Cell Transport

Diffusion, Facilitated Diffusion & Osmosis

Active and Passive

Learning Goal:

1. **What are the differences in passive and active transport?**
2. **Explain osmosis, facilitated diffusion and diffusion**

Cell Transport

Two Types of Cell Transport: (or Movement across a membrane)

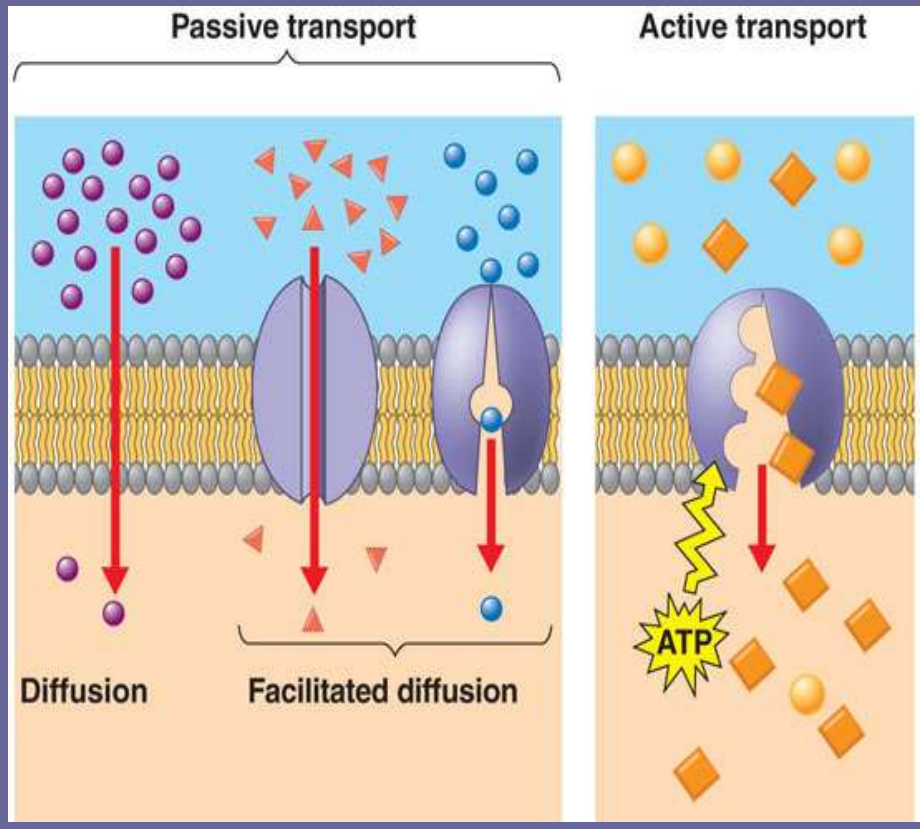
Passive and Active Transport

Passive Transport:

Does NOT require cellular energy for substances/water to pass through the membrane.

Active Transport:

Requires energy output by the cell for substances to leave or enter the cell.



Passive Transport

3 Types of Passive Transport

1. Diffusion:
2. Facilitated Diffusion:
3. Osmosis:

Diffusion

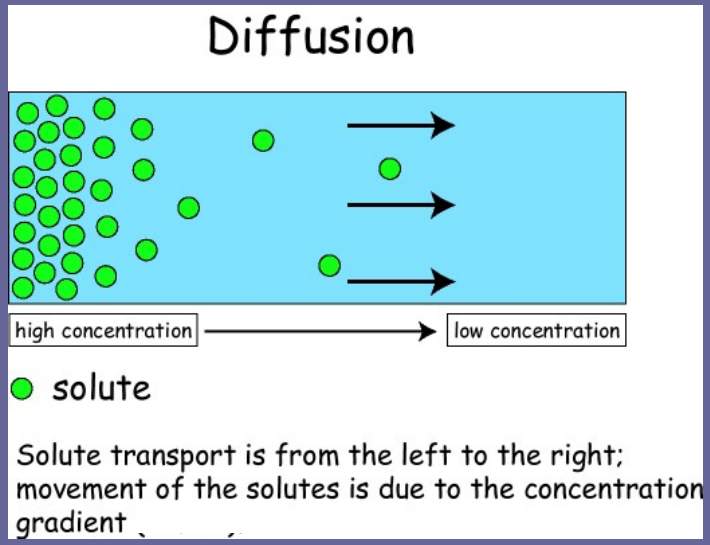
The movement of solute

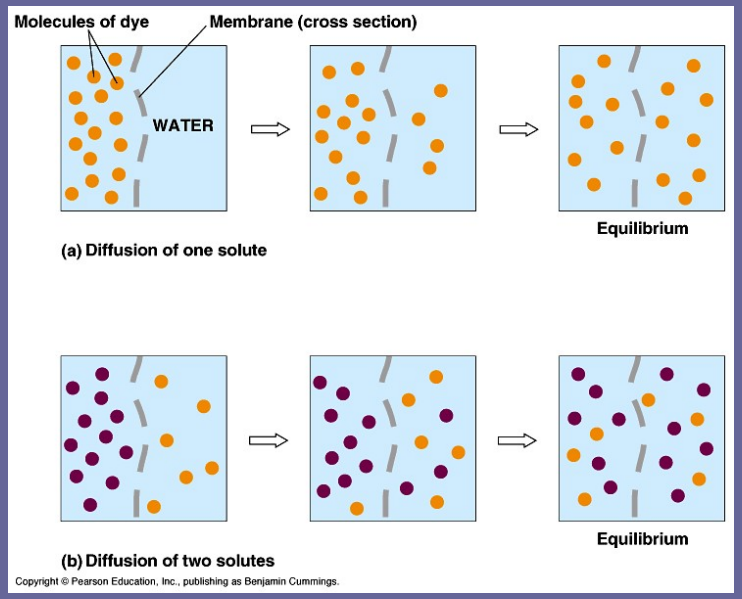
The process in which particles move from a area of high concentration of solute to a low concentration of solute.

