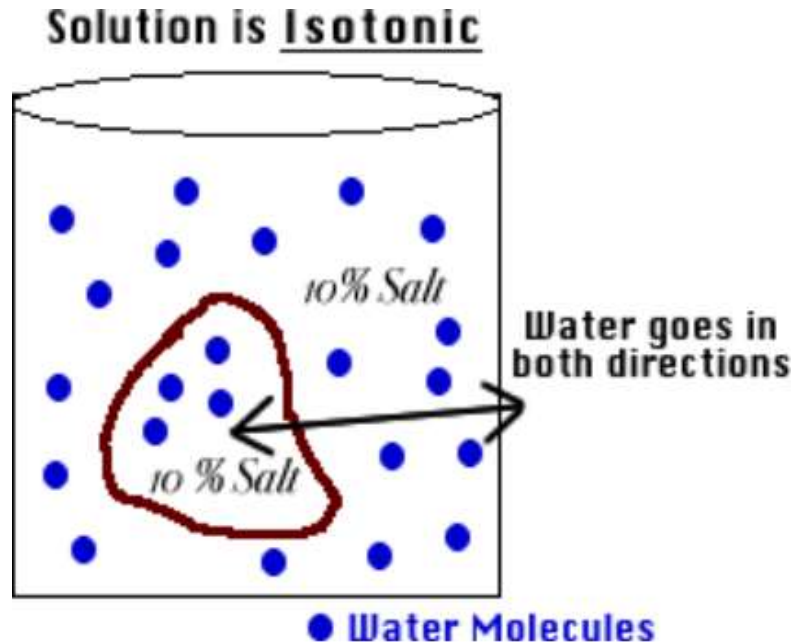
(not just for videos!)



With an elbow partner, discuss what you think is happening in this illustration. Be prepared to share with the class.

