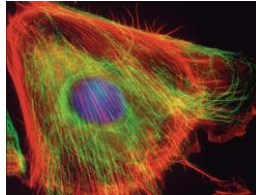


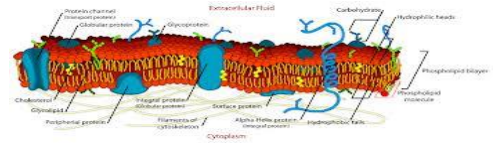
## Cell Structure and organelles

- The **cytoskeleton** is the internal structure of the cell.
  - supports and shapes
  - helps position and transport organelles
  - provides strength
  - assists in cell division
  - aids in cell movement



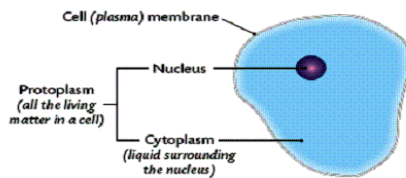
## Cell Structure and organelles

**Cell membrane** (aka plasma membrane) is the cell structure that encloses the cell and regulates the passage of materials between the cell and its environment; also aids in protection and support of the cell. Bi-layer of phospholipids. **Lines inside of cell wall in plants**



## Cell Structure and organelles

**Protoplasm:** Everything in the cell including nucleus.



**Cytoplasm:** All material between the cell membrane and the nucleus

## Organelles involved in making/transporting proteins

The **nucleus** stores genetic information, control center of the cell.

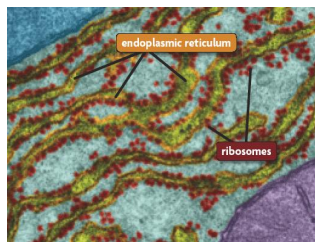
**Nuclear envelope**  
Membrane that surrounds and protects nucleus



**Nuclear Pores:**  
Openings in nuclear membrane that allows material to pass in and out.

## Organelles involved in making/transporting proteins

**endoplasmic reticulum** the main function is the folding of proteins.

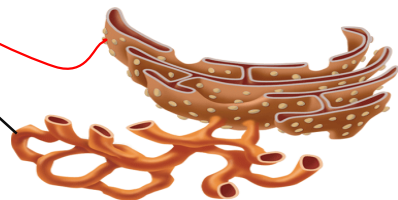


## Organelles involved in making/transporting proteins

### Two types of ER.

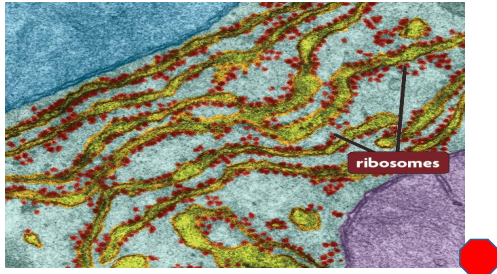
**Rough E.R.:** Studded with ribosomes on the surface.

**Smooth E.R.:** No ribosomes attached. Produces lipids



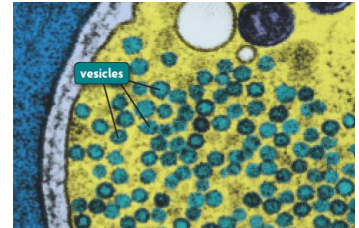
### Organelles involved in making/transporting proteins

**Ribosomes** link amino acids to form proteins. Some on Rough ER, some free in cytoplasm.



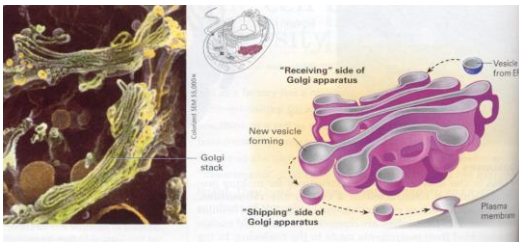
### Organelles involved in making/transporting proteins

**Vesicles** are membrane-bound sacs that hold materials. Some hold/transport proteins. Others transport things like waste out of cells (excretion)



