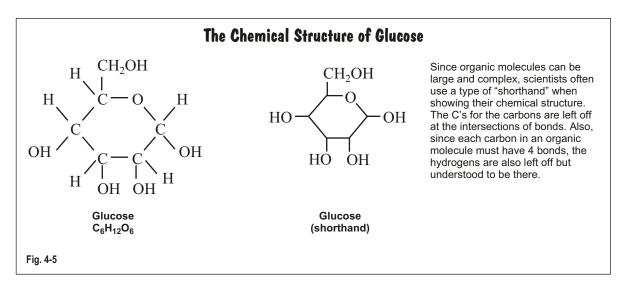
The Components of Life

Section 4.2 Carbohydrates

One type of macromolecule is a **carbohydrate**. Carbohydrates are made of carbon, hydrogen, and oxygen, and these atoms are usually in a ratio of 1:2:1. Carbohydrates serve two main purposes. First, they are used by living organisms as the primary source of energy. Sugars, the main component of complex carbohydrates, are broken down by cells to supply the energy a cell needs for all of the cell's activities. Secondly, they have structural purposes for plants and some animals.



The simplest carbohydrates are called **monosaccharides**, which means "simple sugar." Some examples of monosaccharides are glucose (figure 4-5), fructose (found in many fruits), and galactose (found in milk). During photosynthesis, plants produce glucose, which may be stored as starch.



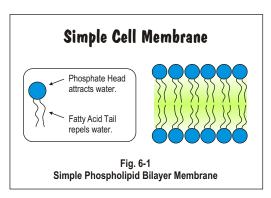
The larger carbohydrates are called **polysaccharides**. The prefix "poly-" is used a lot in science, and it means "many." What do you think polysaccharide means? If you guessed that is means "many sugars," you would be correct. Polysaccharides are polymers of sugar molecules linked together with covalent bonds. Starch is a polysaccharide produced when sugar molecules form a chain (figure 4-6).

One type of polysaccharide is glycogen, a type of animal starch. Many animals use glycogen to store excess sugar, which can release energy when needed. Plants use a different polysaccharide, cellulose, in their cell walls. Whenever we eat, the carbohydrates in the food are broken down to release the stored energy that can be used immediately by the body.

Cellular Transport

Section 6.1 Introduction to Cellular Transport

Since cells are living, they have to be able to take in oxygen and nutrients and get rid of wastes just like all living organisms. They are able to perform these functions because of the **cell membrane**. The cell membrane allows the material inside the cell to remain separate from its surroundings. It is also **selectively permeable**, which means it allows certain materials to move in and out of the cell when needed but keeps other materials from crossing the membrane. The cell membrane is able to allow some substance in but keep others out because of its structure. It is made mostly of a **phospholipid bilayer** — two layers of phospholipids arranged tail to tail (figure 6-1). The membrane also has various proteins, carbohydrates, and cholesterol mixed in.



When materials move in and out of the cell, they use either active transport or passive transport. Active transport means that the cell has to use some of its own energy to move the materials in or out. Some examples of active transport are endocytosis and exocytosis.

In passive transport, the cell does not have to use any of its own energy. **Osmosis** and **diffusion** are examples of passive transport.

The rest of this section will discuss these types of cellular transport in more detail, but for now, review the basics.

Practice

Answer the following questions about cellular transport.

- (A) (B) (C) (D) 1. If a membrane allows movement of only certain materials, it is called
 - A. somewhat permeable.

C. somewhat impermeable.

B. selectively permeable.

- D. selectively impermeable.
- (A) (B) (C) (D) 2. The cell membrane is made primarily of
 - A. carbohydrates.B. nucleic acids.

C. proteins.D. phospholipids.

- (A) (B) (C) (D) 3. When active transport is
 - 3. When active transport is used, the cell A. does not use any of its own energy.
 - A. does not use any of its own end B. uses some of its own energy.
 - C. uses energy from other cells.
 - D. uses the energy stored mainly in the nucleus.
- (A) (B) (C) (D) 4. During passive transport, a cell
 - A. does not use any of its own energy.
 - B. uses some of its own energy.
 - C. uses energy from other cells.
 - D. uses the energy stored mainly in the nucleus.
- (A) (B) (C) (D) 5. Which of these is NOT a type of cellular transport?
 - A. endocytosisB. diffusion

- C. exocytosis
- D. nucleocytosis