

SECTION 2-3**SECTION SUMMARY**

Photosynthesis

Guide for Reading

- ◆ What happens during the process of photosynthesis?
- ◆ How does the sun supply living things with the energy they need?

The sun provides almost all the energy used by living things on Earth. All cells need energy to carry out their functions. The process by which a cell captures the energy in sunlight and uses it to make food is called **photosynthesis**.

During photosynthesis, plants and some other organisms use energy from the sun to convert carbon dioxide and water into oxygen and sugars, including glucose. You can think of photosynthesis as taking place in two stages. The first stage of photosynthesis involves capturing the energy in sunlight. In plants, this energy-capturing process occurs in the leaves and other green parts of the plant. The chloroplasts in plant cells give plants their green color. The green color comes from **pigments**, colored chemical compounds that absorb light. The main pigment found in the chloroplasts of plants is **chlorophyll**. The pigments capture light energy and use it to power the second stage of photosynthesis. In the second stage of photosynthesis, the cell uses the captured energy to produce sugars. The cell needs two raw materials for this stage: water (H_2O) and carbon dioxide (CO_2). In plants, the roots absorb water from the soil. Carbon dioxide enters the plant through small openings on the undersides of the leaves called **stomata**.

The events of photosynthesis can be summed up in a chemical equation. The raw materials—six molecules of carbon dioxide and six molecules of water—are on the left side of the equation. The products—one molecule of glucose and six molecules of oxygen—are on the right side of the equation. An arrow connects the raw materials to the products. Light energy, which is necessary for the chemical reaction to occur, is written above the arrow.

A plant is an autotroph, an organism that makes its own food. The plant's leaves contain sugars made during photosynthesis. A caterpillar is a heterotroph, an organism that cannot make its own food. To live, grow, and perform other functions, the caterpillar needs the energy in plant sugars. By eating plants, heterotrophs get energy from the sun in an indirect way. **Nearly all living things obtain energy either directly or indirectly from the energy of sunlight captured during photosynthesis.** Photosynthesis also is essential for the air you breathe. Almost all the oxygen in Earth's atmosphere was produced by living things through the process of photosynthesis.