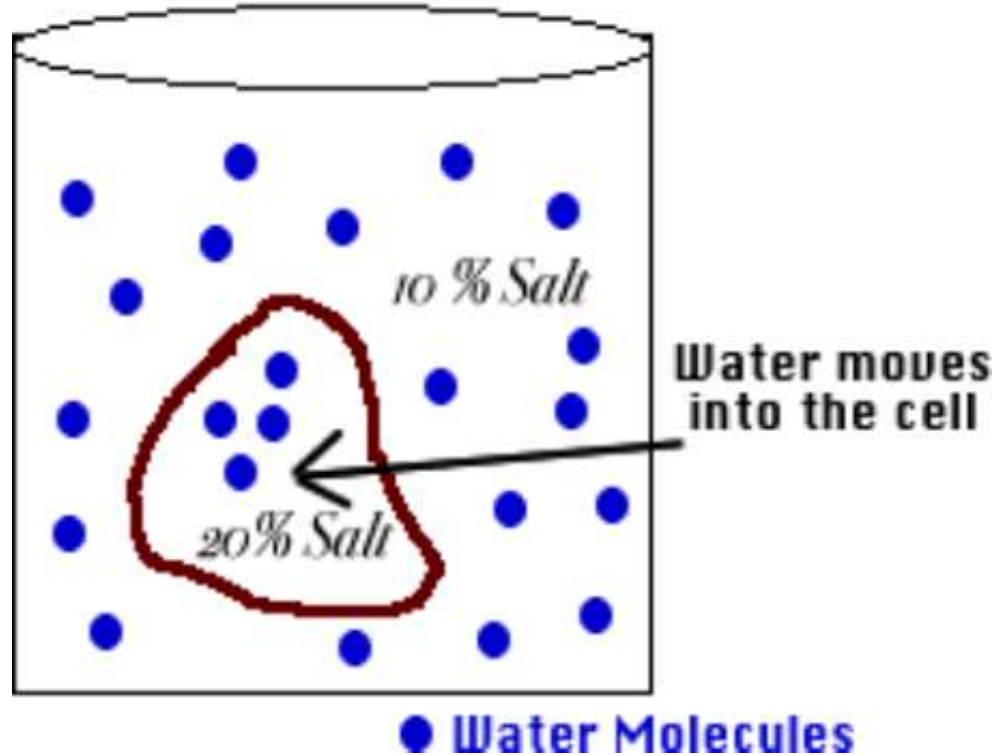
# 6. Cells In Different Solutions

"ISO" means the same



# Hypo = less

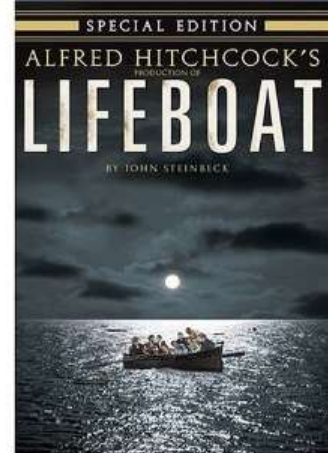
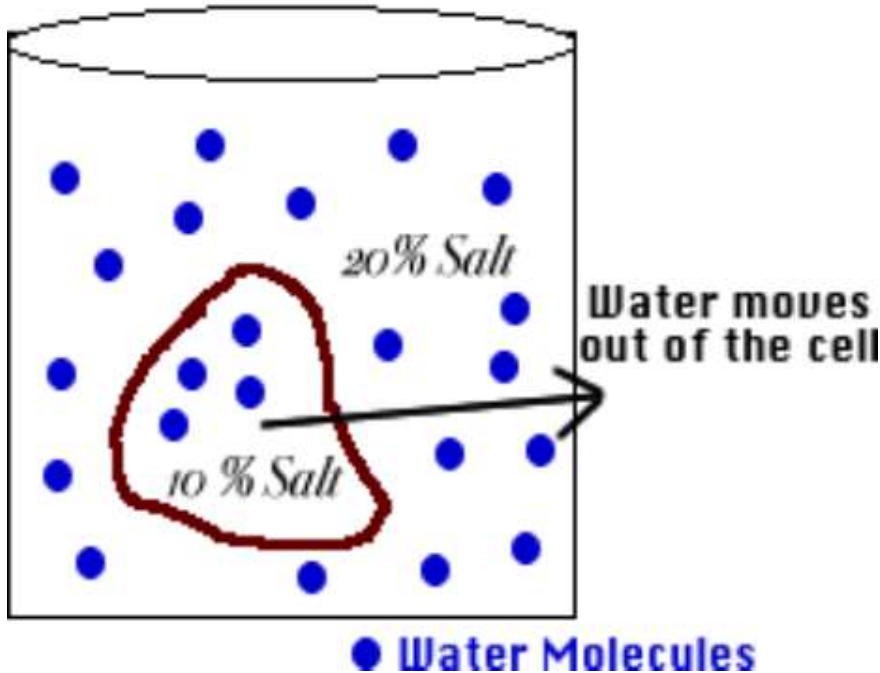
Solution is Hypotonic



# Hyper = more

*Cell will shrink or die, plants wilt*

**Solution is Hypertonic**

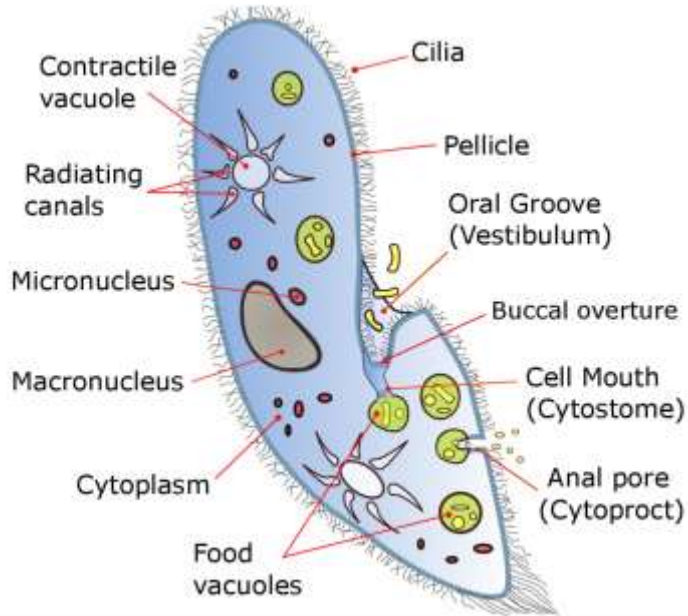


Why is it dangerous to drink sea water?

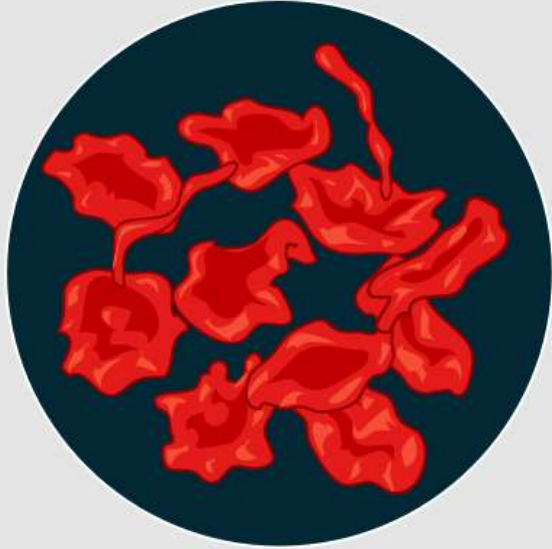
Why does pouring salt on a slug kill it?