Require NO cellular energy, (ATP)

Molecules that pass freely through the membrane are usually small and uncharged-(no charge).

Diffusion through the membrane happens until concentration levels are equal on both sides of the membrane.





Diffusion

The movement of solute

Facilitated Diffusion

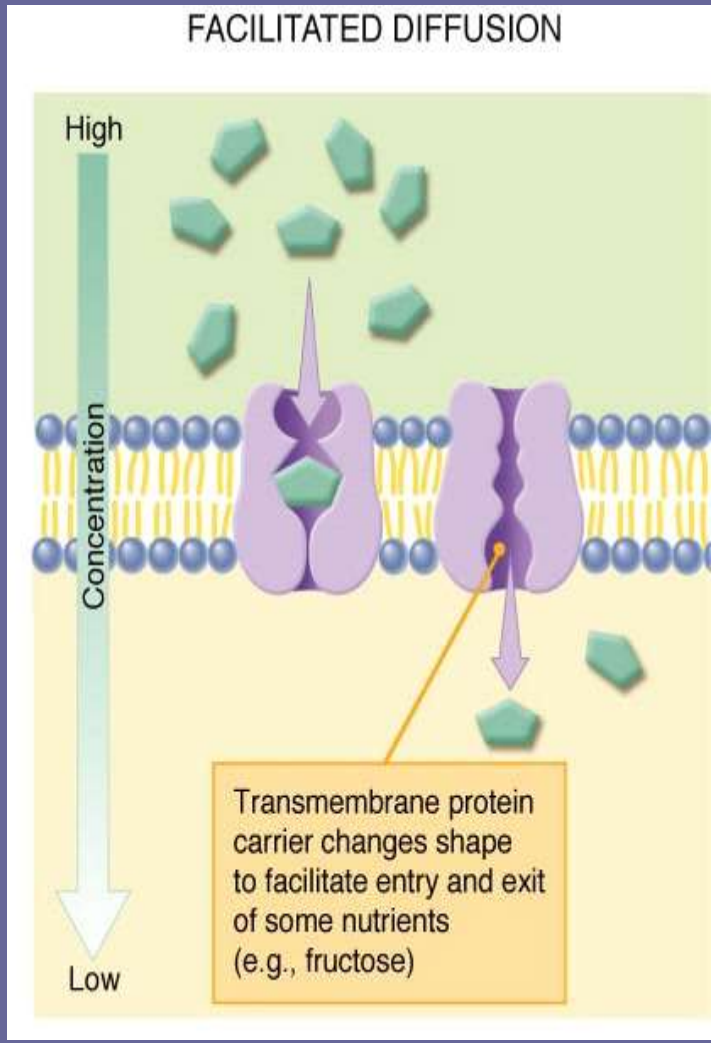
The movement of solute & water

Requires NO cellular energy, (ATP) .

