



The Green Magicians

By David Cochran

Plants are amazing green magicians. They are energy **transformers** that are the first step of our food chain, transferring energy that they receive from sunlight. The story starts 93 million miles away on the star that fuels our solar system, the Sun. The Sun is a huge, fiery mass of hydrogen, helium and other gases. It sends its radiated heat and light energy to the Earth.

It Starts With Light

When the **photons** of light reach plants on the Earth, a great exchange takes place. Plants absorb carbon dioxide (CO_2) from the air into their leaves. CO_2 mixes with water (H_2O), the other main ingredient in the plants. Light energy then makes the magic exchange possible.

In plant cells, light is absorbed by proteins that contain chlorophyll. Some light energy is stored, while the rest is used to take electrons from the water in the plant. The electrons then cause a reaction that changes the carbon dioxide and water into organic compounds, mainly sugar and oxygen. Pretty amazing.

This process is called **photosynthesis**. The word *photo* refers to light, while *synthesis* means to combine simple elements to make a new compound. In this case, the CO_2 and H_2O are combined to make sugars and starches. Oxygen is released as a result of this reaction.

The new compounds that are created are the foundation of life on Earth. Carbon compounds (sugars) are found in the grains, vegetables, fruits, and other plants that humans and other animals eat. Sometimes we eat the fish and animals that eat the plants. When this happens, the energy from the plants is transferred to the fish or animals and then to us. When we eat plants, we are **primary consumers** because we are the first to gain the energy from the plants. When we eat fish and animals that have eaten plants, we are **secondary consumers**. We are getting energy because of a second transfer of energy from the animals to us.

Energy Can Only Change

All energy falls under a basic rule called the law of **thermodynamics**. It states that energy can

be neither created nor destroyed. It can only change form. This is certainly true of plants. The energy from the sun is transferred to plant cells, then plant cell energy is transferred in many ways—into the soil, our bodies, and the air.

Plants are fantastic transformers of energy, which are able to change the light energy from the Sun to the energy we need to move and breathe. Without their ability to transfer energy, humans would not be able to survive.

Activities

1. Draw a diagram to show how energy from the Sun is changed into energy that humans can use.
2. In your own words, pictures, or diagrams, show how energy is neither created nor destroyed in photosynthesis.
3. Why are the sugars and starches created by photosynthesis called the foundation of life? Discuss this with someone and share your ideas in a larger group.



For More Information

See the *Plants* publication at Spigot Science
<http://www.spigotscience.com>