## 7. HOMEOSTASIS = maintaining balance or sameness

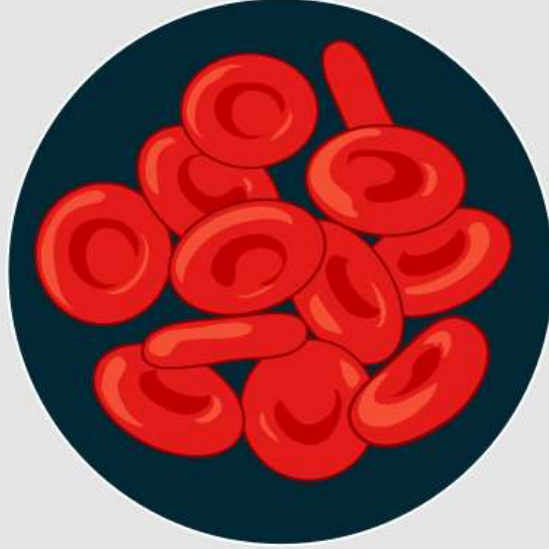
Some freshwater organisms have structures to pump out water -  
CONTRACTILE VACUOLES.



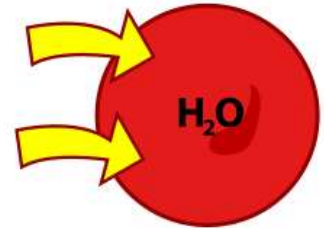
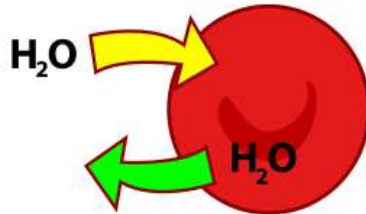
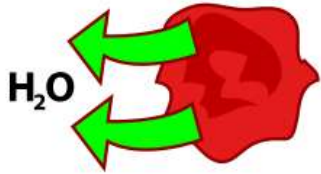
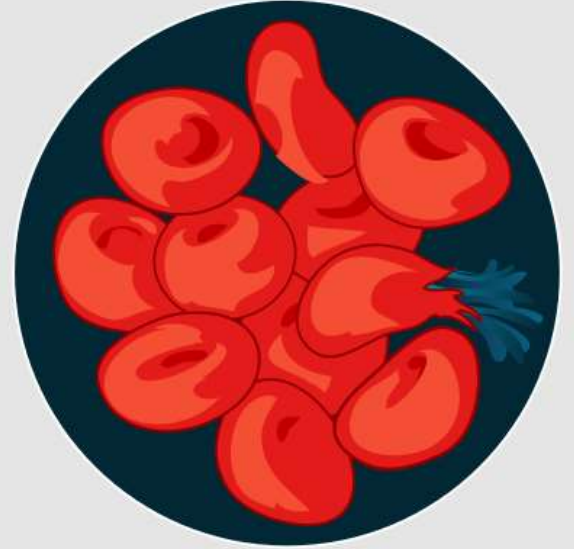
Hypertonic



