

Extracellular space

# Cell Membranes and Transport



Getting material in and out of cells

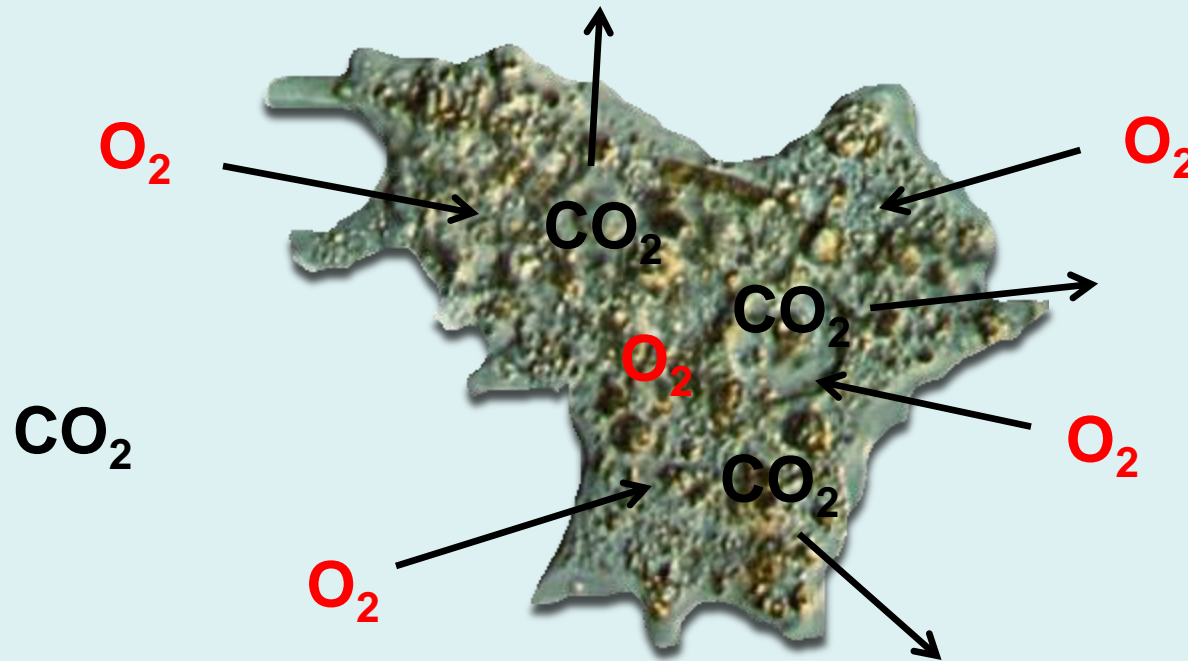
Intracellular space

# Transport

- Getting material in and out of cells
- Two categories

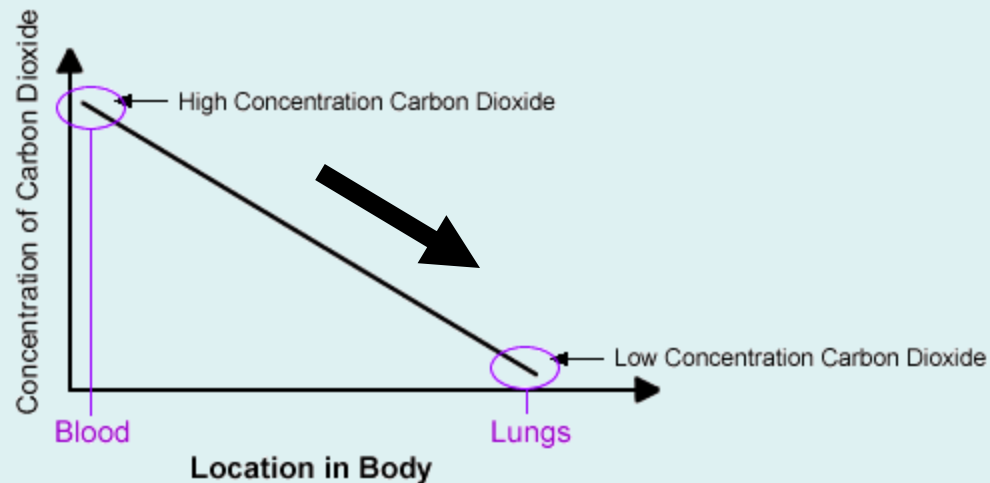
**ACTIVE**

**PASSIVE**



# Passive Transport

- Movement of material in/out of cells
- CELL USES **NO ENERGY** TO DO SO
- Diffusion: (From High Conc. → Low Conc.)
- Down the concentration gradient.



# Osmosis

## Diffusion of water

Net movement of material from high to low concentration

**Salt DOES NOT diffuse through the plasma membrane**

Beaker ("Environment") **Hypertonic**  
4% salt (solute)  
96% water (solvent)

**LOW**  
water

Cytoplasm: **Hypotonic**  
2% salt (solute)  
and other dissolved stuff  
98% water (solvent)

**HIGH**  
water



**CELL SHRINKS**

# Osmosis

## Diffusion of water

Net movement of material from high to low concentration

