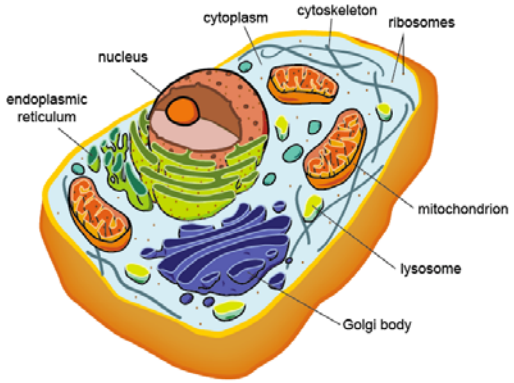
Grade 8 Science

Cells

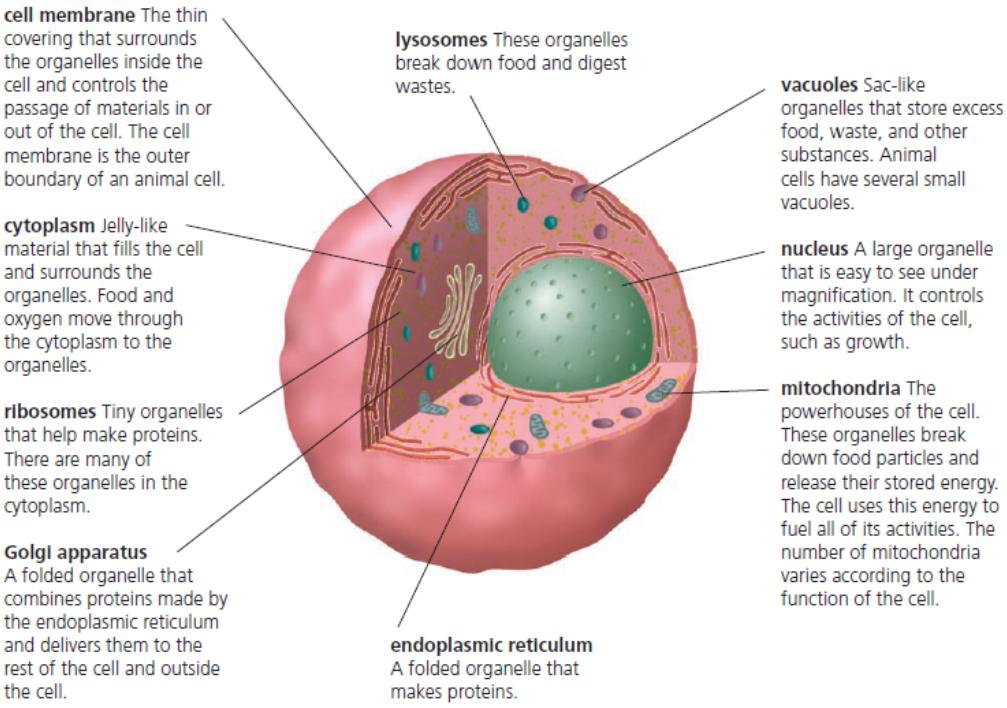
Class 2

Cell Structure

- **Organelles** – a small structure found within a cell that performs a specific function
- **Cytoplasm** – the watery substance inside a cell that suspends organelles and helps transport materials into and out of the cell

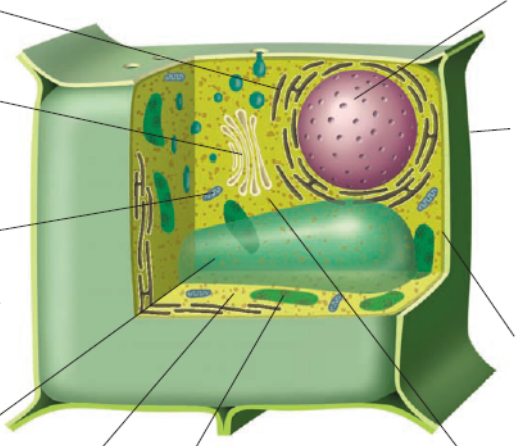


Animal Cell



- **Cell Membrane** – surrounds and holds the cell contents together; controls movement into and out of the cell
- **Nucleus** – control centre of the cell surrounded by a nuclear membrane
  - **Chromosomes** – rod-like structures inside the cell that contain the genetic information (DNA)
- **Vacuole** – storage compartments for the cell; stores water, nutrients and waste

Plant Cell



endoplasmic reticulum A folded organelle that makes proteins.

