The Wonderful World of Plants

A Science A–Z Life Series

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The Wonderful World of Plants

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KEY ELEMENTS USED IN THIS BOOK
The Big Idea: Our world is full of plants. Plants have parts, and each part has a function. Plants survive through the processes of photosynthesis, pollination, fertilization, seed dispersal, and germination. Plants and animals rely on each other. People use plants for both food and materials. Without plants, animals—including humans—could not survive.
Key words: absorb, carbon dioxide, chlorophyll, chloroplast, cone, egg, fertilization, flower, food chain, fruit, germinate, leaves, materials, minerals, nutrients, oxygen, photosynthesis, pistil, plants, pollen, pollination, reproduce, roots, seed, seedling, shelter, soil, species, sprout, stamen, stem, stomata, vegetable, water vapor **Key comprehension skill:** Main idea and details *Other suitable comprehension skills:* Compare and contrast; classify information; cause and effect; identify facts; elements of a genre; interpret graphs, charts, and diagrams **Key reading strategy:** Ask and answer questions *Other suitable reading strategies:* Connect to prior knowledge; summarize; visualize; retell

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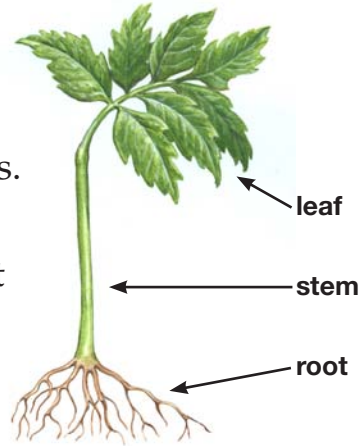
Introduction

Imagine a family is going out for dinner. The kids put on clean clothes and get ready to leave. At the restaurant, Mom parks the car under a large shade tree. The family walks across a grassy lawn to the entrance. Everyone sits down at a wooden table. They read from a paper menu. Their chicken dinners come with mashed potatoes and fresh vegetables. They share apple pie for dessert. Dad takes their leftovers home in a cardboard box.

Think about the clothes, tree, lawn, table, chairs, menu, foods, and boxes. What do they all have in common? They are all examples of—or products that come from—**plants**! Even the chicken relies on plants. In your life, you see plants almost everywhere and use plants in countless ways.

In this book, you will learn what plants need in order to survive, how they make their own food, and how they make more plants. You'll also learn about how animals and plants depend on each other. Plants are very important living things. In fact, you could not survive without plants!

The Parts of a Plant



You have probably learned that most plants have the same basic parts. Each of these parts helps the plant get the things it needs to survive: water, air, **minerals**, and light.

The *roots* of a plant have several important jobs. In most plants, roots act as an anchor to hold the plant in place and help keep it upright. Roots also absorb water and minerals, which plants need in order to live and grow. Finally, roots store some of the food that plants make.

Roots usually grow downward into the soil. In the soil, roots absorb water and minerals. Plants cannot survive without water. Minerals are the nutrients that help plants grow and stay healthy.

WOWSER!

Some roots must grow very deep to reach water. Mesquite shrubs in the desert can send roots as far down as 50 meters (164 ft.).

Do You Know?

The stems of some plants are long, like the trunk and branches of a tree. Some plants have stems that creep along the ground, such as the vines of a strawberry, cucumber, melon, or pumpkin plant. The stems of some plants, such as white potatoes and tulip bulbs, are underground.

The *stems* are important for a few reasons. In most plants, stems that support the leaves grow toward the Sun and help the plant absorb the sunlight it needs to survive. The stem also transports water and minerals from the roots to other parts of the plant. Finally, like roots, stems can store food and water for the plant.

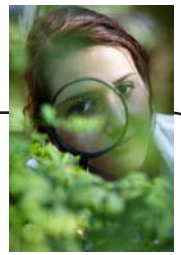
Stems can be hard or soft, thick or thin, and long or short.

Leaves come in a wide variety of shapes and sizes.

Leaves are another important plant part. Leaves are where plants make most of their food. Leaves also get rid of the waste products made during the food-making process.

Leaves grow above the ground because that's where the light is that plants need to make food. Leaves are usually flat, which helps them catch as much sunlight as possible.

