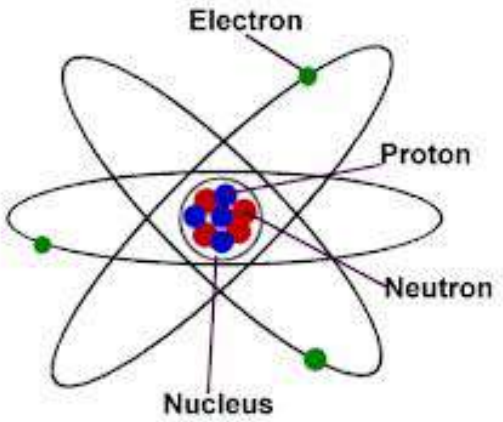
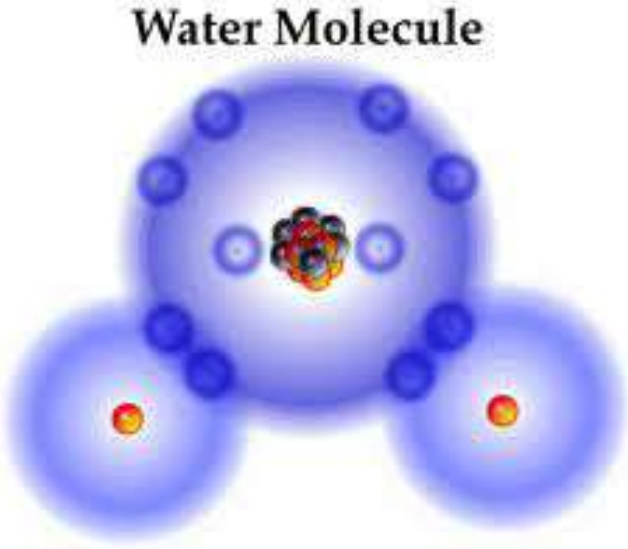
Cellular Chemicals

The Chemistry of Life

Elements and Compounds

- Everything around us is made up of Matter and Energy
  - Matter is anything that has mass and takes up space.
  - Energy is having the ability to cause change.
- Elements are the smallest form of matter. Ex: oxygen, carbon, hydrogen.
- Compounds are more than one element together Ex: carbon dioxide and water

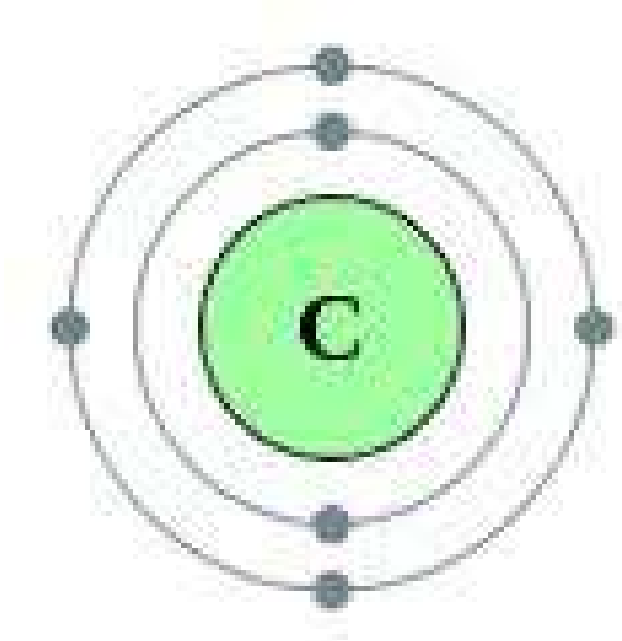




Elements and Compounds

Organic Compounds

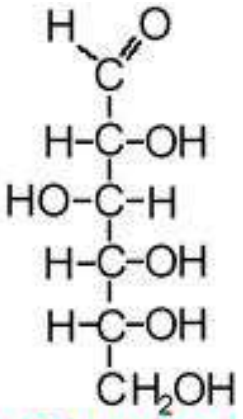
- Always contain carbon
- These include:
  - Carbohydrates
  - Proteins
  - Lipids
  - Nucleic acids