When molecules are too large pass to directly flow across the cell membrane,

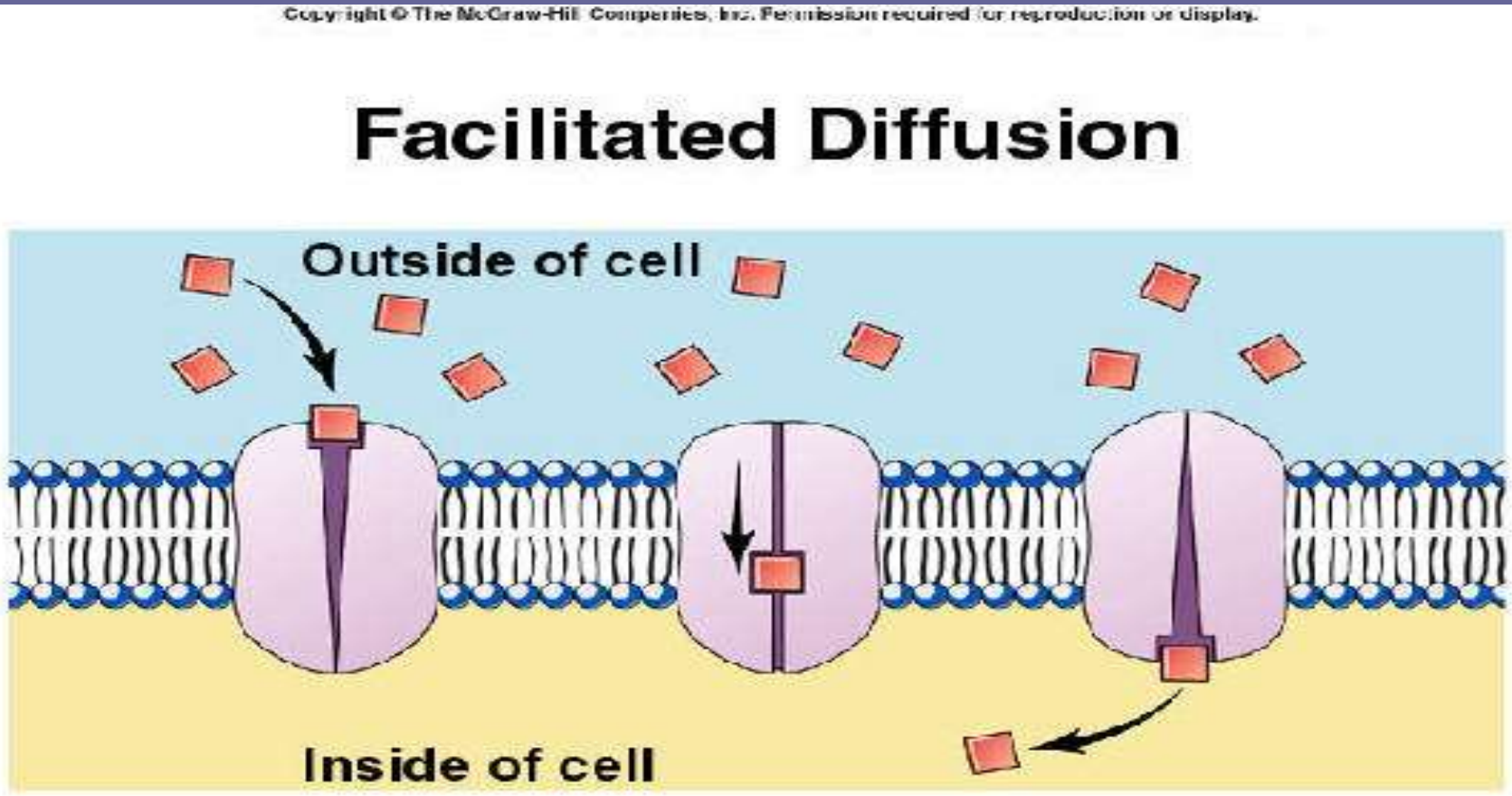
They use special protein channels to move in and out of the cell.

Also moves from a high concentration to lower concentration.



Facilitated Diffusion

The movement of solute

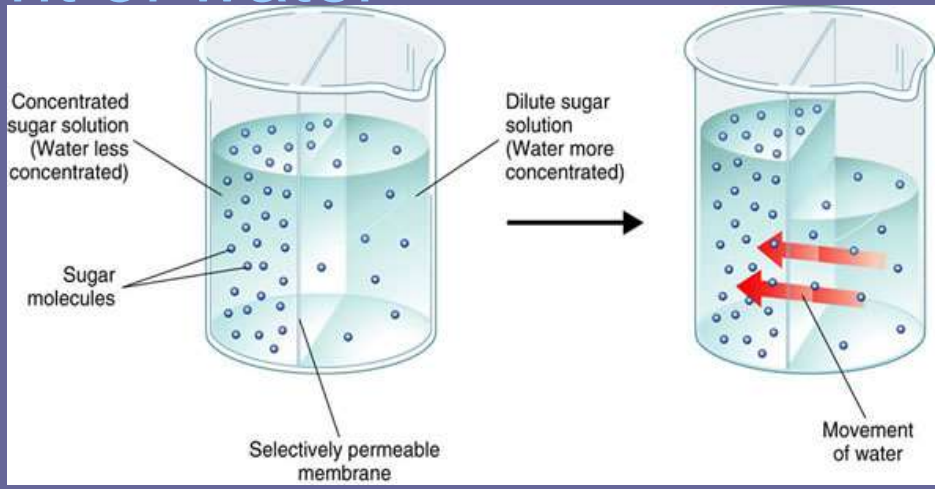


Osmosis

The movement of water

Diffusion of **water** through a selectively-permeable membrane

Selectively-permeable: permeable to solvents like water but not to large molecules.



Flows from high concentration-to low concentration water will move across the membrane until equilibrium is reached.

When equilibrium is reached concentrations of sugar and water will be equal on both sides of the