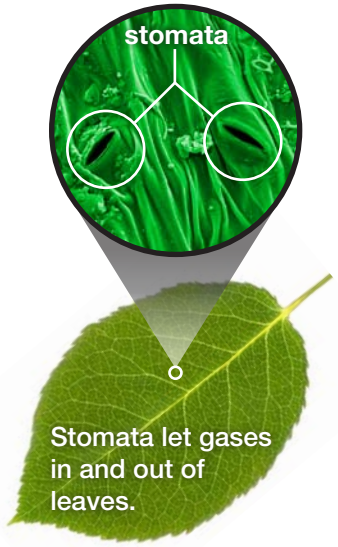
Try This



Botanists (plant scientists) describe leaves in many ways. Are the edges smooth, wavy, or toothed like a saw? Is the tip pointy, rounded, or dented? Is the surface smooth, rough, bumpy, hairy, sticky, or waxy? Does light pass through the leaf? Gather some leaves and compare their many features.

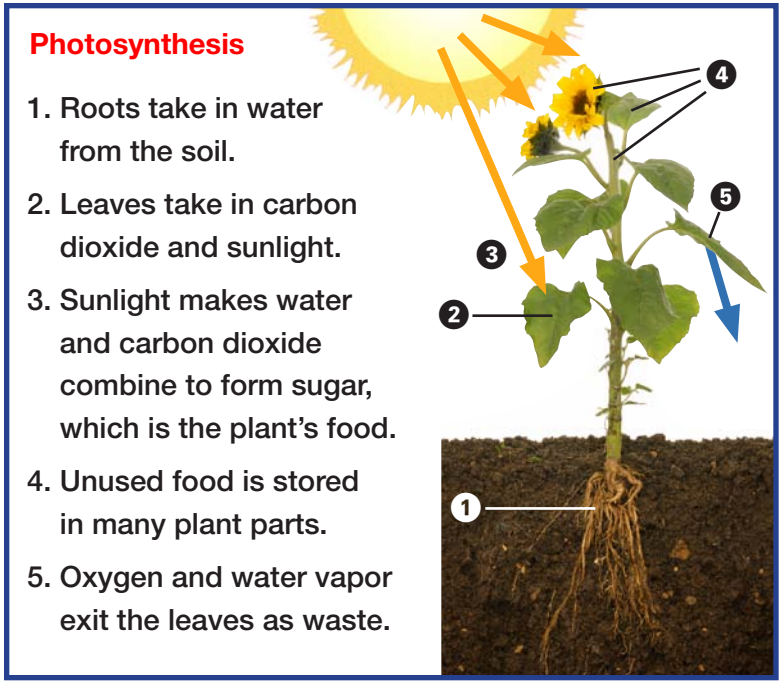
How Plants Make Food

As you read earlier, plants need food, just as animals do. But plants do not eat. They make their own food through a process called **photosynthesis**. Before photosynthesis can happen, a plant needs three things: water, air, and light.



You have already learned that roots absorb water from the soil. The water is transported through the stem to the rest of the plant, including the leaves. The leaves are the "factories" where food is made. Air enters the plant through tiny openings in the leaves called *stomata*. The air contains a gas called *carbon dioxide*. The plant needs carbon dioxide to make food.

As plants turn food into energy, they make waste products, including gases called *oxygen* and *water vapor*. Water vapor is water in the form of gas.



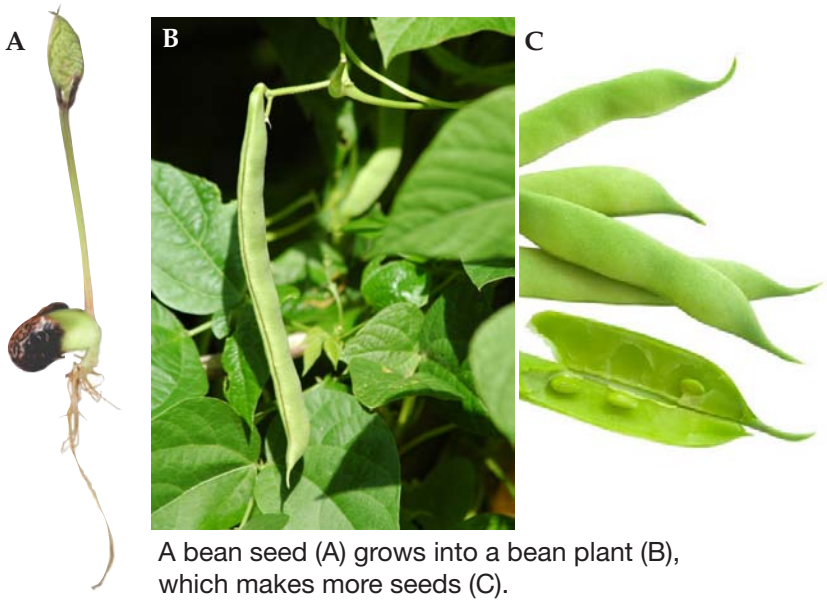
Leaves have thousands of tiny parts called **chloroplasts** where food is made. These chloroplasts have a special green substance in them called **chlorophyll**. This substance is what makes most plants green. Chlorophyll collects light energy from the Sun. The Sun's energy causes carbon dioxide and water to combine inside each chloroplast. This step makes a simple kind of sugar.