Golgi apparatus A folded organelle that combines proteins made by the endoplasmic reticulum and delivers them to the rest of the cell and outside the cell.

mitochondria The powerhouses of the cell. These organelles break down food particles and release their stored energy. The cell uses this energy to fuel all of its activities. Mitochondria are surrounded by a membrane.

vacuole A large, sac-like organelle that stores excess food, waste, and other substances. Each vacuole is surrounded by a membrane.

cytoplasm Jelly-like material that fills the cell and surrounds the organelles. Food and oxygen move through the cytoplasm to the organelles.

chloroplasts Membrane-bound organelles that contain a green substance (pigment) called chlorophyll. In a process called **photosynthesis**, chlorophyll uses the Sun's energy to convert carbon dioxide and water into sugar (food) and oxygen. Chloroplasts are found in plant cells but not in animal cells.

nucleus A large organelle that is easy to see under magnification. It controls the activities of the cell, such as growth.

cell wall Found in plant cells but not in animal cells. The rigid structure that surrounds the cell membrane. It provides the cell with strength and support. Materials pass in or out of the cell through pores in the cell wall.

cell membrane The thin covering that holds the cytoplasm and the organelles inside the cell and controls the passage of materials in or out of the cell.

ribosomes Tiny organelles that help make proteins. There are many of these organelles in the cytoplasm.

- Plants cells have the same organelles as animal cells with the addition of the following:
- **Cell Wall –** found only in plants; rigid structure surrounding the plant cell for protection and support, made of cellulose
- **Large Vacuole** – filled with water to maintain turgor pressure
- **Chloroplasts** – the site of photosynthesis, which turns the Sun's energy to glucose
  - Looks green because of the chlorophyll pigment

Cell Movement

- Some cells need to move
- **Flagella** – long, tail-like structures that can rotate in a corkscrew fashion or whip-like motion
- **Cilia** – tiny hairs found on the surface of the cell to move the cell, surface adhesion or to move substances surrounding the cell

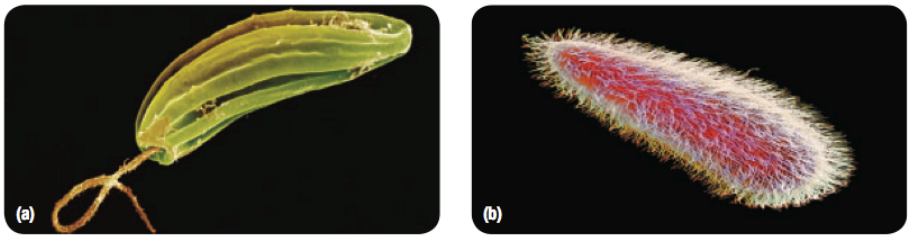
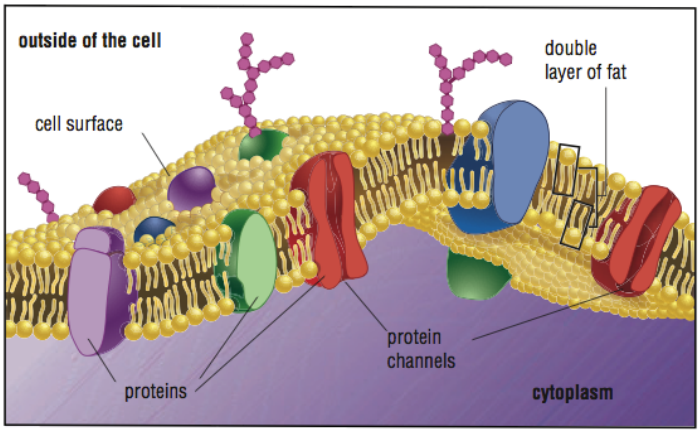


Figure 4 Both a flagellum (a) and cilia (b) are projections from the cell, but they work differently to produce different types of movement.