Isotonic



Hypotonic

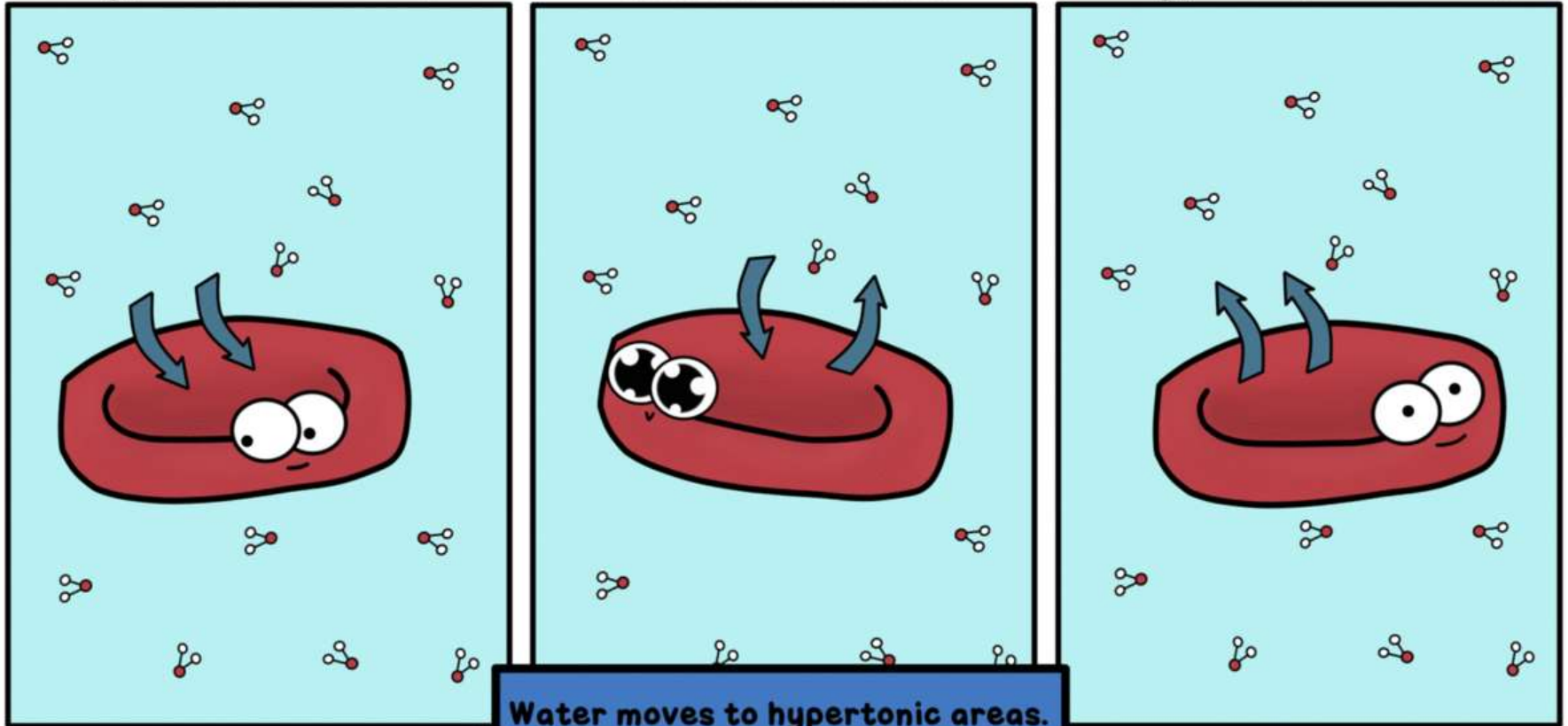


# Passive Transport: Osmosis

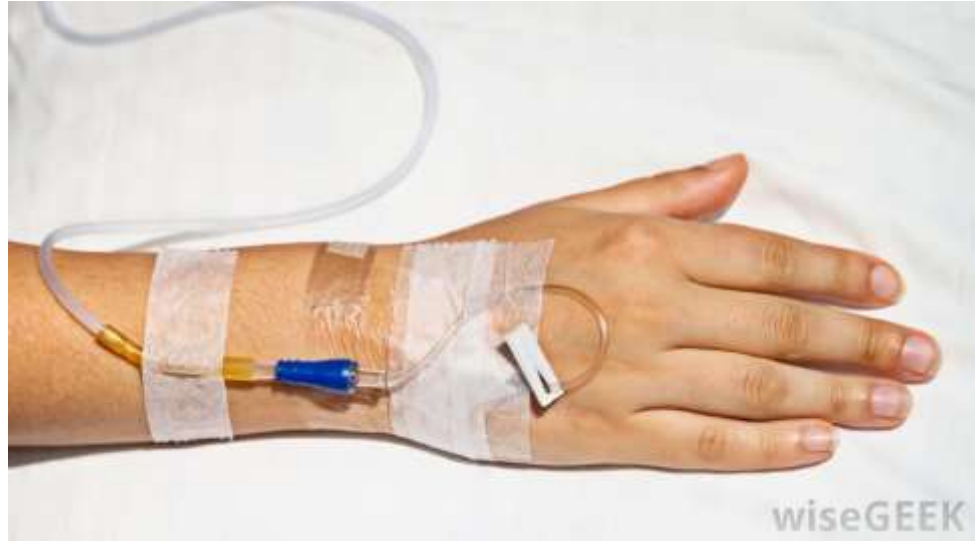
Hypotonic Solution

Isotonic Solution

Hypertonic Solution



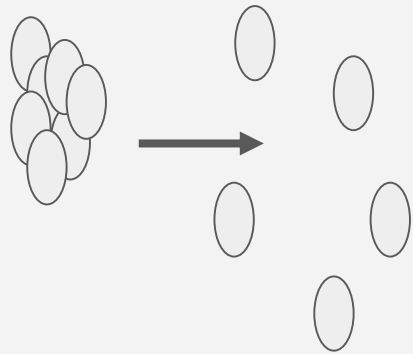




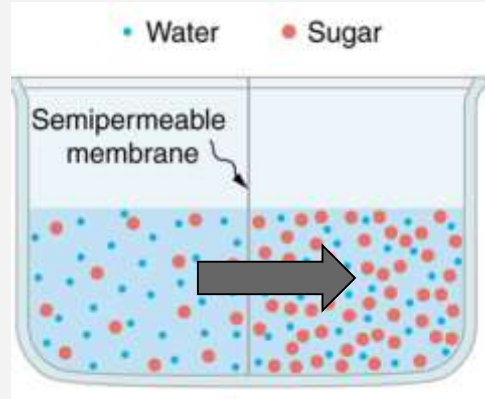
Have you ever gotten an IV? Why is the solution in the bag not pure water?

