AP BIOLOGY
CELL UNIT
ACTIVITY #5

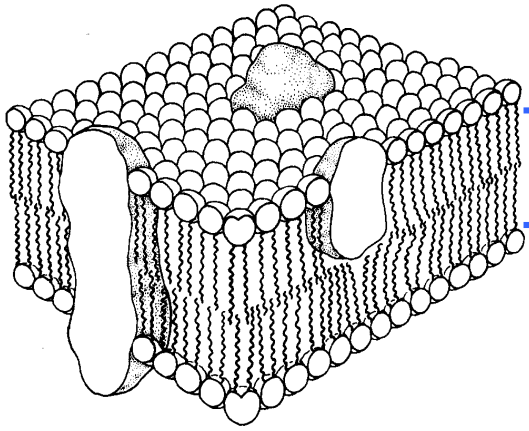
NAME_____

DATE_____HOUR_____

CELL TRANSPORT

MEMBRANE PROPERTIES

Selectively permeable



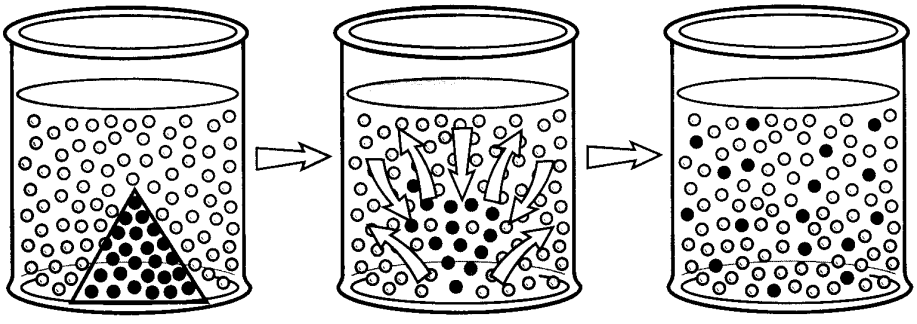
Hydrophobic core:

- Nonpolar cross with ease
- Small polar (H_2O) small enough to pass between lipid molecules
- Large polar and ions cannot pass without help

PASSIVE TRANSPORT

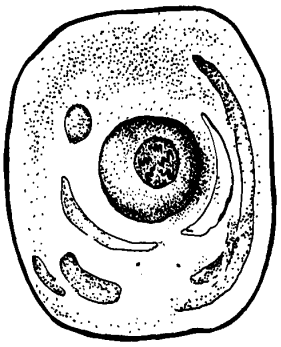
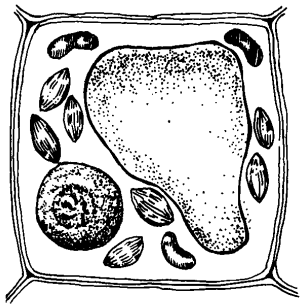
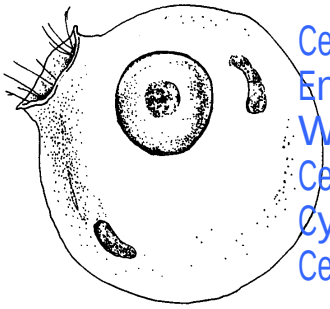
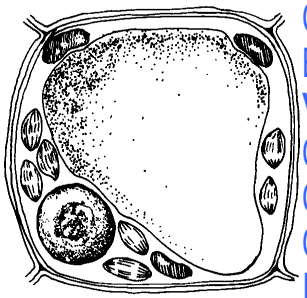
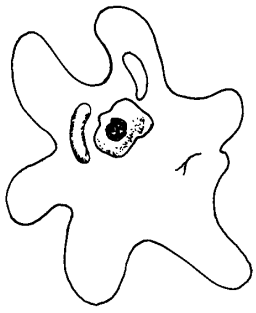
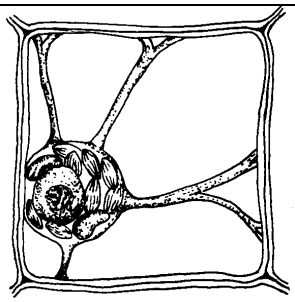
CHARACTERISTICS: Does not require cell energy
Molecues move down (H to L) conc. gradient.

