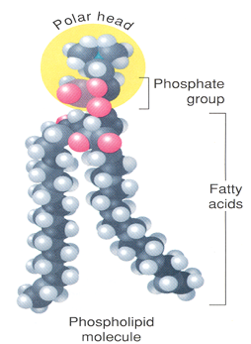
**The Cell Membrane**

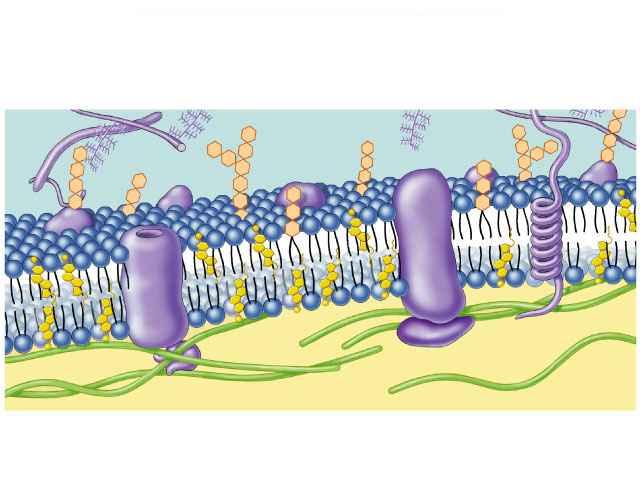
* **Plasma membrane** is the boundary that separates cells from their environment. Its function is to regulate what enters and leaves the cell.
* The plasma membrane displays a property known as **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ permeability**.
* Selective permeability means that only \_\_\_\_\_\_\_\_\_\_ substances are allowed to pass through the membrane.
* It is selective for what that particular cell needs and its permeability may change.

**Model of the Plasma Membrane- Phospholipids**

* When viewed under a microscope the plasma membrane looks like two thin lines, and is the **Lipid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* The Lipid Bilayer is composed of two layers of phospholipids.
* In a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,** one fatty acid chain is replaced with a phosphate group.
* Phosphate groups are soluble in water. This determines the arrangement of phospholipids.
* The phosphate heads are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (“love water”) and point toward the **\_\_\_\_\_\_\_\_** of the cell and the fatty acid tails are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (“fear water”) and point towards the **\_\_\_\_\_\_\_\_\_\_\_** of the membrane.



* Phospholipids are motile and move along the membrane (float around).
* In many cells, rigid molecules of cholesterol are embedded in the bilayer.
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** restricts much of the movement of phospholipids, and adds strength and flexibility to the membrane.
* **Model of the Plasma Membrane- Proteins**
* Proteins are scattered throughout the lipid bilayer.
* Some are embedded, called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ proteins** and others are on the surface, called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ proteins**.
* Proteins have polar and nonpolar regions that determine their position in the membrane, and are capable of motility in the membrane.
* The pattern of proteins in the membrane and the ability of proteins and phospholipids to move in the membrane give rise to what is called the **\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Model**.
* Label the parts of the Cell Membrane. Identify the polar and nonpolar regions on the cell membrane.



* The proteins **\_\_\_\_\_\_\_\_\_\_** which particles pass across the membrane, can act as **\_\_\_\_\_\_\_\_\_\_** (chemical reactions) and serve as **\_\_\_\_\_\_\_\_\_\_\_\_** (possibly for fighting disease or so the cell can be recognized).

**Model of the Plasma Membrane- Other membrane bound organelles**

* Other Organelles: enclosed in membranes display the fluid mosaic patterns.
* Their membranes are also selectively permeable to the substances that that organelle needs for its specific reactions.

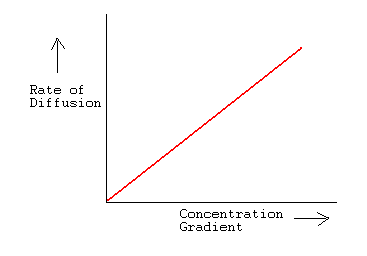
**Function of the Cell Membrane**

* Remember that the cell membrane is selectively permeable and regulates what enters and leaves the cell.
* **Random movement/\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Movement** is unorganized (no patterns) movement of substances due to the collisions of particles which results in the even distribution of molecules.