# 9. Passive Transport **Requires no energy!**

Diffusion

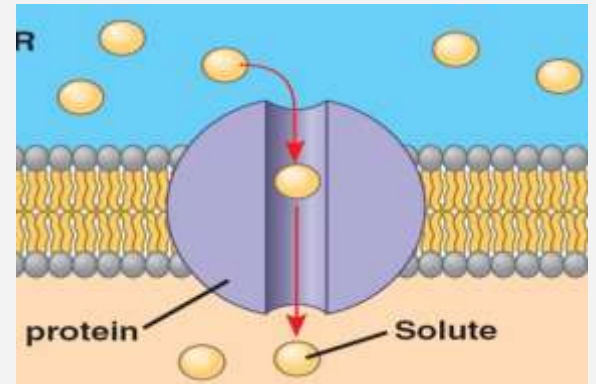


Osmosis

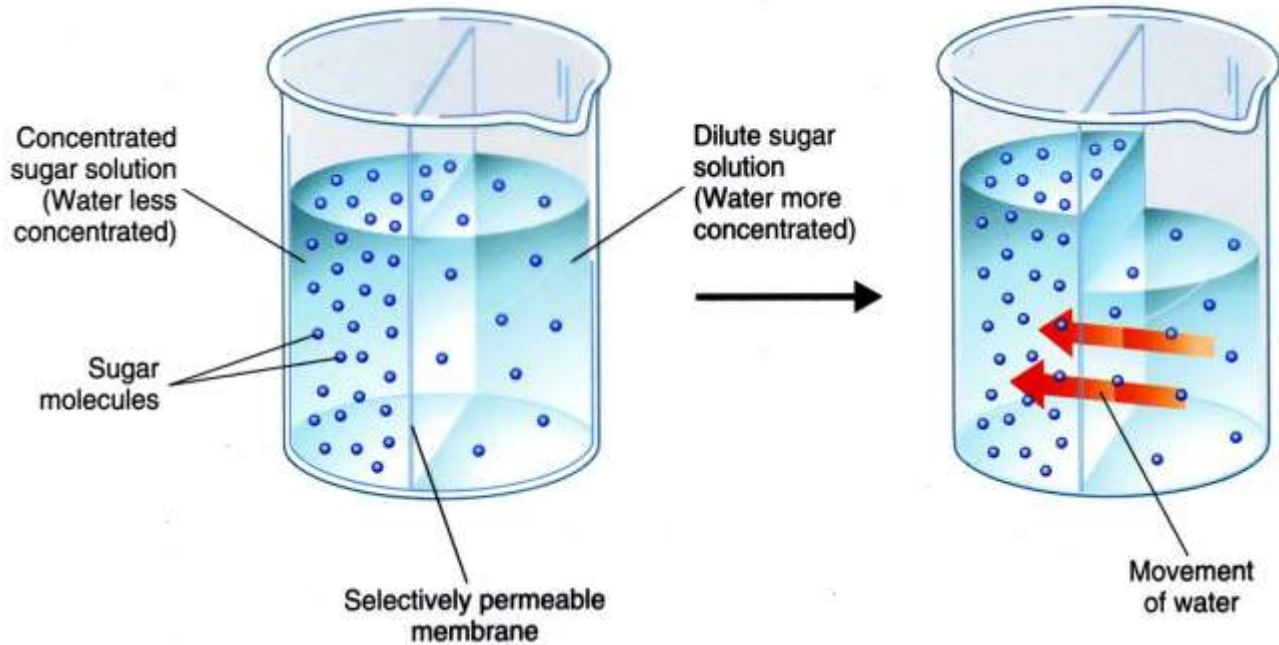


Facilitated Diffusion

(helper proteins move things across)