**Salt DOES NOT diffuse through the plasma membrane**

Beaker ("Environment") **Hypotonic**

0.5% salt (solute)

99.5% water (solvent)

**HIGH**  
water

Cytoplasm: **Hypertonic**

2% salt (solute)

and other dissolved stuff

98% water (solvent)

**LOW**  
water



**CELL SWELLS**

# Osmosis

## Diffusion of water

Net movement of material from high to low concentration

**Salt DOES NOT diffuse through the plasma membrane**

Beaker ("Environment") **Isotonic**

2% salt (solute)

98% water (solvent)

**EQUAL**  
water

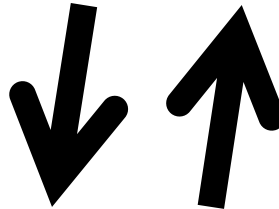
Cytoplasm: **Isotonic**

2% salt (solute)

and other dissolved stuff

98% water (solvent)

**EQUAL**  
water



**CELL "CHILLS"**

# If you have the choice...

Is it better to drown in the North Sea (Cold, Salty),



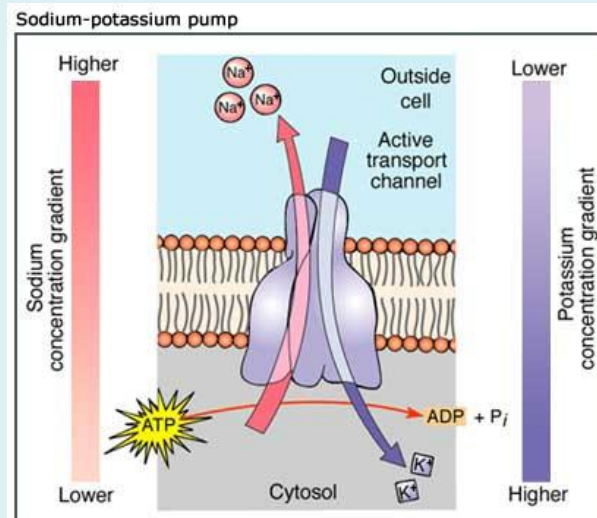
Most importantly,  
WHY?

Or the Wallkill River?