**Movement of Materials Across the Cell Membrane- Passive Transport**

**Passive Transport- Diffusion**

* **Diffusion of Particles** - particles moving from an area of greater (\_\_\_\_\_\_\_\_) concentration to an area of lesser (\_\_\_\_\_\_\_\_\_\_) concentration. No Energy Required!
* Example: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The diffusion of particles continues to occur until the particles of solute become evenly distributed, at this point the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is reached.
* Dynamic Equilibrium is the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** movement of particles but no overall change.
* The particles are still evenly distributed.
* Particles may diffuse through air, \_\_\_\_\_\_\_\_\_\_, other fluids and across membranes.
* **Diffusion Through Membranes -** explains the physical process by which some particles enter and leave the membrane.
* **\_\_\_\_\_\_\_\_\_\_\_\_** and materials dissolved in lipids can cross through the membrane. Why?
* **\_\_\_\_\_\_\_\_\_\_\_** (O2) and **\_\_\_\_\_\_\_\_\_\_\_\_\_** (CO2) can **\_\_\_\_\_\_\_\_** right through the cell membrane because they are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* **\_\_\_\_\_\_\_\_\_** (H2O), \_\_\_\_\_\_\_ and other molecules must **\_\_\_\_\_\_** through **\_\_\_\_\_\_\_\_\_\_\_\_** in the cell membrane.
* If there is a **\_\_\_\_\_\_\_** concentration of particles **\_\_\_\_\_\_\_\_** the cell than **\_\_\_\_\_\_\_** the cell, the particles will pass through the membrane and **\_\_\_\_\_\_\_\_\_** the cell.
* The particles will move **\_\_\_\_\_\_** of the cell if there is a **\_\_\_\_\_\_\_\_\_** concentration on the **\_\_\_\_\_\_\_** of the cell than on the outside of the cell.
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is the difference in concentration of molecules from highest to lowest number of molecules.
* The concentration gradient is also the difference in concentrations from inside the cell as compared to outside the cell.



**Passive Transport- Osmosis**

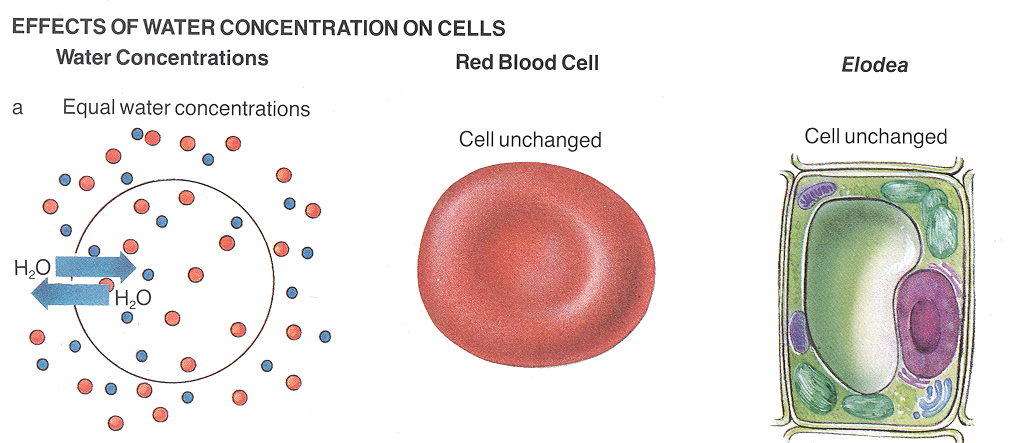
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is the (facilitated) **\_\_\_\_\_\_\_\_\_\_\_** of water into and out of the cell.
* For any cell to survive it must be in **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** with its water environment.
* Osmotic balance occurs when the movement of water \_\_\_\_\_ and \_\_\_\_\_ of a cell is equal (dynamic equilibrium occurs).