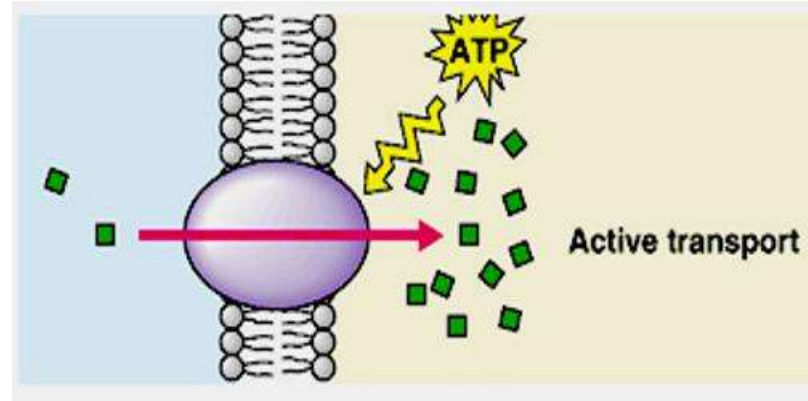
## 10. Quick check!



1. Why is the water moving toward the left side of the beaker?
2. Which side of the beaker is hypertonic?
3. Salt is a solute in the other examples, what is the solute in this

# 11. ACTIVE TRANSPORT

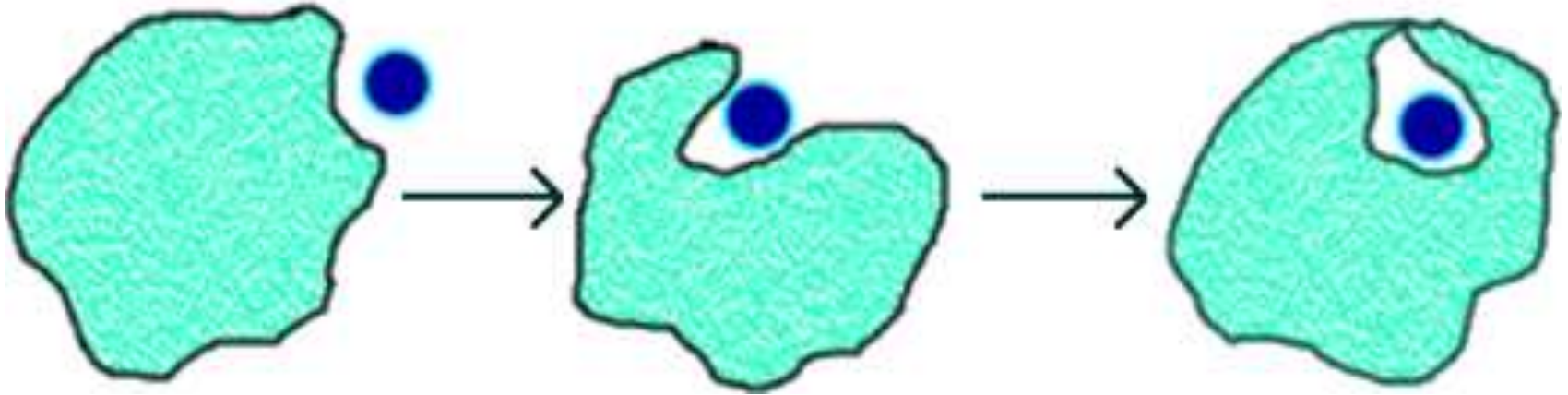
- Requires the cell to use energy (ATP)
- Proteins found in the membrane move materials across