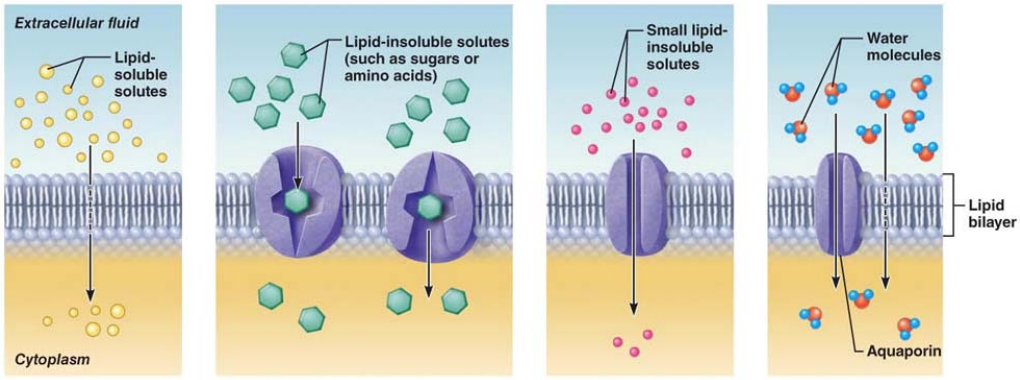
Cell Membrane

- The cell membrane is permeable to some materials and impermeable to others – **selectively permeable membrane**

- Made of two layers of fat particles (phospholipid bilayer) with proteins

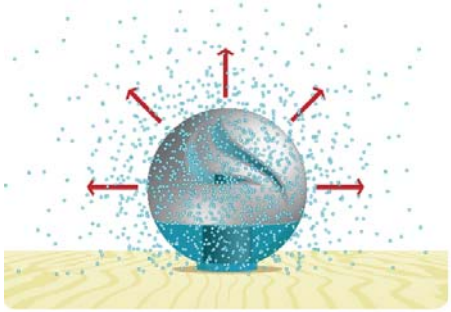


- Proteins act as channels to allow water and small nutrients through
- Larger molecules like sugars and fats cannot pass through as easily
- Cell membrane helps to take in nutrients and remove waste from the cell

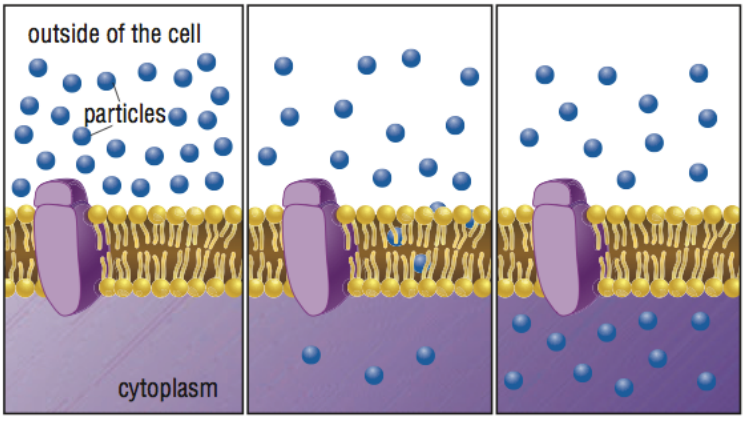


Diffusion

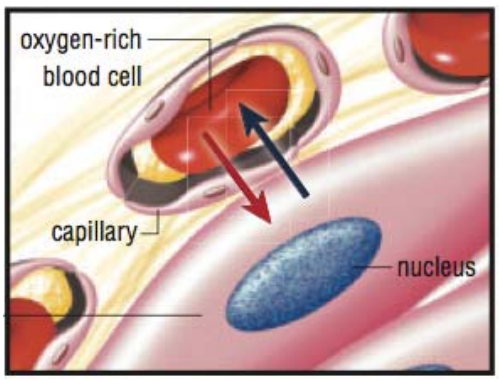
- Diffusion – the movement of particles from an area of high concentration to an area of low concentration
- The difference in concentration between two areas is called a concentration gradient



