Chapter 7 General Science

The Plant Kingdom

**seed-** the part of a seed plant from which a new plant can grow

**root-** the part of a plant below the surface of the soil; used to hold the plant in place, store extra food, and soak up water and minerals from the soil

**stem-** the upright part of a plant; used to carry food and water and hold a plant up so its leaves can get sunlight

**leaf-** the food-making part of the plant

**photosynthesis-** the process that plants use to make food in the form of sugar

**pistil-** the female part of a flower

**egg cell-** a female sex cell

**stamen-** the male part of a flower

**pollen-** the light, powdery dust in stamens that contain the male sex cells

**sperm cell-** a male sex cell

**petal-** one of the colorful outer parts of a flower; it attracts insects

**pollination-** the process of transferring pollen from the stamen of a flower to the pistil of the same or a different flower

**fertilization-** the process of a sperm cell and an egg joining

**germination-** the process by which a tiny new plant breaks through the hard seed coat that is protecting it

**fruit-** the part of a plant that holds the seeds

**7-1 Plants as Food Makers**

What are plants?

\* Plants are organisms made of many specialized cells. They are different from animals in three important ways:

 1.) Plants make their own food.

 2.) Plant cells have cell walls.

 3.) Plants cannot move from place to place.

There are about 265,000 kinds of plants. See how many you can name in 3 minutes.

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You can see plants almost everywhere you go. You can see trees, grasses, bushes, weeds, flowers, etc. all by looking out of the windows in this classroom. Plants grow in most places- from the desert to the mountains. Some even grow in water.

\* We owe a lot to plants. Without them, humans and all other animals could not survive. We would have no food to eat and no air to breathe. In fact, animal life would be impossible without plants.

Seed Plants

\* Most of the plants you see around you are **seed plants**. These are the kind you will study in this chapter. The parts of seed plants are:

 1.) Seeds

 2.) Roots

 3.) Stems

 4.) Leaves.

Seeds

\* Some kinds of **seed** plants produce flowers. These plants produce seeds inside the fruit. Avocados, daisies, and plum trees are examples of flowering seed plants. Another kind of seed plant produces cones. The seeds are inside the cones. Pine trees produce cones. Seeds are important in plant reproduction.

Roots

\* Below the surface of the soil is the plant’s **root**. Roots have several jobs. One job is to hold the plant in place. Roots also store extra food that the plant has made. However, the most important job of roots is to soak up water and minerals in the soil. Water enters a plant through its roots. From the roots, water moves to other parts of the plant. Sugar beets and carrots are examples of roots.

Stems

\* The **stem** starts at the ground and goes up to the leaves. The stem holds a plant up so its leaves can get sunlight. It also carries water and food through long, narrow tubes that go up and down the stem. First, the roots soak up water. Then the water is carried up the stem to other parts of the plant. Some of the food that plants make is sent down the stem to the roots.

\* Some stems are soft and flexible, like the stem of a daisy. Other stems are hard and rigid, like the stems of trees and shrubs. These are woody stems. The wood is made of cells with thick walls. The stems of trees are called **trunks**.

\* You have probably eaten plant stems. Name all that you have tasted. Go.

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Asparagus, bamboo shoots, and sugar cane are all stems. Potatoes are also stems. Many people think they are roots because they grow under the ground. However, potatoes are really just underground stem structures that store extra food.

Leaves

\* Plants make their own food, using chlorophyll. Most of a plant’s chlorophyll is found in its **leaf** (leaves). The process that plants use to make food, in the form of sugar, is called **photosynthesis**. Four things are needed for photosynthesis:

 1.) Sunlight

 2.) Water

 3.) Chlorophyll

 4.) Carbon Dioxide

Carbon dioxide is a gas in the air. It is made of carbon and oxygen molecules. Here is how photosynthesis works:

1.) Water goes from the soil through the roots and stems to the leaves.

2.) Carbon dioxide from the air enters small openings on the undersides of the leaves.

3.) As sunlight strikes the chlorophyll in the leaves, energy is released.

4.) This energy makes the carbon dioxide and water join together to make sugar and oxygen.