The solutions are said to be Isotonic

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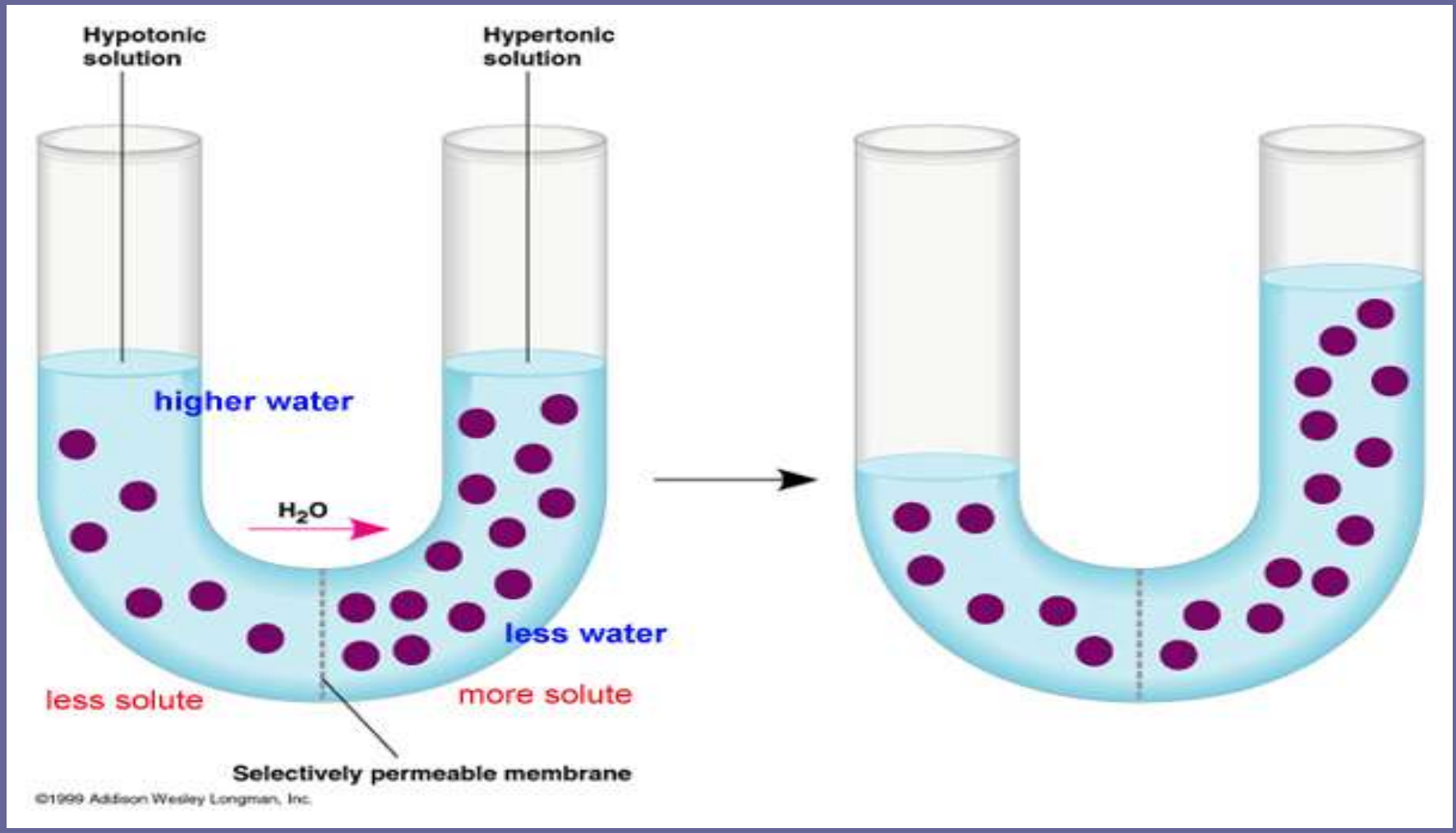
Osmosis
The movement of water



Osmosis

Movement of water

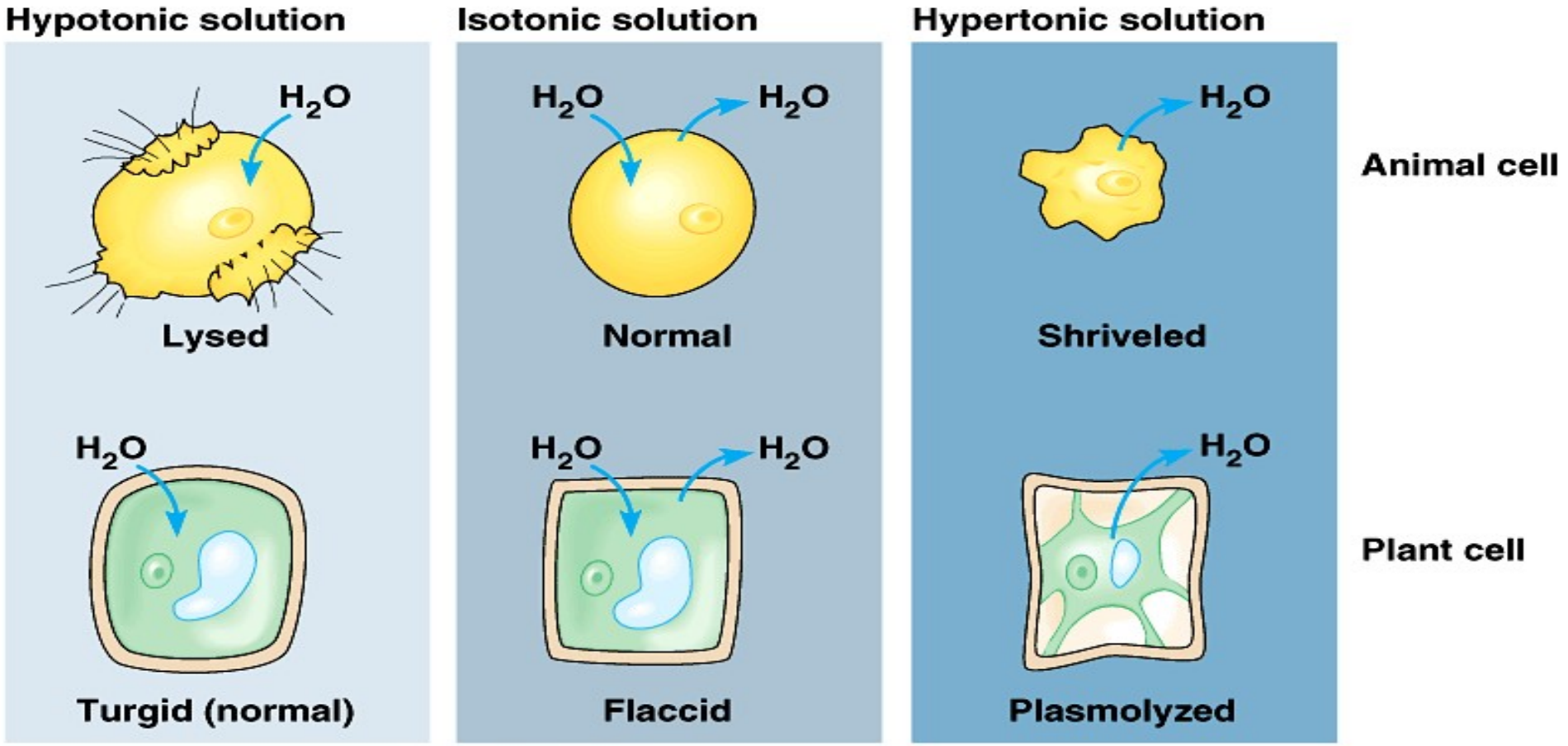
Driven by differences in solute concentration, the net movement of water produces a force known as **osmotic pressure.**