- Diffusion is a natural process and particles move down the concentration gradient (from high to low concentration)
- Concentration gradient decreases until concentrations are equally distributed

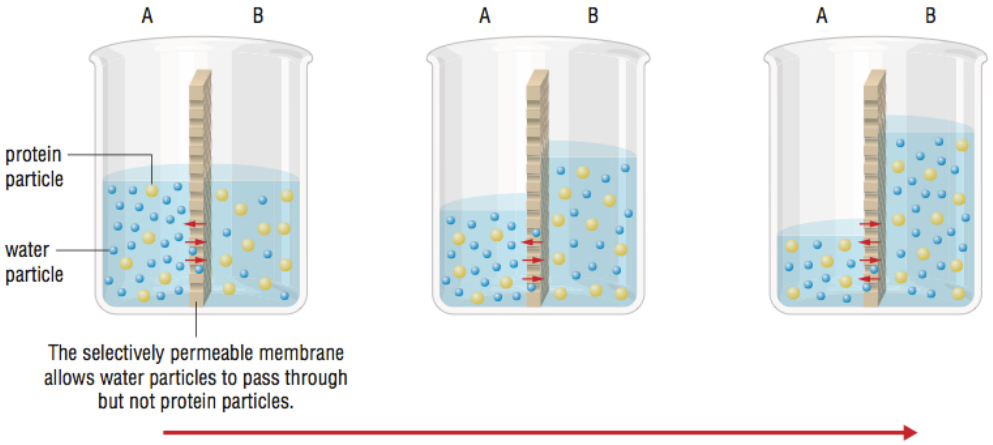


- Diffusion in cells:
  - Oxygen diffuses from the blood (high concentration) to the muscle cells (low concentration) through diffusion
  - Carbon dioxide builds up in the muscle cell (high concentration) and moves into the blood (low concentration) to be removed



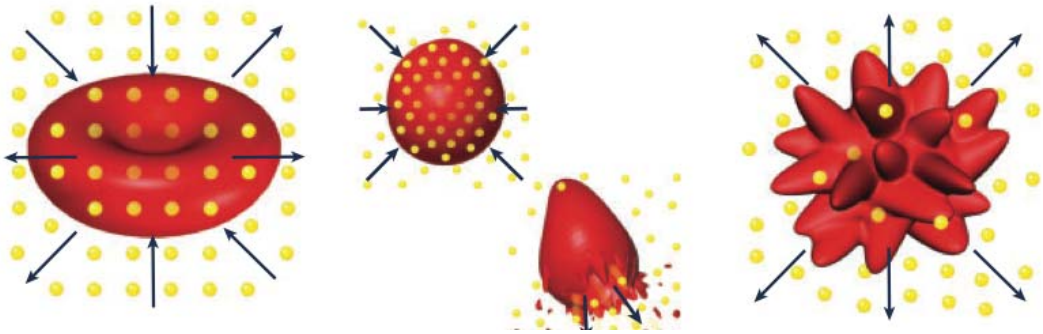
Osmosis

- Osmosis – the movement of water from an area of high concentration to low concentration across a selectively permeable membrane