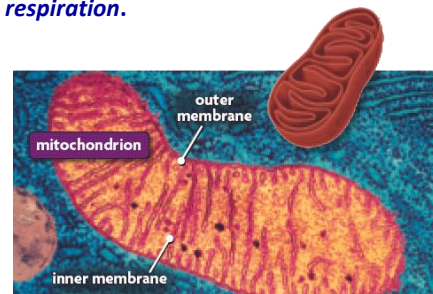
### Organelles involved in making/transporting proteins

**Golgi apparatus** modifies, collects, packages, and distributes molecules within the cell or outside the cell. Looks like stacks of flattened sacs



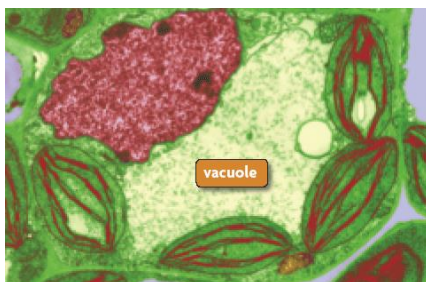
### Organelles with various functions

**Mitochondria** supply energy to the cell, *site of respiration*.



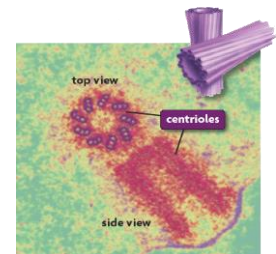
### Organelles with various functions

**Vacuoles** are fluid-filled sacs that hold materials. Many in cells. "Storage unit"



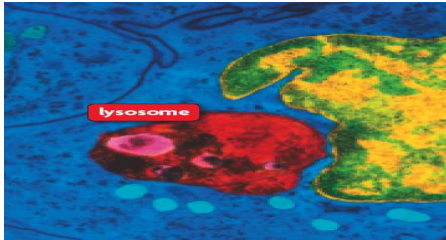
### Organelles with various functions

**Centrioles** are tubes found in the centrosomes. Help divide DNA in cell division  
Form cilia and flagella.



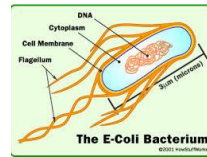
**Organelles with various functions**

**Lysosomes** contain enzymes to digest material. Can act as a suicide or kill switch for cells. Mainly animal cells only, very rarely in plant cells



**Organelles only in animal cells**

**FLAGELLA** – long, thin, whip – like structures with a core of microtubules. Move with an “S-shaped” movement



**CILIA** – shorter and more numerous, bundles of microtubules “back and forth” movement

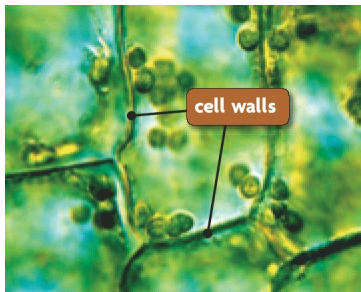


▲ Figure 6-28 The cilia lining your respiratory tract sweep mucus and trapped debris out of

**Organelles in plant cells only**

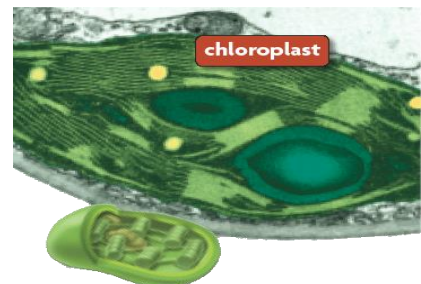
**Cell wall** provides rigid support. Gives rigidity or crunchiness to plants (think celery)

<http://learn.genetics.utah.edu/content/begin/cells/insidea cell/>



**Organelles in plant cells only**

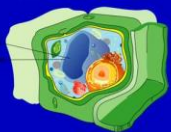
**Chloroplasts** convert solar energy to chemical energy.