Hypertonic solution - The solution outside the cell has a higher concentration than the cell. The water leaves the cell and the cell shrivels

Hypotonic solution- The solution outside the cell has a lower Concentration than the cell. Water comes into cell until equilibrium is obtained

Isotonic solution- Water is entering and leaving the cell at the same rate. Both sides of membrane concentrations are equal. It is said to be in Equilibrium

Osmosis
Movement of water



Active Transport

Active Transport:
Movement of materials through the cell membrane from a *low to high* concentration or against the concentration Gradient.

Uses cellular energy in the form of ATP.

3 Types of ActiveTransport:
- Protein Pumps
- Endocytosis
- Exocytosis

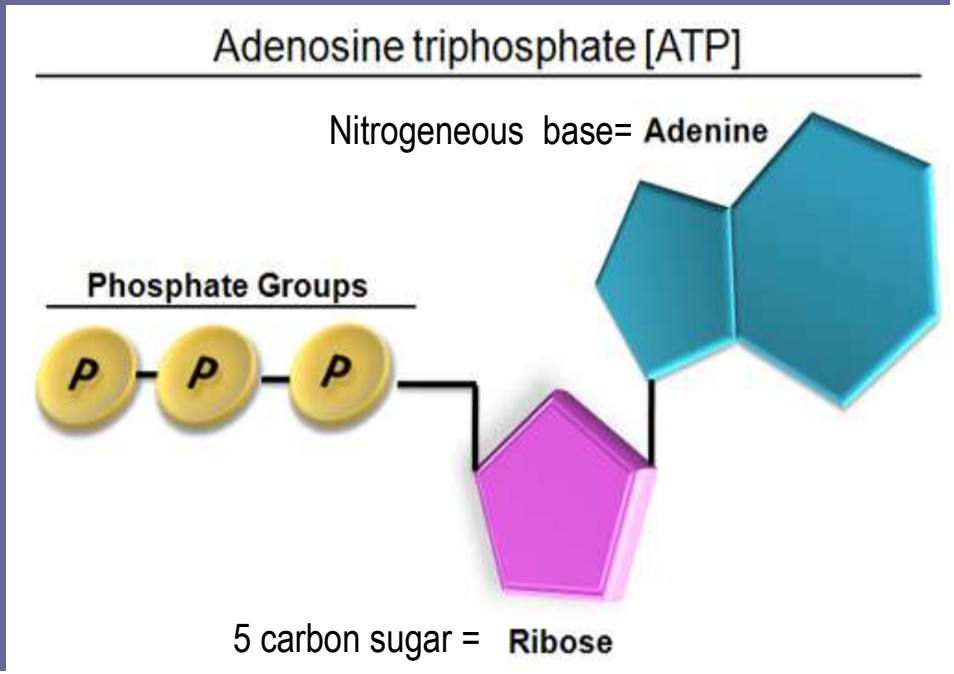
Active Transport

What is ATP?

Remember the macromolecules? ATP is a *macromolecule* a type of nucleotide.