DIFFUSION:



- Random movement of molecules
- Down conc. gradient
- Until equilibrium reached

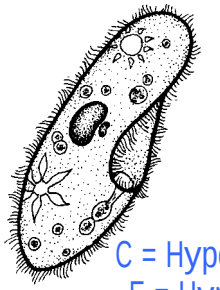
OSMOSIS: Diffusion of water across selectively permeable membrane		
ISOTONIC	**HYPOTONIC**	**HYPERTONIC**
Two sol'n with same solute conc.	Sol'n with lower solute conc.	Sol'n with higher solute conc.

ANIMAL CELLS	**PLANT CELLS**
 Isotonic No net movement of water Normal state for animal cells	 Isotonic No net movement of water Cell flaccid (limp) Plant wilts
 Cell: Hypertonic Environ: Hypotonic Water enters cell Cell swells & bursts Cytolysis Cell dies	 Cell: Hypertonic Environ: Hypotonic Water enters cell Cell swells Cell wall pushes back Cell becomes turgid Normal state for plant cells
 Cell: Hypotonic Environ: Hypertonic Water exits cell Cell shrinks Crenates Plasmolysis Cell dies	 Cell: Hypotonic Environ: Hypertonic Water exits cell Cell membrane pulls away from cell wall Plasmolysis Usually lethal

C = Cell E= Environment

OSMOREGULATION – ADAPTATIONS

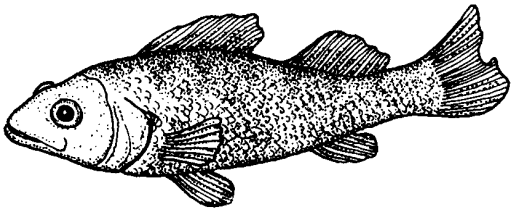
Paramecium



C = Hypertonic
E = Hypotonic
Water enters

Cell membrane less permeable to water
Contractile vacuole pumps water out

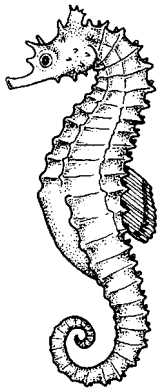
Fresh Water Bony Fish



C = Hypertonic
E = Hypotonic
Water enters

Don't drink water
Excrete large volumes of watery urine

Marine Bony Fish

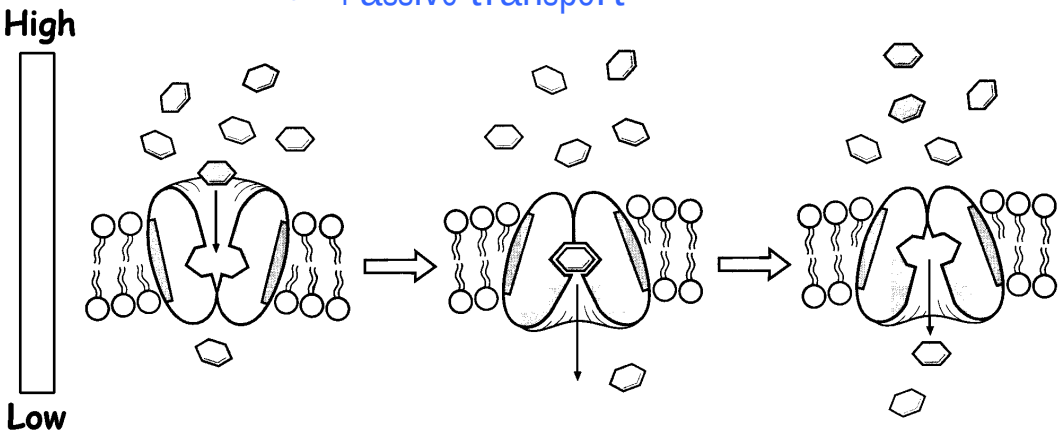


C = Hypotonic
E = Hypertonic
Water exits

Drink large amounts of water
Gills pump excess salts out of body

FACILITATED DIFFUSION:

- Diffusion of solutes across membrane with help of transport proteins
- Passive transport



- Transport proteins are specific
- Model
  - ~~Protein has 2 conformations~~
  - Solute binds to protein
  - Protein changes shape
  - Solute released to other side of membrane

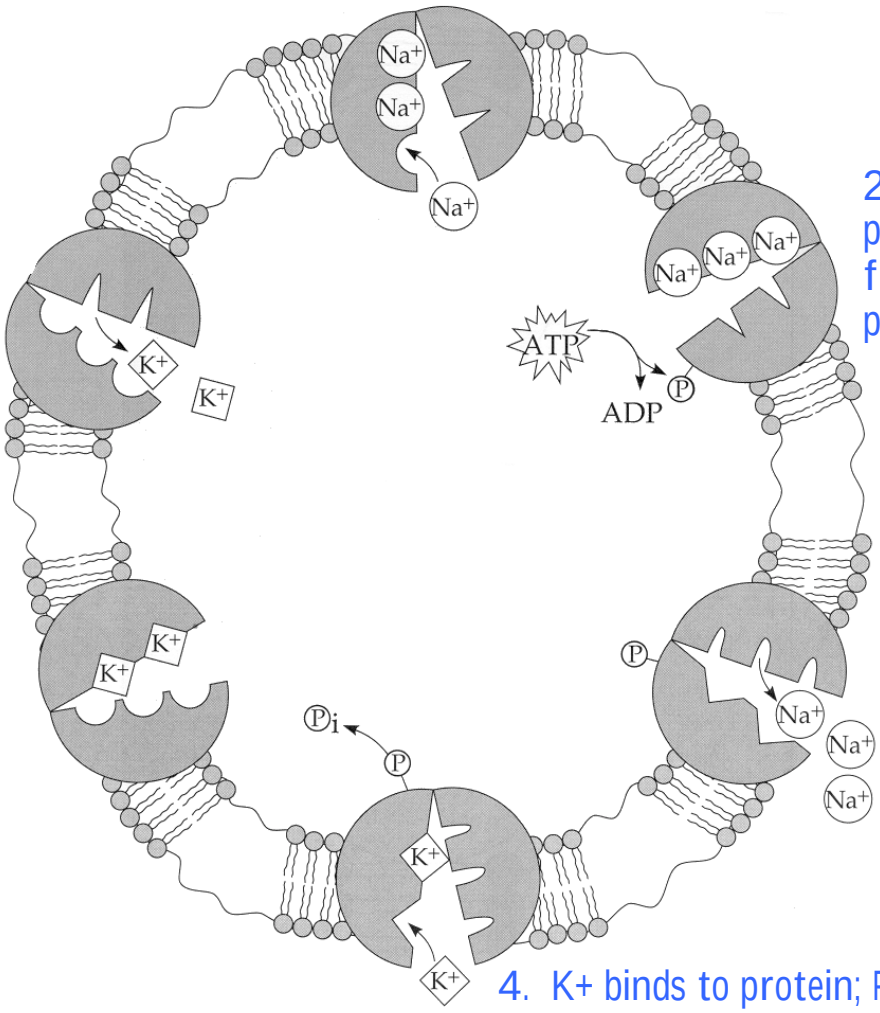
ACTIVE TRANSPORT

CHARACTERISTICS:

Requires cell energy (ATP)
Materials moved against (L to H) conc. gradient

NA+ / K+ PUMPS:

1. Na+ binds to transport protein



2. Protein is phosphorylated; P from ATP added to protein

3. Protein changes shape; Na+ released to outside

4. K+ binds to protein; Protein loses P

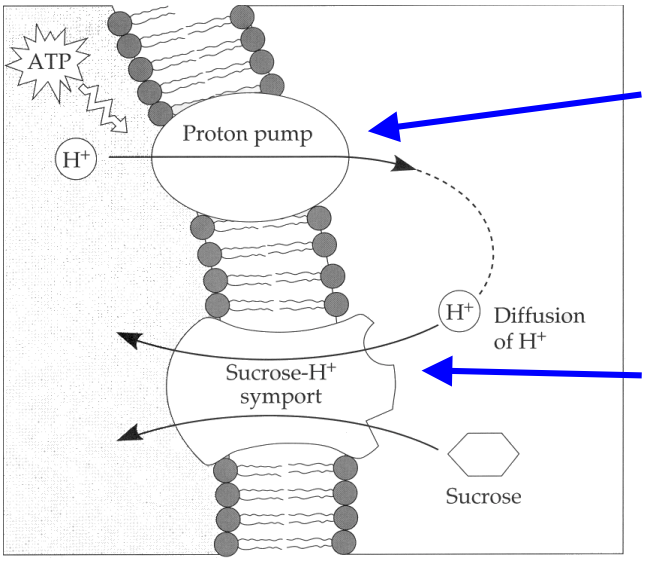
5. Protein changes chape

6. K+ released to the inside

OTHER EXAMPLES:

Proton pumps: Mitochondria & chloroplasts
Involved in plant cell growth

COTRANSPORT:



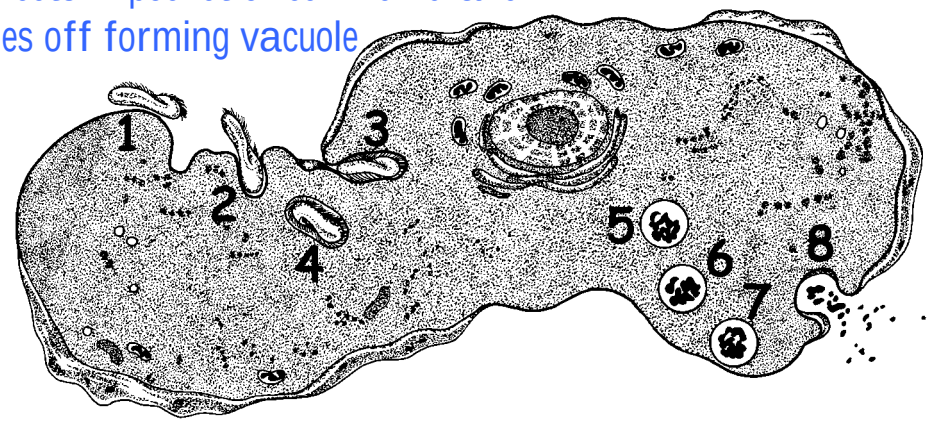
1. Active transport of H+ creates H+ conc. gradient

2. H+ allowed to diffuse down conc. gradient; sucrose tags along

TRANSPORT OF LARGE MOLECULES:

Endocytosis (1-4)

- Intake of large molecules, solids, food
- Material collects in pocket of cell membrane
- Pocket pinches off forming vacuole



Exocytosis (5-8)

- Release of large molecules, solids, wastes from cell
- Vacuole/vesicle fuses with cell membrane
- Contents released to outside

TYPES OF ENDOCYTOSIS	
PHAGOCYTOSIS	• Cell eating • Intake of solids, food, bacteria • Nonspecific
PINOCYTOSIS	• Cell drinking • Intake of small droplets of liquid (oil) • Nonspecific
RECEPTOR-MEDIATED ENDOCYTOSIS	• Specific • Model – Molecule binds to receptor protein – Complex migrates to "coated" pit – Pit pinches off forming vacuole – Receptor protein returns to cell membrane