This sugar, which is the plant's food, helps a plant grow. The plant stores unused food in its roots, stems, leaves, and other parts.

How Plants Reproduce

Palm trees must make new palm trees, or else there would be no more palm trees. Tomato plants must make new tomato plants, too. The same is true for all types, or **species**, of living things. Each species must **reproduce**—which means it must make more of its own kind—in order for the species to survive.

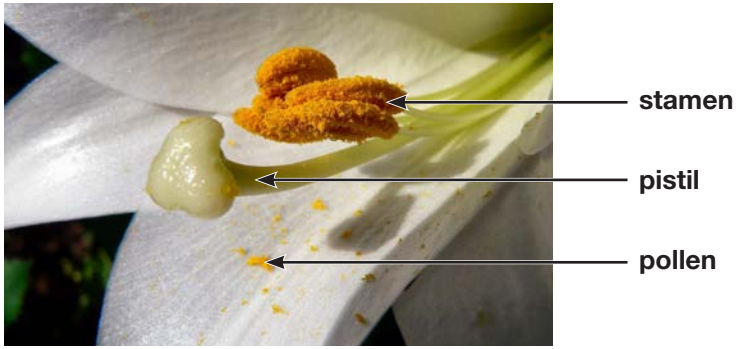
Most plants reproduce by making *seeds*. These seeds grow into new plants. The new plants are the same type of plant as the one that produced the seeds. Plants have special parts that make seeds.



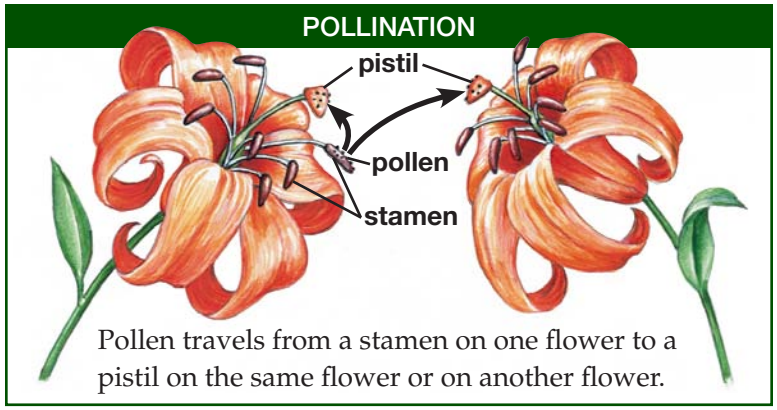
A bean seed (A) grows into a bean plant (B), which makes more seeds (C).

Flowers are special seed-producing parts found on many species of plants. Flowers have male and female parts. Some flowers have only male parts, and others have only female parts. But many flowers have both male and female parts.