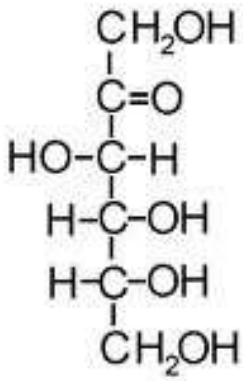
Carbohydrates

- Supply energy for cell processes and are important parts of cell structures

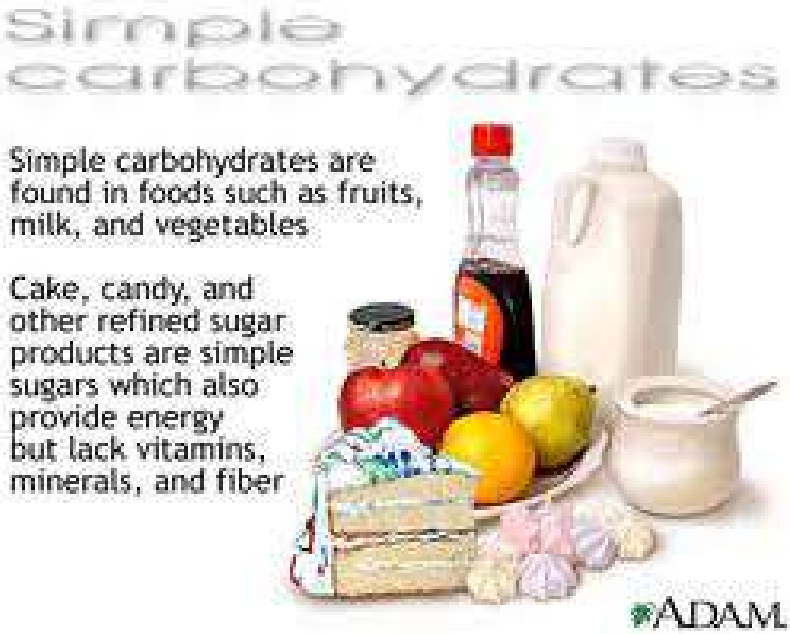
- Sugars and Starches
  - Potatoes, noodles, rice, and beans have starch



Glucose

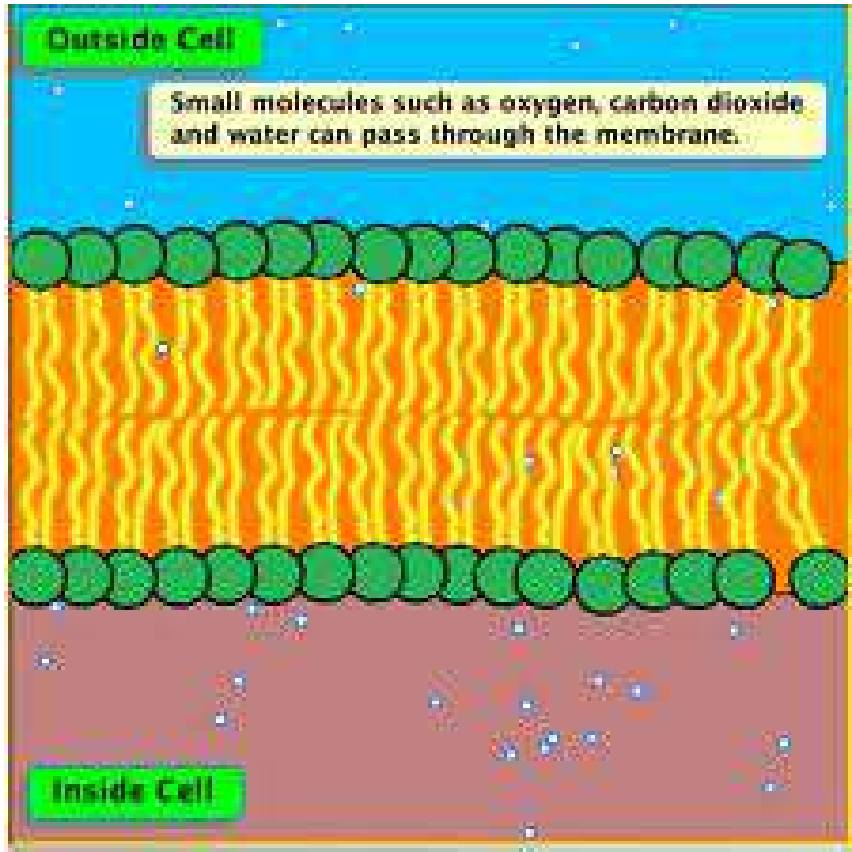


Fructose



Lipids

- Used for storage of energy
- Major parts of cell membranes
- Fats, oils, and waxes