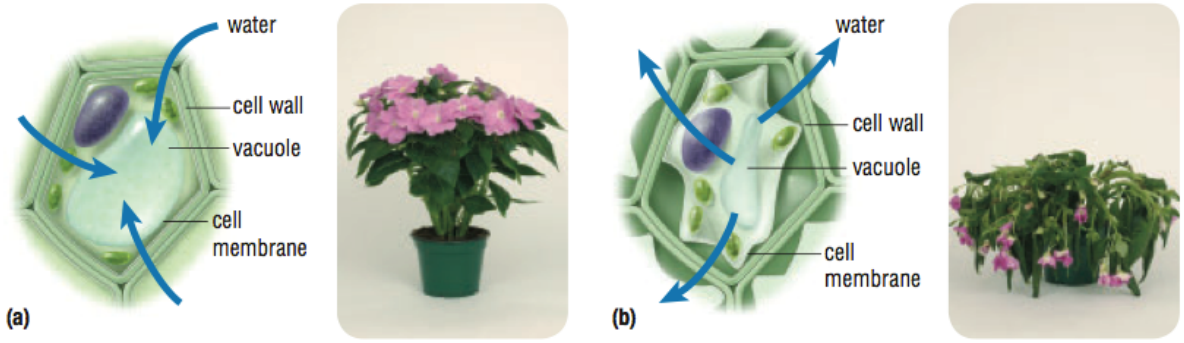
- When thinking about osmosis, think of the water concentration NOT the solute concentration
- Osmosis continues until the concentration of water is equal on both sides; at equilibrium, water continues to move back and forth but without net movement

- Osmosis in cells:
  - Cells need to maintain solute concentrations at certain levels to stay healthy and alive; solutes cannot move in and out of the cell (too big)
  - Water determines the solute concentration inside the cell
  - Example: Red Blood Cell



Turgor Pressure

- Plant cells have a large vacuole that contains water taken up from the roots
- When filled the vacuole maintains the cell's turgor pressure



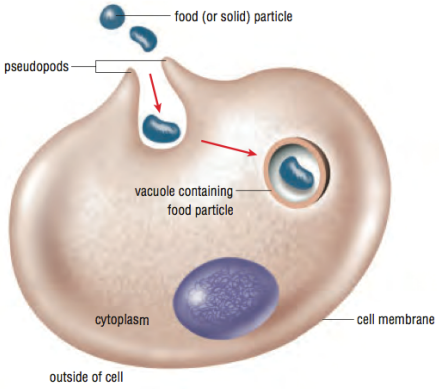
- Turgor Pressure – the outward pressure exerted by the contents of the plant cell on the cell wall
- Plant cell is called “turgid” if their vacuole is filled with water
  - Stems and leaves stiffen and remain upright

Checkpoint

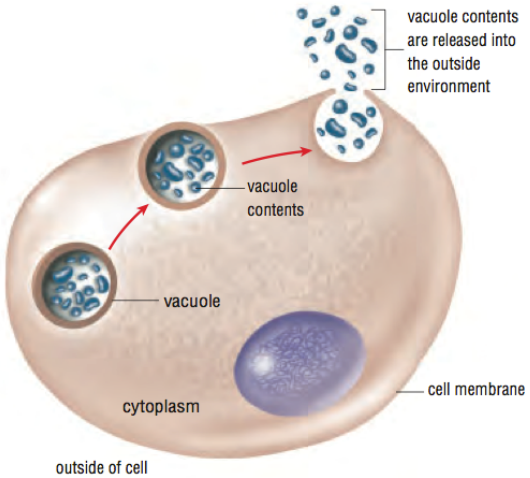
Fertilizers contain nutrients that help plants grow. These nutrients are dissolved in the soil increasing the soil’s concentration and lowers the soil’s water concentration. How can adding fertilizers damage and dehydrate a plant?

Endocytosis

- Moves large amounts of material or non-dissolved materials into the cell
- Phagocytosis – a type of endocytosis in which a cell uses pseudopods to move the materials into the cytoplasm via a vacuole that contains chemicals to break down the material



Exocytosis



- Moves large amount of materials or non-dissolved particles out of the cell
- A vacuole containing wastes fuses with the cell membrane and releases its contents outside