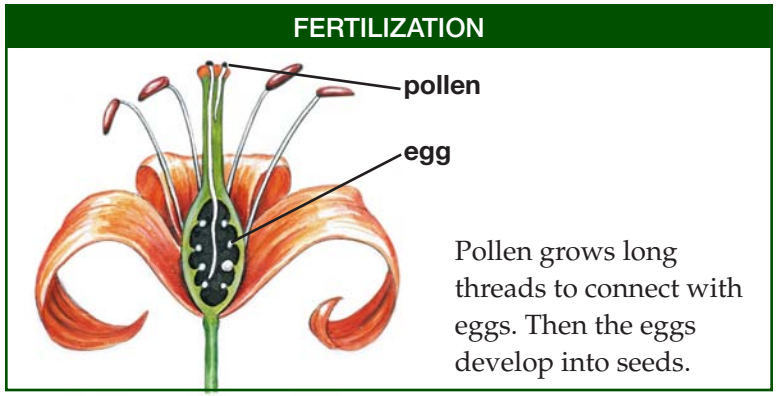
The male part of a flower is called the **stamen**. It produces tiny grains of **pollen**. The pollen grains are often carried to another flower by the wind. Animals such as bees, bats and hummingbirds also help transport pollen. The female part of the flower is called the **pistil**. Pistils tend to be sticky. The pollen from a stamen on one flower will stick to the tip of the pistil on another flower from the same plant species. This process is called **pollination**.



After landing on the pistil, a pollen grain grows a tiny threadlike piece. This thread grows down into the pistil, where eggs are located. The pollen has sperm that join with the eggs. This step is called **fertilization**. After fertilization, the egg develops into a seed. The pistil often swells up and becomes a *fruit* that protects all the new seeds. Some plants, such as pine trees, produce seeds in cones instead of in flowers.



Pollen travels from a stamen on one flower to a pistil on the same flower or on another flower.



Pollen grows long threads to connect with eggs. Then the eggs develop into seeds.

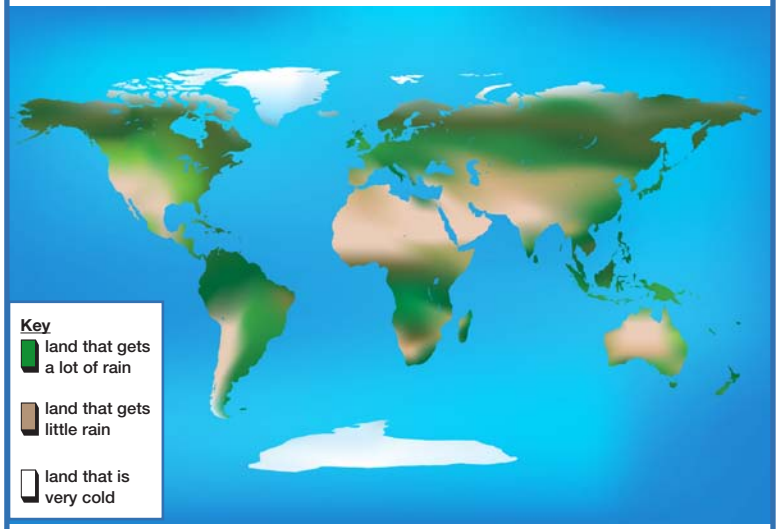
Many seeds reach the ground on their own. But some seeds travel far from their parent plant before they begin to grow. They may blow in the wind or be carried by water. Other seeds stick to the fur of animals until they are knocked off. Some seeds have to pass through animals. An animal eats the seeds or the fruit that holds the seeds. Later, the seeds reach the ground when the animal gets rid of waste.

When conditions are right, a seed will sprout, or **germinate**. Many plants need moisture and warm temperatures before they start growing. The tiny plant, or **seedling**, grows into a full-sized plant over time. As an adult plant, it will produce its own seeds, and the cycle will repeat.

Plants Live (Almost) Everywhere

With so many ways for seeds to travel, plants grow almost everywhere on Earth. Plants grow inside buildings and outside. They grow in rainforests and deserts, on lush farmland and barren tundra, on windswept mountaintops and in the open ocean. Plants grow in soil, in sand, on rocks, and in the water. Plants grow just about everywhere they can get what they need: sunlight, water, carbon dioxide, and minerals.

WHERE PLANTS GROW



Look at this map. Why do you think most plants tend to grow in the green areas, and fewer plants grow in the brown and white areas?

Plants and Animals

You have learned that plants produce two things that all animals need: food and oxygen. Animals also depend on plants for other things. For example, birds use twigs and leaves to build nests for shelter. Lions nap in the cool shade of a tree.

Plants need animals, too. Plants absorb carbon dioxide to make food during photosynthesis. The carbon dioxide comes from animals every time they breathe out.