# Active Transport

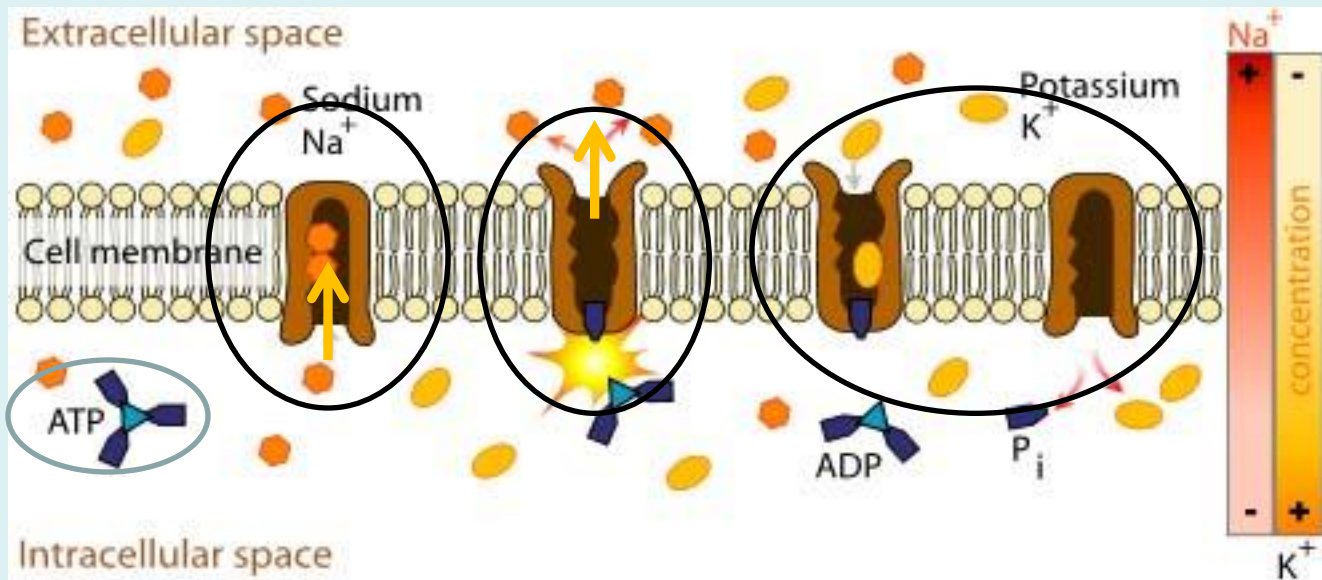
- Cell **USES ENERGY** to move material in/out cells.
- “Up” the concentration gradient: (Lo → Hi)





# Protein Channels

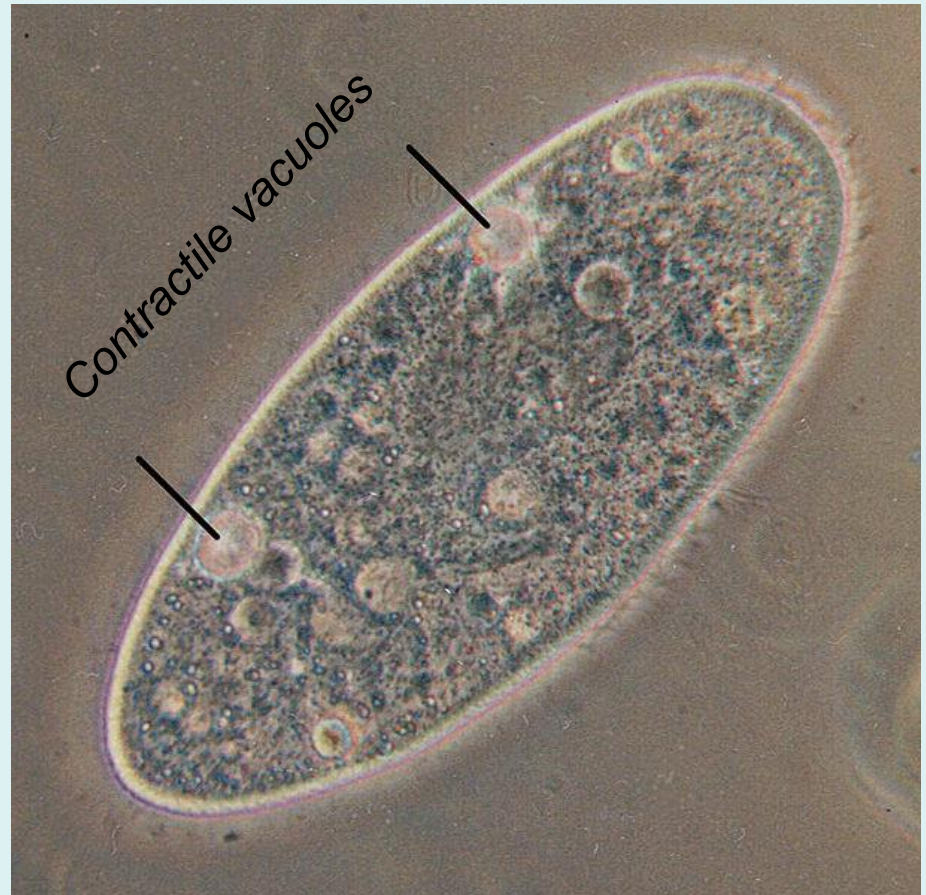
- Cell membrane proteins
- “Tubes” through which substances can pass