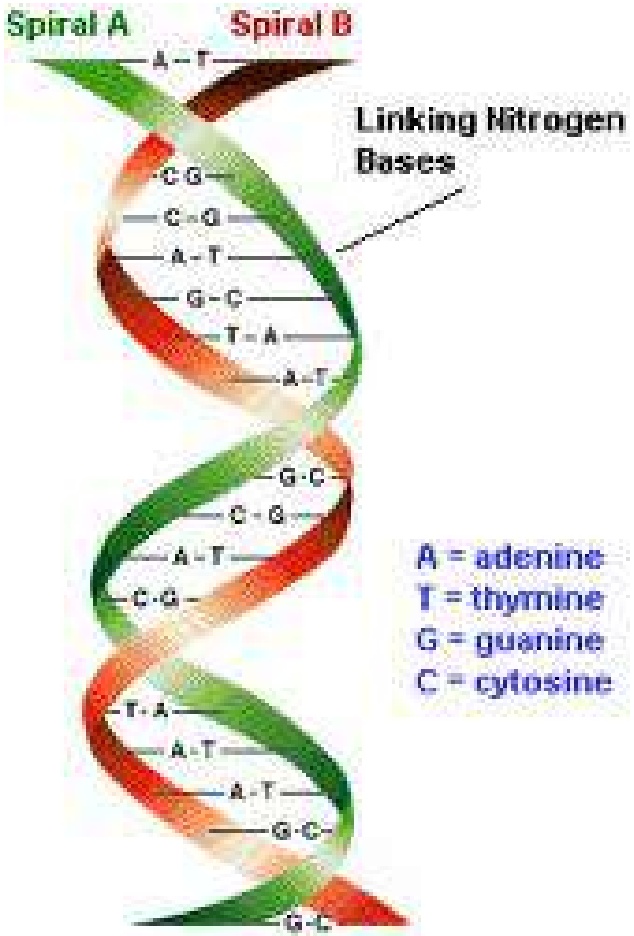


Proteins

- Form parts of cell membranes and many of the cell's organelles
- Proteins are made up of amino acids
- One example is enzymes
  - speed up chemical reactions
- Foods high in protein include meat, eggs, fish, nuts, and beans

Nucleic Acids

- Very long organic molecules that contain instructions that cells need to function
- Carry hereditary information
- Contain the instructions that cells need to make proteins
  - Two kinds of nucleic acids are DNA and RNA



Inorganic Compounds

- Made from elements other than Carbon (C)
- They are the sources for many elements needed by living things

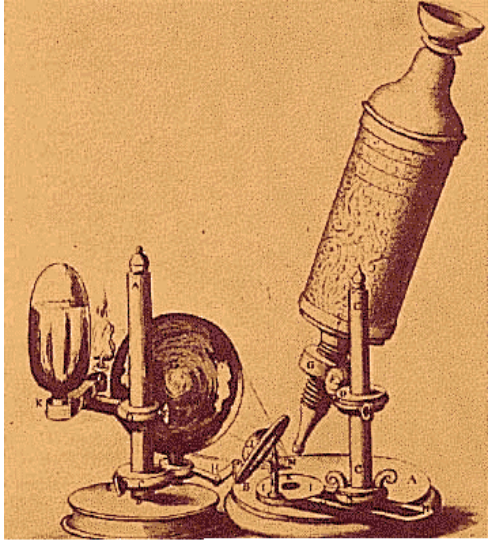
Water

- Water is important to us because
  - It makes up most of the blood
  - Most chemical reactions occur in water

Cell Theory

http://safeshare.tv/w/BNWfLHffYQ

Discovery of Cells



- The experiments of Robert Hooke and Anton van Leuwenhoek led to the discovery of cells.
- Robert Hooke- used a compound microscope to observe cells in a slice of cork
- Anton van Leuwenhoek- used a simple microscope to observe lake water and scraping from teeth and gums. He called them “animalcules”

Discovery of Cells

- Cells are the basic units of structure and function in living things
- The microscope made it possible to observe cells.
- We use compound light microscopes that have more than one lens

The Cell Theory

There are three parts to the cell theory

1. All organisms are composed of one or more cells.
2. The cell is the basic unit of structure and function in living things.
3. All cells are produced from other cells.

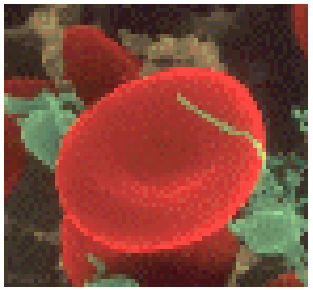
Cellular Organization

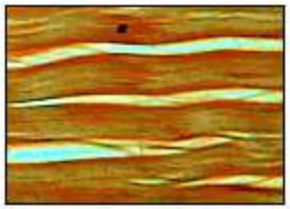
- ✓ In many-celled organisms, cells are organized in the following way:
- ✓ Cell – Smallest functional and structural unit of all living organisms.
- ✓ Tissue – A group of cells working together to perform a specific job.
- ✓ Organ – A structure that is made up of two or more tissues working together to perform a specific function.
- ✓ Organ System – A group of organs working together to perform a particular function.
- ✓ Organism – made up of the organ systems working together