Plants and You

All around the world, people depend on plants. People pick wild plants and eat them. People also rely on farming to provide them with a wide variety of plants to eat. And much of what you need—such as shelter, cooking supplies, paper, and clothing—is also made from plants.

Some people gather wild berries to eat or sell.

Farmers grow crops and prepare them to be shipped to customers.

Loggers cut down trees to be used for paper, fabric, and building materials.

Using Plants for Food

Much of what you eat comes from plants. Do you eat apples and bananas? Do you snack on potato chips or corn chips? Do you enjoy salads? Do you chomp on bread or cereal? Have you ever tried a mixture of chocolate, nuts, and raisins? All these foods come from plants!

When you think of eating plant parts, you might think of the fruit first. Grapes, apples, oranges, and peaches are all fruits. Some foods we eat as *vegetables* are considered fruits, too. Tomatoes, cucumbers, and squash contain the plant's seeds, so they are actually the fruit of their plant.

Many familiar foods come from parts of the plant other than the fruit.

You eat other plant parts, too.

- **Sweet potatoes and yams are swollen roots.**
- **The part of asparagus that you eat is the stem.**
- **The top of broccoli is flowers that haven't opened yet.**
- **Lettuce, spinach, and collard greens are leaves.**

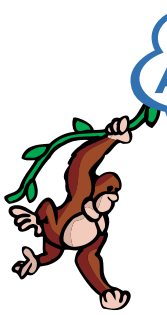
Do you remember the chicken dinner on page 4? Even the meat we eat comes from plants, but not directly. Animals must eat plants, or they must eat other animals that ate plants. Plants are part of every animal's **food chain**. A food chain describes how energy passes from one species to another.

Using Plants for Materials

Food is not the only thing that makes plants valuable to people. Plants provide us with many useful **materials**. Think back to the family at the restaurant. The gasoline in the car, the wooden table, the paper menu, the fabric in the children's clothes, and the to-go boxes all came from plants. The wood in our homes and buildings comes from trees. Wooden furniture, paper, and cardboard boxes all began as trees. Cloth is used to make our clothes. Much of this cloth is made from fibers that come from cotton or flax plants.

When you sit next to a campfire, the heat of the burning wood warms you. The wood and even the coal and oil that we use for fuel were once living plants. The plants in coal and oil died and decayed millions of years ago.

Many medicines, such as aspirin, are made from plants. Soap, paint, shampoo, perfume, makeup, ink, chewing gum, and rope are all often made from plants. In fact, there are too many products from plants to list in this book!



Think About It

Which items in your classroom or home come from plants? What are the rest of the items made of?

Conclusion

You have learned about the importance of plants. They grow almost everywhere on Earth and come in countless varieties. They fill our bellies with food and fill our lungs with oxygen. In fact, without plants, animals could not survive. Plants also give us many of the products we use every day.

Plants can also add another thing to our lives—beauty! They come in many shapes and sizes. They can have amazing colors and patterns. How dull our planet would be without beautiful forests and colorful flowers. Earth is decorated with green meadows, autumn leaves, and shady trees. Our world truly is a wonderful world of plants.

Glossary

chlorophyll a material in green plants that can turn water, air, and sunlight into food (p. 10)

chloroplasts the parts of a plant cell that contain chlorophyll and makes energy from sunlight, air, water, and nutrients (p. 10)

fertilization the process of combining male and female cells to create a new animal or plant (p. 13)

food chain a group of plants and animals that all have a relationship with each other through what they eat (p. 19)

germinate to begin to grow from a seed (p. 14)

materials any kinds of physical substances that are used to make things (p. 20)

minerals nutrients from nonliving things that are required in small amounts for health and normal growth (p. 6)

photosynthesis the process by which plants turn energy from the Sun into food (p. 9)

pistil the female part of a flower, where seeds begin to grow (p. 12)

plants living things that make their own food from sunlight and do not move from place to place on their own (p. 4)

pollen male flower cells, which often look like fine yellow powder (p. 12)

pollination the transfer of pollen from flower to flower for the purpose of fertilizing a plant (p. 12)

reproduce to make offspring that are similar to the original living thing (p. 11)

seedling a young, developing plant that has grown from a seed (p. 14)

species a group of living things that are physically similar and can make offspring (p. 11)

stamen the male part of a flower, where pollen is made (p. 12)

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