ATP – *adenosine tri-phosphate*

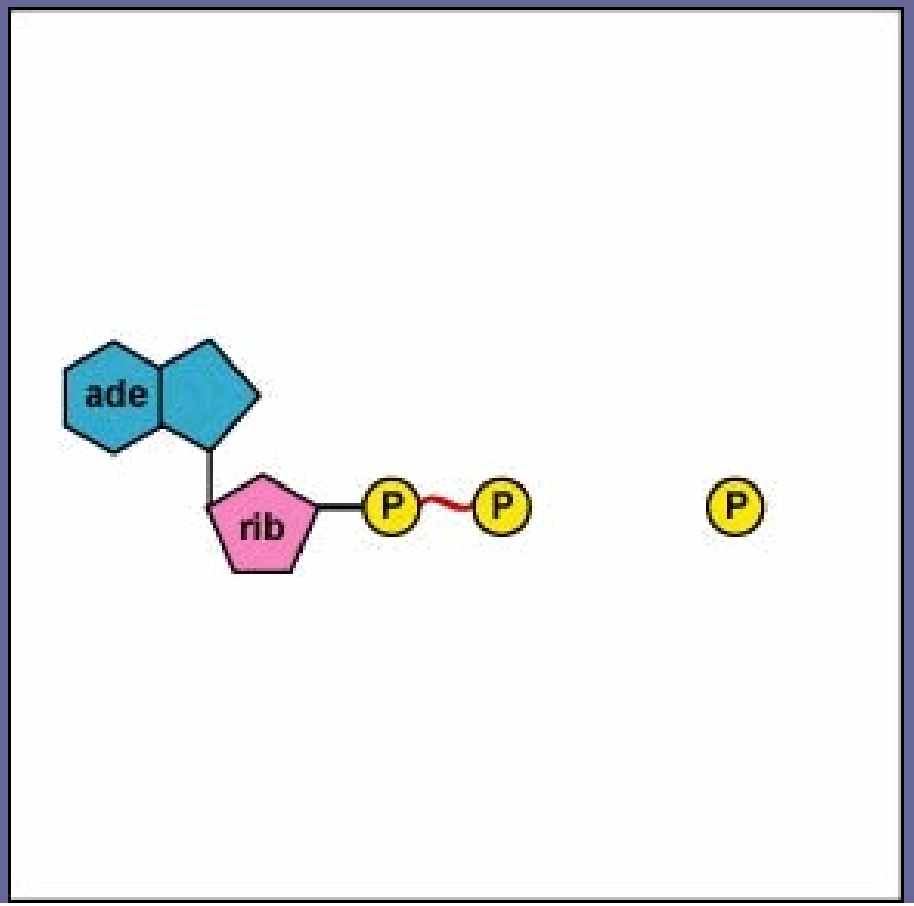
it plays important roles in capturing and transferring energy in cells.



Active Transport

What is ATP?

How does it work?



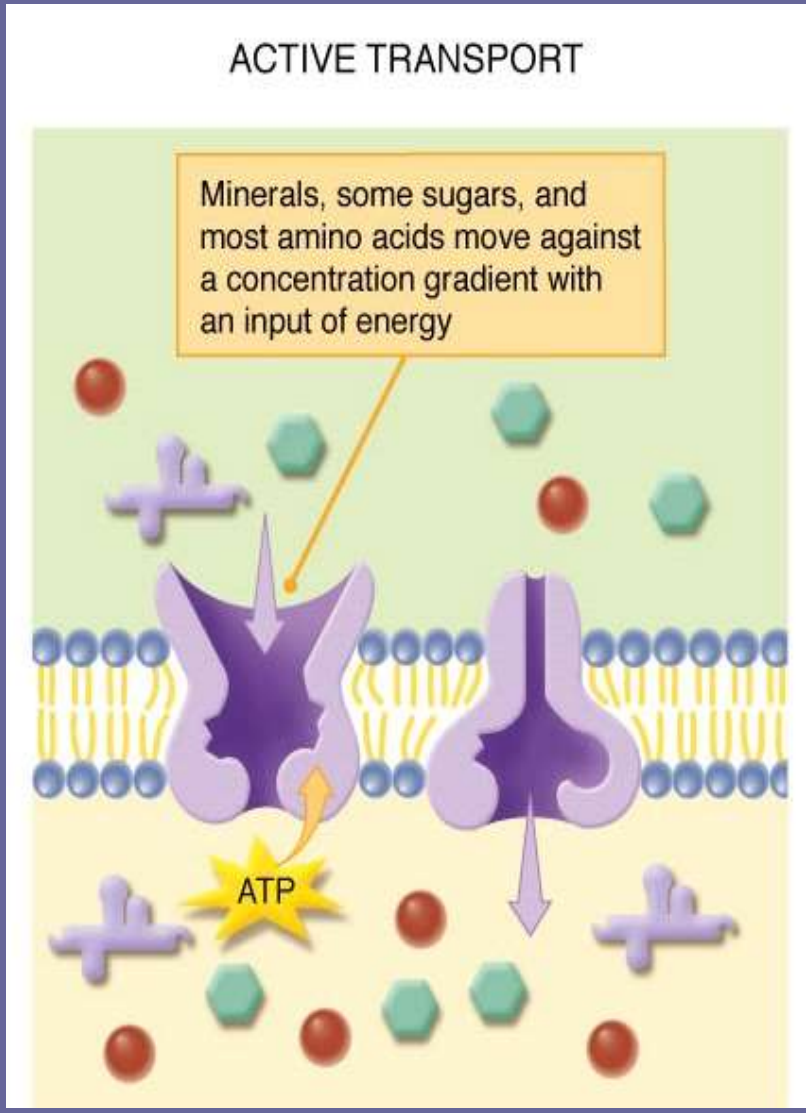
Active Transport
Protein Pumps

Transport Proteins:

Uses cellular energy

Proteins found in the membrane allow smaller particles to move through using ATP

Moving against the gradient going from a low concentration to high concentration.