**Difference between plant and animal cell**

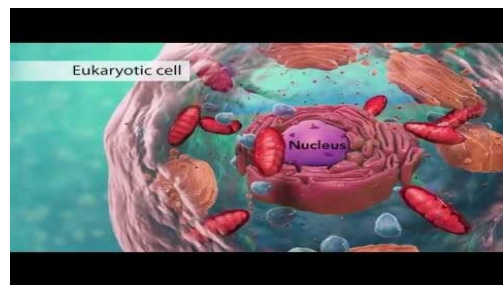
**Plant cell**

- Present in plant cell but absent in animal cell
- Cell wall
- Chloroplast
- Central vacuole



**Animal cell**

- Present in animal cell but absent in plant cell
- Centrosome with centriole
- Lysosome
- Flagella

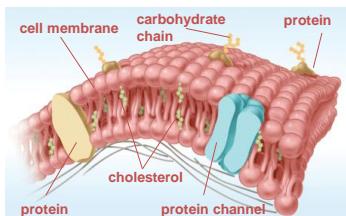


<https://www.youtube.com/watch?v=URUJD5NEXC8>

## Unit 1 Part 2

**H.B.2C** Transport processes which move materials into and out of the cell serve to maintain homeostasis of the cell.

- There are other molecules embedded in the membrane.
- The **fluid mosaic model** describes the membrane.



**Homeostasis:** process by which a cell or an organism maintains an internal balance in response to its changing environment.

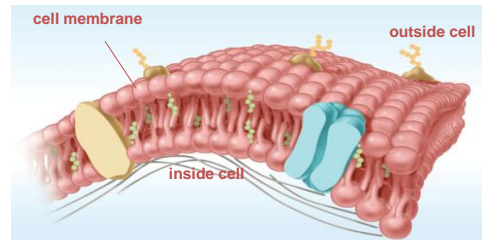
Cells maintain homeostasis by the movement of materials into and out of the cell depending on what is going on in the environment. Cells do this using a number of processes, which one depends on what is being moved across the selectively permeable cell membrane.

As a result the water moves equally in both directions and the cell remains same size! (**Dynamic Equilibrium**)

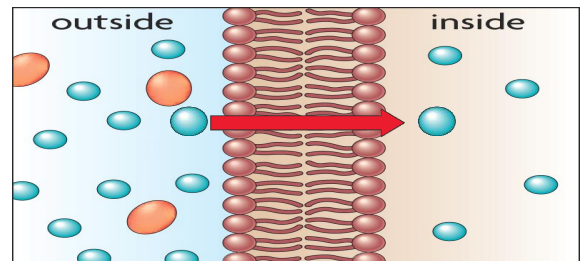
Cell membranes are composed of two phospholipid layers.

The cell membrane has two major functions.

1. forms a boundary between inside and outside of the cell
2. controls passage of materials



The cell membrane is selectively permeable meaning that some substances can pass directly through the cell membrane while other substances can not.

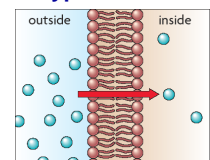


## Diffusion and Osmosis

Molecules can move across the cell membrane through passive transport.

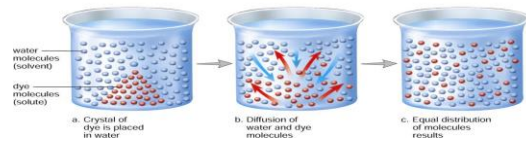
**Passive transport** does not require energy input from a cell. (Water, oxygen are examples of things that move via passive transport)

**Diffusion and osmosis** are the two types of passive transport.



**Diffusion:** when **molecules** move from areas of higher concentration to lower concentration or **down the concentration gradient**.

**Concentration gradient** is the difference in concentration of a substance from a region of high concentration to low concentration.

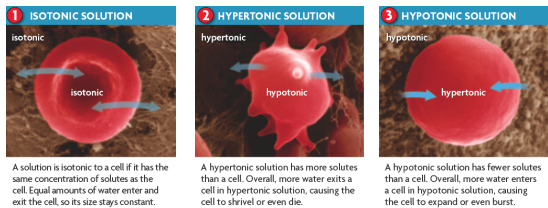


**Osmosis is the diffusion of water from higher to lower concentrations across a membrane**

• **Hypertonic Solution** - Solution is more concentrated outside than the inside of the cell. **As a result water leaves the cell.**

- Cells placed in a hypertonic solution will **shrink**.
- Called **Plasmolysis** in plant cells, called **Crenation** in animal cells

**HYPER = water Exits**



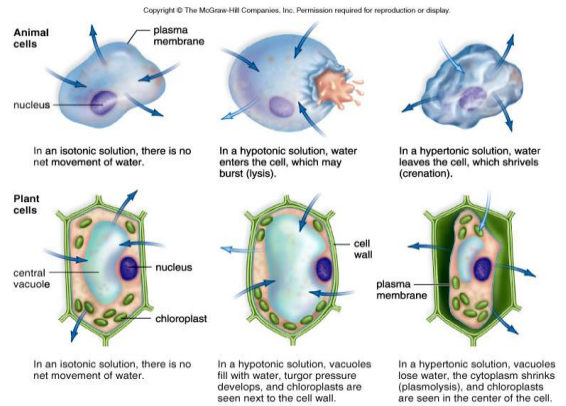
• **Isotonic Solution** - Solute and water concentrations both inside and outside the cell membrane are equal.