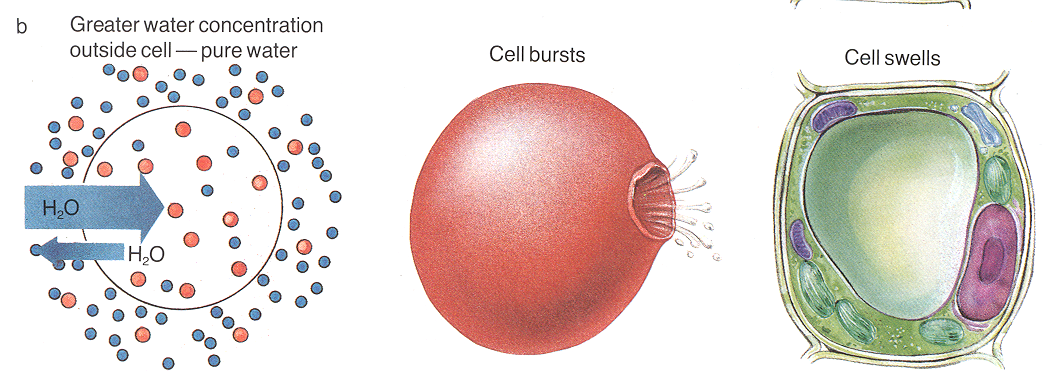
Can you explain what is going on in the diagram?

**Osmotic Balance in solution and the responses of Plant and Animal Cells.**

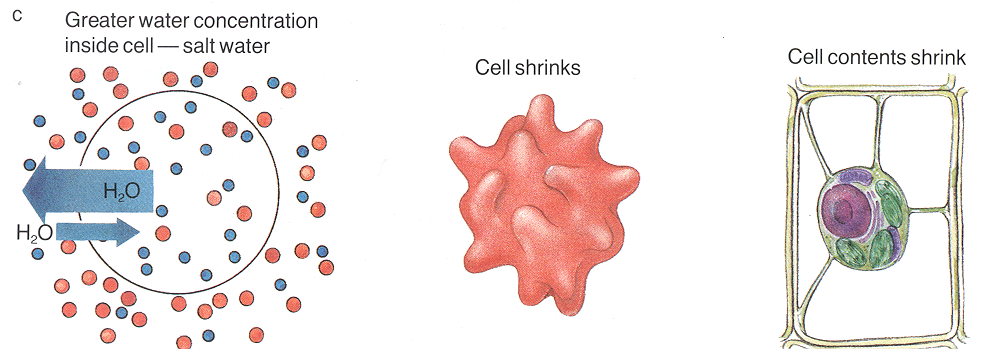
* Three types of solutions: ISOTONIC, HYPOTONIC, HYPERTONIC
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (iso=same) equal concentrations of pure water inside and outside the cell, therefore, **\_\_\_ \_\_\_\_\_\_\_\_** movement in water.



* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (hypo=under) greater concentrations of pure water outside the cell than inside, thus water will flow into the cell from a greater concentration to a lesser concentration to reach equilibrium. If the water is not removed, the animal cell may burst, while the plant cell swells to the limits of the cell wall (**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**). This is why a plant that has been watered “stands” up and one that hasn’t been watered wilts.



* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (hyper=above) greater concentrations of pure water inside the cell than outside, thus the cells shrink as water flows out of the cell to reach equilibrium. In plants this is called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.



* The cell plays no active role and does no work in moving water, lipids, and lipid-soluble particles across the membrane.
* The passage of water, lipids and lipid-soluble particles across the membrane is due to their net movement from greater to lesser concentrations, this type of movement is called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Transport**.
* In Passive transport the cell uses **\_\_\_\_** energy to move particles across the membrane.