Cellular Organization in Living Things

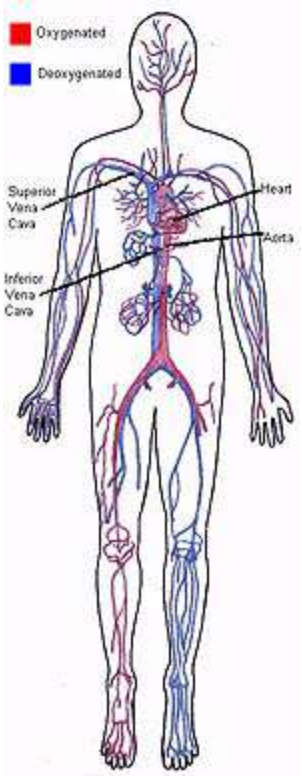
Example: Circulation

Cells → Tissue → Organ → Organ System





Fibrous connective tissue



Types of Cells

- There are two basic kinds of cells
  1. Prokaryotic - organism made of one cell that does not have a nucleus or other organelles covered by a membrane.
     - Example- bacteria
  2. Eukaryotic - a type of cell that has a nucleus and membrane bound organelles.
     - Example- Plant and animal cells

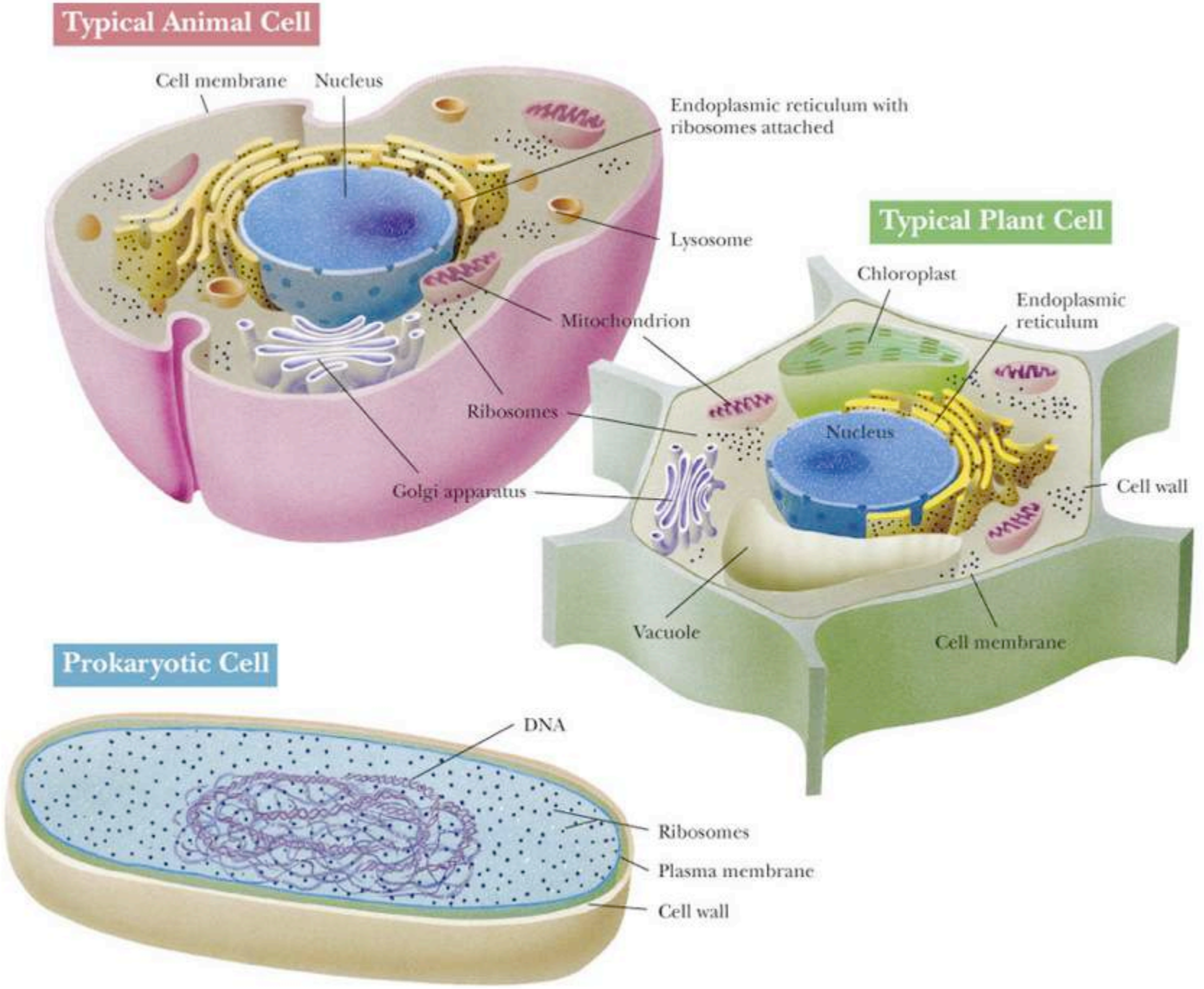


Fig. 1-11, p. 17