• **Hypotonic Solution** - Solution is more concentrated inside than the outside of the cell **as a result water comes in to cell.**

**HYPO = LOWER**

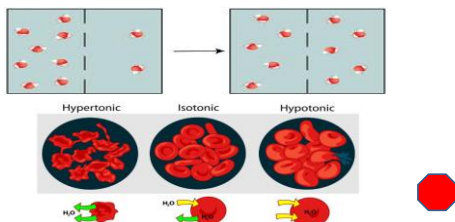
- Cells placed in a hypotonic solution will swell. called **Lysis**

<https://www.youtube.com/watch?v=SSS3EtKAZyC>



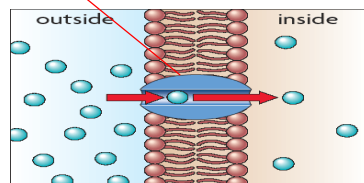
**REMEMBER!!!**

Water always moves from areas of higher concentration of dissolved materials to areas of lower concentration of dissolved materials. The dissolved materials, never move to balance out the 2 environments the water does.



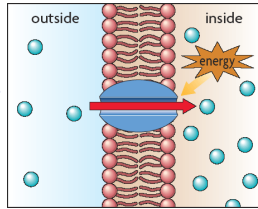
• Some molecules cannot easily diffuse across the cell membrane, they need help. This is called **facilitated diffusion**.

• **Facilitated diffusion** is diffusion through **transport proteins**. **Glucose Enters this way\*\***



**Active transport** *requires energy* input from a cell and enables a cell to move a substance against its concentration gradient.

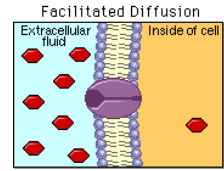
- Active transport is powered by **chemical energy (ATP)**.
- Active transport occurs through **transport protein pumps**.



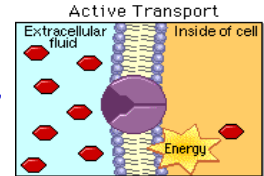
Calcium, Sodium, Potassium IONS Enter this way

### Active Transport vs Facilitated Diffusion

**Facilitated:** uses protein channel, no energy, High to low conc.



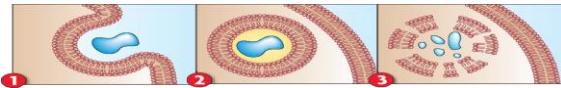
**Active:** uses protein pump, needs energy, **Low to high** conc.



### Endocytosis and Exocytosis.

Active transport to large to fit through membrane.

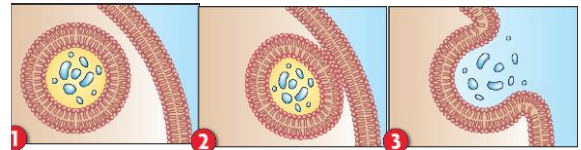
- **Endocytosis** is the process of taking material into the cell. **Phagocytosis** and **Pinocytosis** is a type of endocytosis, where the cell membrane engulfs large particles and brings them in cell



**Phagocytosis:** Endocytosis of Solids  
**Pinocytosis:** Endocytosis of Liquids

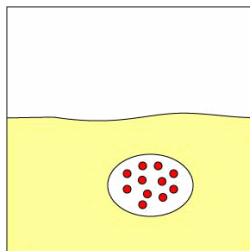
### Endocytosis and Exocytosis.

- **Exocytosis** is the process of expelling material such as waste products from the cell.



### Types of Active Transport

Exocytosis



### Endocytosis

<http://www.stolaf.edu/people/giannini/flashanimat/cellstructures/phagocytosis.swf>