\* Leaves have an extensive network of veins that carry water to the leaves and sugar to the rest of the plant. Even a cactus has leaves. They are modified/different than normal leaves. They protect the plant from animals that would eat it. The spines also prevent the plant from losing too much water in the hot, dry desert.

\* The sugar that plants make is not the kind of sugar you buy at the store. It is the basis of all food. Plants use the energy stored in the sugar to carry out life processes. Animals eat the plants and get energy stored in this sugar. People eat the animals or the plants and also get the energy. So you can see that all animals depend on photosynthesis for food.

\* Animals also get oxygen from photosynthesis. Remember that animals need oxygen to get energy from food during cellular respiration. After the plant sugar is made, there is some oxygen left over. This goes out of the plant through small openings on the underside of leaves. Without plants covering the Earth and releasing oxygen, animals could not breathe.

Insect-Eating Plants

\* There are a few plants that actually eat animals! These plants live in soil that does not have everything the plants need to grow. So the plants catch insects to get what they need. The pitcher plant has leaf parts that are shaped like pitchers. These parts are lined with brush-like hairs. The hairs point down into the pitcher. When an insect comes along, it gets trapped in the hair and cannot get out. It slides down into the pitcher. The plant then digests the insect. The Venus’ flytrap is another insect-eating plant. It catches insects on its brush-like leaves. The leaves snap closed like a trap around the insect.

Why, then are these classified as plants rather than animals? Because they are rooted in the ground. They cannot move around at will. Also, they still make food using photosynthesis. Insects just add to their diet.

**7-2 Plant Reproduction**

Pollination

\* Seed plants reproduce using female and male plant parts found in their own flowers. The **pistil** and the **egg cell** are female parts in a plant. The **stamen** has **pollen** at the end of each one. A flower that has stamens and a pistil is called a perfect, or complete, flower. A flower that lacks one of these structures is called imperfect, or incomplete.

\* Flower **petals** attract insects and protect the inner parts of a flower. For seeds to reproduce, pollen must land on a pistil. Sometimes, wind blows pollen off the stamens. That pollen may land on the pistil of the same plant or another plant. The pistil is sticky and traps the pollen. This is **pollination**.

\* Bees often help with pollination. They are attracted to a flower because of its bright colors, pleasant smell, and its nectar. **Nectar** is a sweet liquid the plant produces. The bees use nectar to produce honey.

\* The bees have sticky legs. When they land on a stamen, the pollen sticks to their legs. They fly off. When they land on another flower, they leave a little pollen behind, on the pistil.

\* Bees recently have experienced a shortage. Here is a video about this.

<http://www.nbcnews.com/video/nightly-news/51795179#51795179>

Protecting the Seed

You may have eaten sunflower seeds. These come from a sunflower. Seeds are also found in other fruits and vegetables. See how many you can name in 2 minutes.

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\* A seed is the part of a plant from which a new plant can grow. A seed includes a young new plant surrounded by a hard protective coating. Most of a seed is food for the young plant. The young plant needs a lot of food for growing. When the environment is and wet enough, the seed grows into a plant. This may take weeks or even years.

\* Wind and water can carry seeds far away from plants. Think about what many people do with dandelions after they turn white. We pick them and blow on them. We are spreading the seeds of a weed! Sometimes animals carry seeds, too. Some kinds of seeds stick to the coats of animals. An animal may carry a seed a long way before it falls off. Some seeds never make it to a good place for growing. If a seed gets a chance, however, it will grow. The tiny new plant will break through the hard seed coat that has been protecting it. This is called **germination**.

\* The **fruit** of a seed plant is really a container for the seed. It may be juicy. It is the plant’s ovary that has grown bigger. Inside a watermelon are a lot of black seeds. All the rest of the melon is protecting those seeds from water loss, disease, and insects.

\* Many of the foods we call vegetables or grains are really fruits. Anything that has seeds in it but is not a cone is a fruit. This includes tomatoes, beans, avocados, eggplants, oats, and wheat. All these fruits have seeds.

\* The fruits that provide the most food for humans are wheat, rice, corn, and oats. The fruit of these cereal plants are called **grains**.