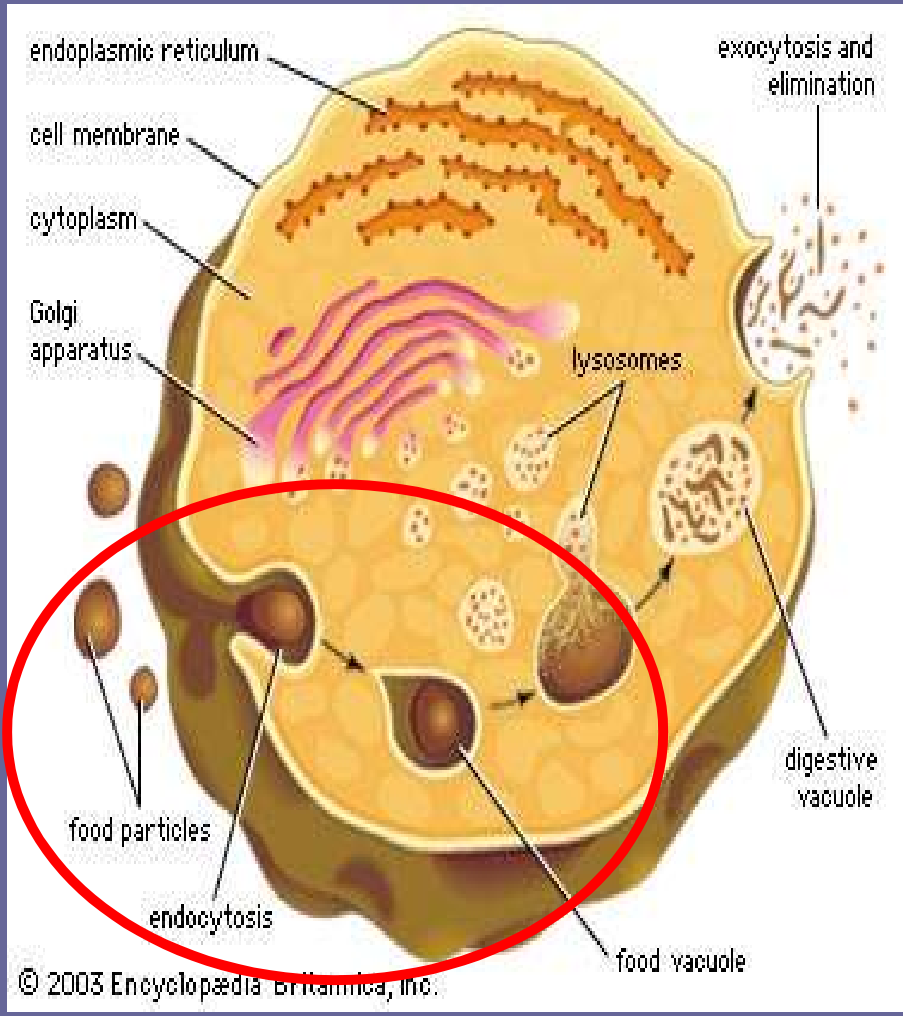


Active Transport
Endocytosis

Endocytosis:

The process of taking materials into the cell by means of the cell membrane folding or making pockets around the materials.

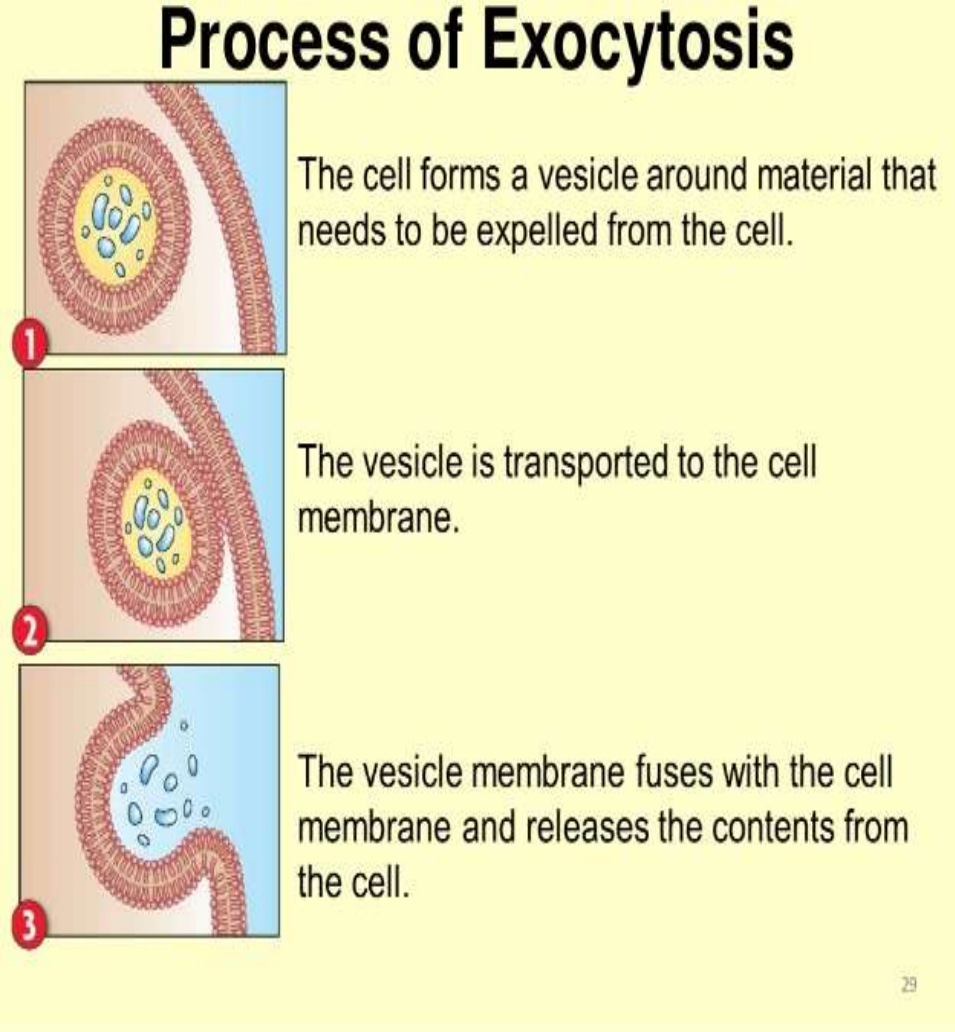
Requires Cell Energy



Active Transport
Exocytosis

Endocytosis:

The process of taking materials out of the cell by means of the cell membrane fuses with a vesicle and shedding the material out of the cell



Homeostasis

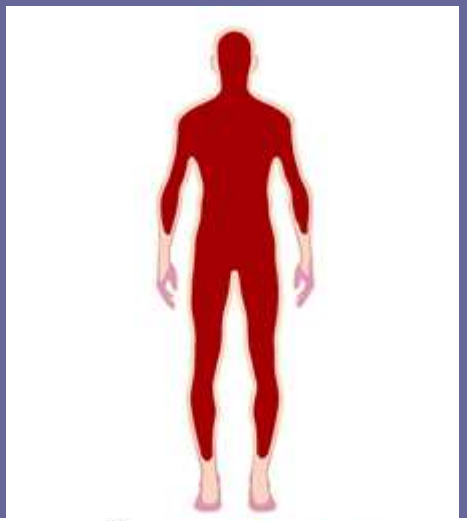
Homeostasis: All living organisms need to maintain stable internal environments in order to:

Grow

Respond to the environment

Transport energy

Reproduce.



Hot	Cold
Vasodilation Arterioles dilate (enlarge) so more blood enters skin capillaries and heat is lost.	**Vasoconstriction** Arterioles get smaller to reduce blood going to skin: keeping core warm.
Sweating Sudorific glands secrete sweat which removes heat when water changes state.	**Shivering** Rapid contraction and relaxing of skeletal muscles. Heat produced by respiration.
Pilorelaxation This means the hairs flatten.	**Piloerection** Hairs on skin stand up.
Stretching Out By opening up, the body was a larger surface area.	**Curling Up** Making yourself smaller so smaller surface area.

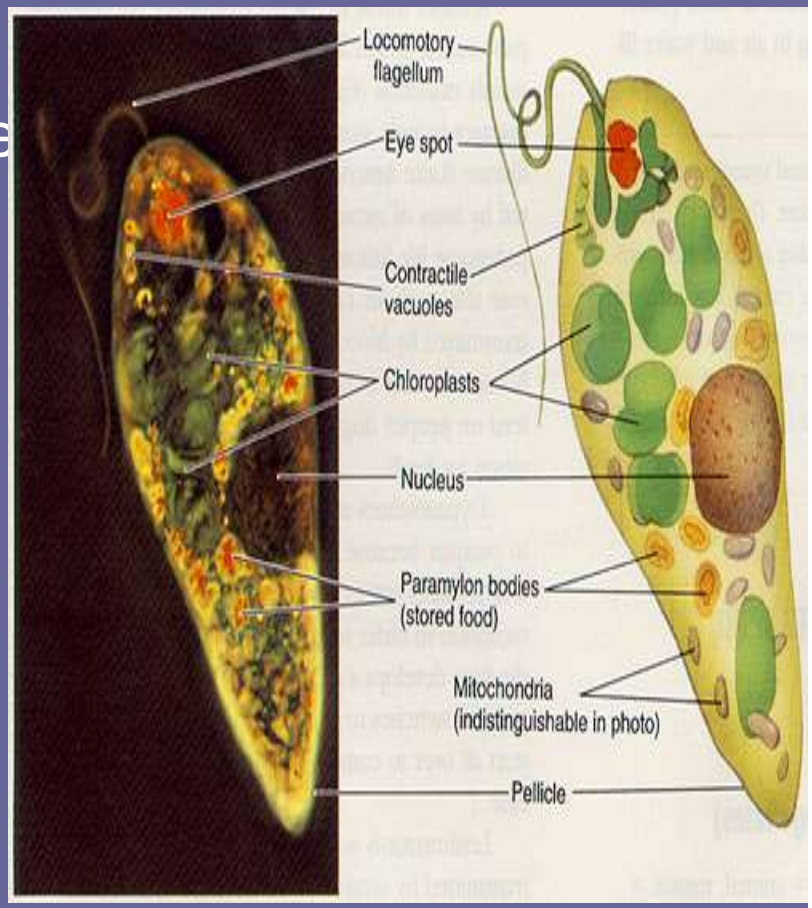
Homeostasis
Unicellular

Single-celled organisms: Must maintain homeostasis in order to live

1. They must find energy sources/food

2. Keep concentrations of water and minerals within certain levels.

3. Respond to changes in its environment.



Homeostasis
Multicellular

In Multicellular organisms, cells become specialized for particular tasks and communicate with one another in order to maintain Homeostasis.

Examples: Human trachea with cillia cleaning the air we breath.

Homeostasis
Multicellular

These specialized cells for specialized tissues, which form organs and organ systems in the body.

Example: Each muscle in your body is an individual organ.

Homeostasis

Cellular Communication

Cells in large organisms communicate by means of chemical signals.

Some cells form junctions with other neighboring cells.

In order to respond cells contain **receptors** where signaling molecule can bind

These receptors help to transmit signals and gain information about how the body is maintaining homeostasis.

Chemical signals can cause important changes in cellular activity.