**PRACTICE**

1- Inside one osmosis bag, A, is a 50% glucose solution and inside bag B is a 20% glucose solution. Both bags are put into beakers containing 100% water.

A) Bag A will gain weight. D) Both bags will loose weight

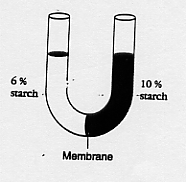
B) Bag B will gain weight. E) Both bags will remain the same.

C) Both bags will gain weight.

2- A 0.9% NaCl solution is isotonic to red blood cells. Which of these describes the results if red blood cells are placed into a 9.0% solution of NaCl?

A) They will lyse. C) Nothing will happen.

B) They will shrivel. D) They will become flaccid.

3- The U-shaped tube in the figure below is divided by a membrane that is impermeable to starch but permeable to water. Which of the following will occur?

A) Water will move from the right to the left.

B) Water will move from the left to the right.

C) Starch will move from the right to the left.

D) Starch will move from the left to the right.

E) Nothing will happen. The membrane blocks

the passage of all the molecules.

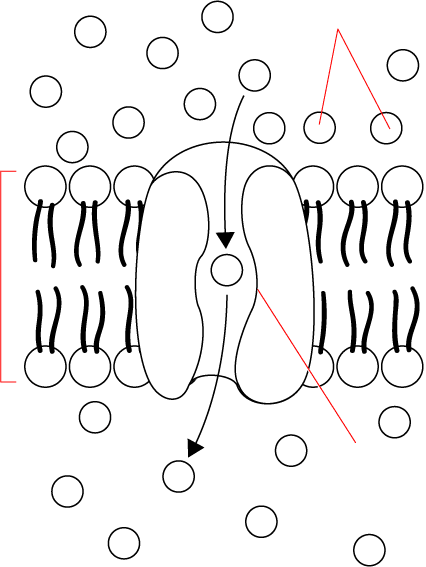
4- *Wallway* is a new general herbicide for aquatic plants. Its main ingredient is a marine salt solution. It is effective against freshwater but not saltwater plants. It works by breaking down the cell walls of the plants. The freshwater plants die because their cells

A) swell and burst. C) remain the same size but malfunction.

B) shrink and cease to function. D) are crushed by the weight of the plant.

**Passive Transport- Facilitated Diffusion**

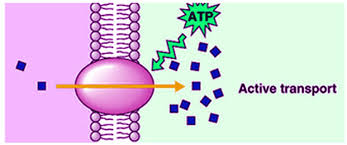
* A form of passive transport is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Diffusion**.
* Facilitated Diffusion is when **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** proteins (proteins embedded in the plasma membrane) are used to help particles cross the membrane from greater to lesser concentrations (with the concentration gradient).



**Active Transport across the cell membrane**

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Transport** is the movement of substances into and out of

cells that requires the cell to expend/use energy.



* Transport proteins known as **\_\_\_\_\_\_\_\_\_** are used in active transport.
* Particular particles bind to each pump (like a “lock and key”).
* \_\_\_\_\_\_\_\_\_ is then used to alter the \_\_\_\_\_\_\_\_\_ of the pump so that the particle is moved across the membrane.
* When the particle is released the pump returns to its original shape.



For example: salt water fish getting excess salt out of their cells.

**Active Transport: Moving Large Particles across the membrane**

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (exo=out) is the movement of substances out of the cell.
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (endo=inside) the process by which the plasma membrane engulfs and takes in substances from a cell’s environment.



**Two Types of Endocytosis**:

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** (phag=to eat) is the movement of solids into the cell. The membrane closes around the particle and forms a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is the movement of liquids with solute and small particles into cells.



Factors affecting the RATE (number of particles) of the transport across the cell membrane.

|  |  |  |
| --- | --- | --- |
| * **Effects on Transport** |  | **Rate of Transport** |
| Size | Large |  |
| Small |  |
| Temperature | Hot |  |
| Cold |  |
| Concentration | High |  |
| Low |  |