# Cellular Sump Pumps

Fresh-water = hypotonic  
(Cells take on water)

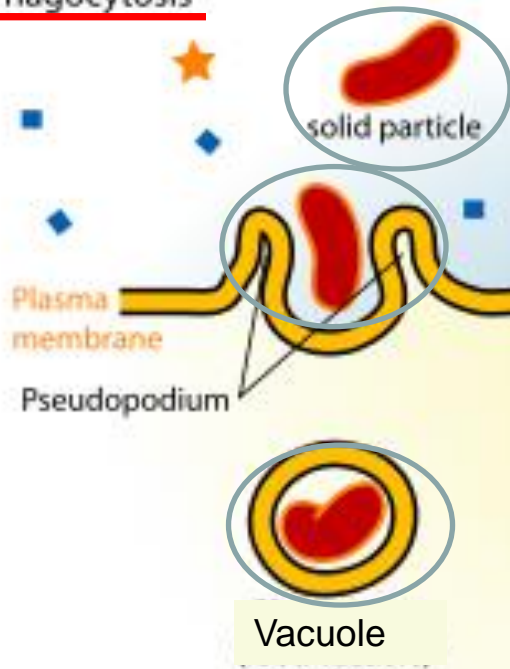
Pumping takes energy =ACTIVE



# More Active Transport

## Endocytosis “Inward cell process”

### Phagocytosis



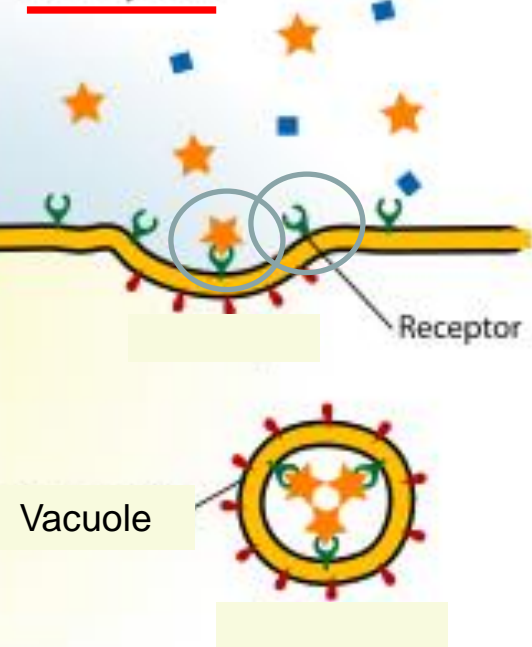
Cell surrounds a solid particle  
- Cell “eating”

### Pinocytosis



Dissolved particles  
- Cell “drinking”

### Receptor-mediated endocytosis



Uses receptor molecules to “know” to eat the particle

# Thanks for checking in...

- [www.mrulrichslandofbiology.com](http://www.mrulrichslandofbiology.com)
- [kulrich@newpaltz.k12.ny.us](mailto:kulrich@newpaltz.k12.ny.us)

**Yay! Science!**