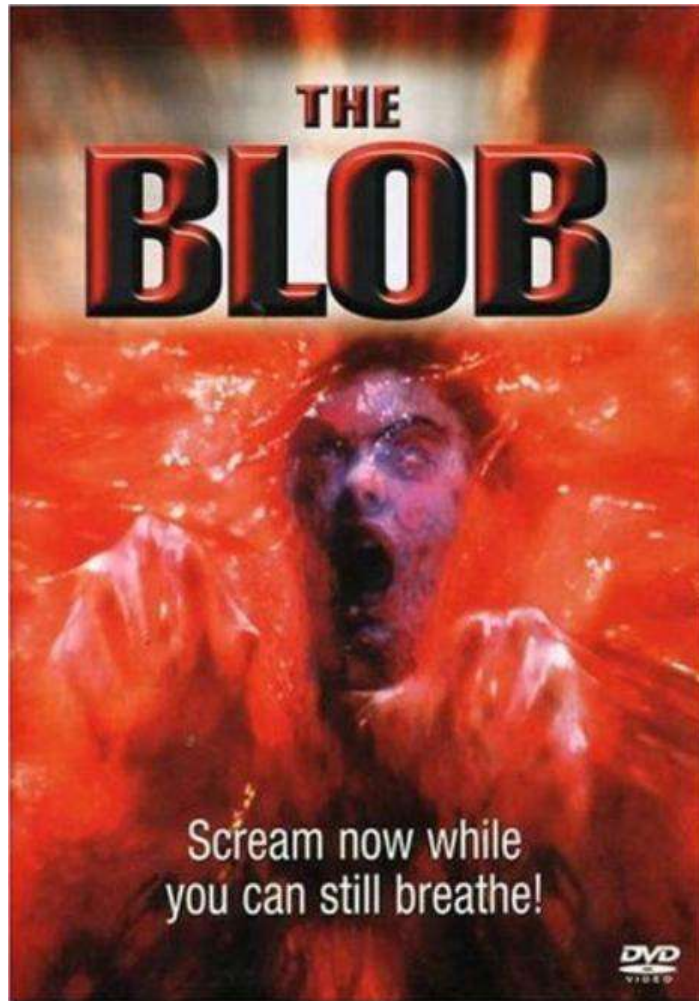


What part of the cell makes ATP?

# 12. Endocytosis

Taking "in" large molecules by the cell

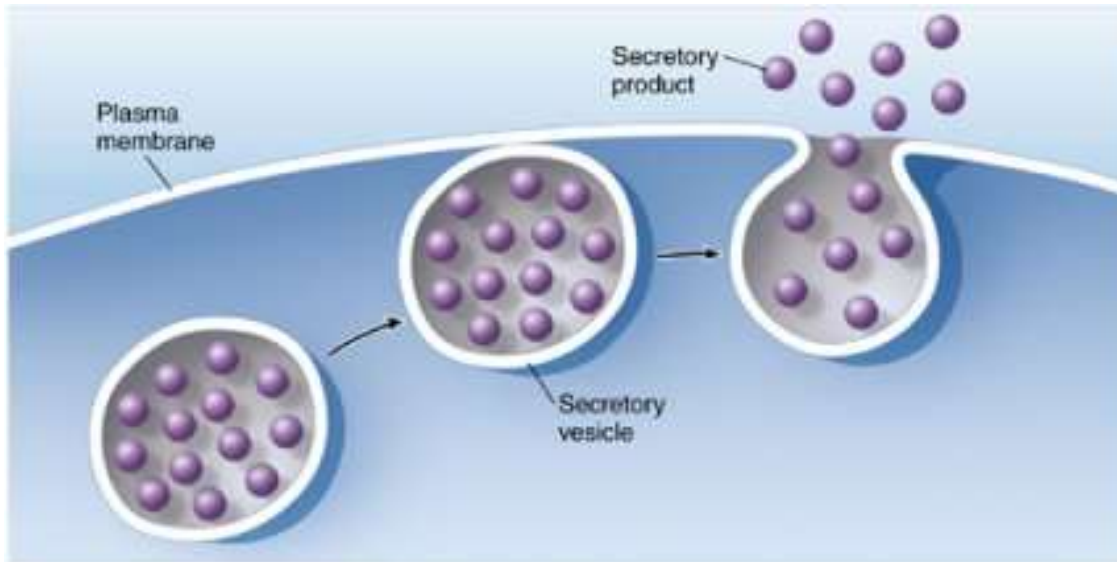




This amoeba is about to consume a paramecium. ACK!

# 13. EXOCYTOSIS

Removing large particles (waste) from the cell  
Stuff “exits” the cell





Endocytosis and Exocytosis

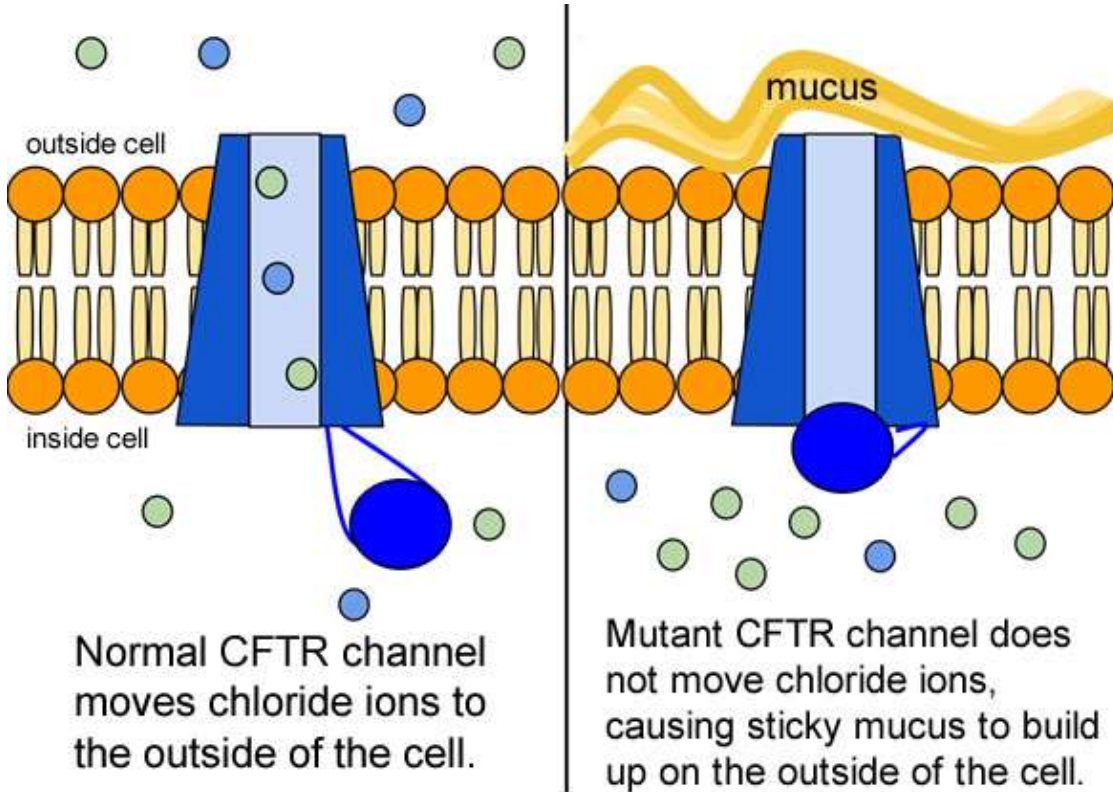


**14. CYSTIC FIBROSIS** is caused by a problem with the cell membrane.

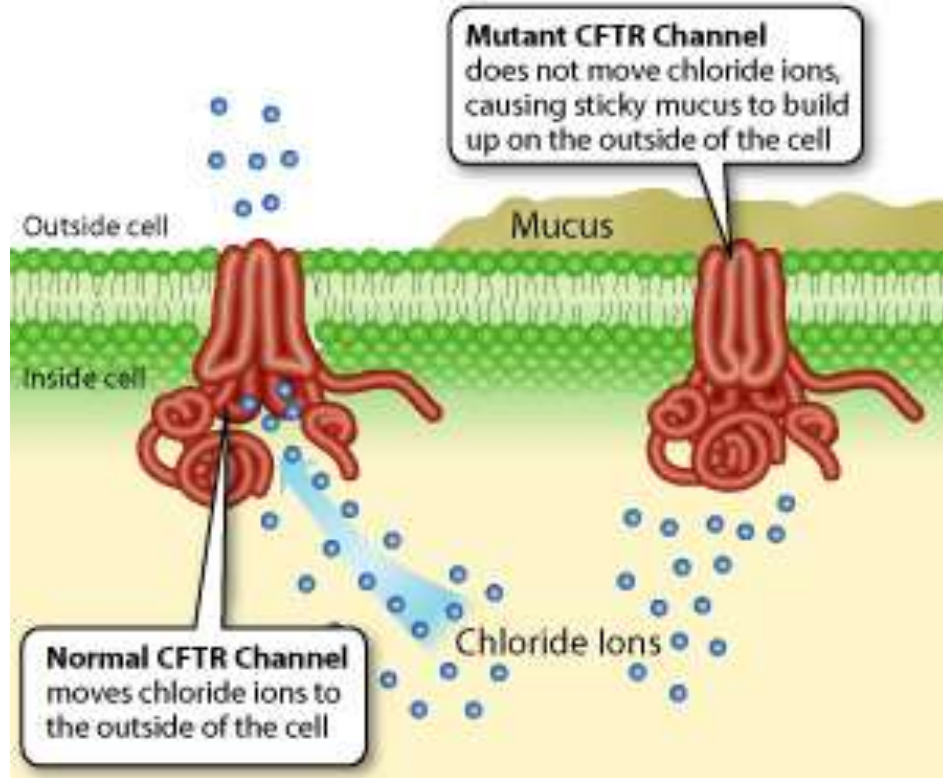


Mucus build up causes respiratory infections and difficulty breathing.

These broken channels may also affect the child's ability to absorb nutrients.



**CYSTIC FIBROSIS** is caused by a problem with the cell membrane.



How could you treat or cure a child who has cystic fibrosis?



# WHAT IS CYSTIC FIBROSIS?

# Quick Review

- Diffusion
- Osmosis
- Facilitated Diffusion
- Selectively permeable
- Equilibrium

- Hypertonic Solution
- Hypotonic Solution
- Isotonic Solution

- Contractile Vacuole
- Passive Transport
- Active Transport
- Endocytosis
- Exocytosis



Be able to explain what happened in the labs:

-Why did the starch in the bag turn purple?

-What happened to carrots soaked in salt water and why did that happen?