

Leaves and Photosynthesis

3rd - 6th Grade

Introduction

Like all parts of a plant, the leaf has a very important job in helping a plant to survive and grow.



One of the smallest leaves known is on a duckweed plant. A duckweed leaf will fit through the eye of a needle. This giant rhubarb leaf is a record breaker at over 11 feet across.



Leaves can come in many shapes and sizes, but all leaves have the same jobs.

1. Manufacture food
2. Exchange gases
3. Allow transpiration or evaporation

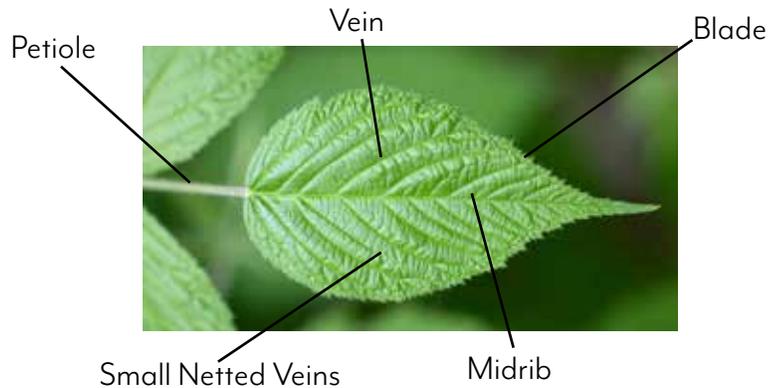
Objectives

- Students will understand the basic function of leaves.
- Students will know the basic parts of a leaf.
- Students will be able to explain the process of photosynthesis.

Background

Parts of a leaf

Before learning how a plant produces its own food, we need to learn some of the basic parts of the leaf. There are two basic types of flowering plants: dicots and monocots. They both have the same parts but may look a little different.



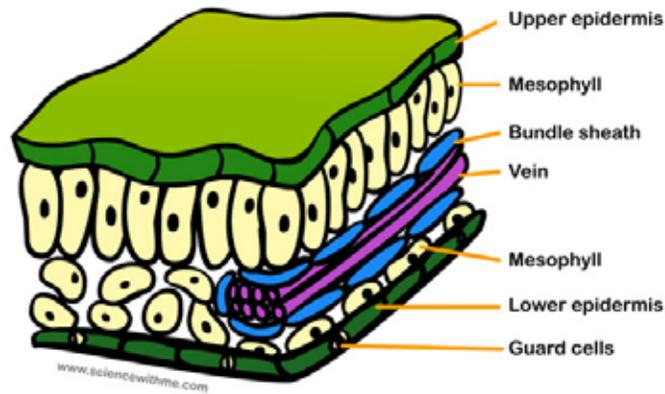
The midrib holds the leaf in the place to catch as much sunlight as possible. The veins and small netted veins move water, sugars and other nutrients around the plant. The petiole is like a branch and attaches the leaf to the stem. The blade is the area between the veins where most of the things that we are going to talk about in this lesson take place.

How does a plant produce food?

We get the energy that we need to survive by eating but, plants produce their own food through a process called photosynthesis. The leaves use energy from sunlight to make food from water and carbon dioxide. The mesophyll is made up of plant cells. A plant cell has a special part called chloroplasts. They contain chlorophyll that traps sunlight and give plants their green color. That energy from the sunlight is used to combine water and carbon dioxide from the air. The plant then converts that into sugar and oxygen. Veins in the leaves, called phloem, carry the sugars to all of the parts of the plant. The sugar produced can be stored in the roots, stems and leaves. Some plants use this sugar to produce sweet tasting fruit like strawberries, peaches and apples.

A plant still needs energy at night to stay alive. The plant uses a process called respiration to produce energy also. The plant uses some of the energy that it stores during the day for respiration. Photosynthesis and respiration are opposite of each other in some ways. Photosynthesis uses carbon dioxide and gives off oxygen. Respiration uses oxygen and gives off carbon dioxide. Photosynthesis only happens during the day. Respiration goes on during the day and at night. Plants produce approximately ten times more oxygen during the day that what they consume at night.

CROSS SECTION OF A LEAF



Picture from: <http://www.sciencewithme.com/learn-about-leaves/>

Exchanging gases

One of the jobs of the leaf is to exchange gases. It will give off oxygen during photosynthesis and carbon dioxide during respiration. The leaf is covered in upper and lower epidermis. This is like our skin. The bottom of the leaf has several holes called the stomata. The stomata is kind of like a mouth. The guard cells are like our lips. They opens and close to allow gases to enter and exit the leaf during photosynthesis and respiration.

Allow transpiration or evaporation

Gently cover your mouth with the palm of your hand. Slowly breathe out into your palm. Do you feel moisture on your hand? A plant does the same thing when it releases oxygen. Water vapor is with the oxygen, this process is called transpiration. It is how water evaporates from a plant.

Activity

To demonstrate oxygen being produced when photosynthesis is taking place.

Materials

- 2 jars with lids
- Plant cuttings
- Water

Directions

1. Take a cutting from a house plant, shrub or garden plant that will easily fit in the jar. It must have leaves.
2. Place cutting in the jar.
3. Put enough water in the jar to cover the cutting.



4. Put lid on both jars.
5. Set one jar where it gets a lot of sunlight.
6. Put the other jar somewhere that it does not get any sunlight. Possibly in a box or cabinet.
7. Wait at least two hours.
8. View results.

Explanation

The plant in the sunlight will continue to photosynthesize and produce oxygen. You should see little air bubbles in the jar. The plant in the dark will not photosynthesize but should respire. It may have some bubbles too but not nearly as many as the plant that was photosynthesizing.

Conclusion

A plant cannot survive without producing its own food. A plant cannot produce its own food without photosynthesis. The leaf plays the most important role in that process.

Interesting fact

It takes over 500 average size house plants to produce enough oxygen for one person every day. The crops that farmers grow are extremely important in producing the oxygen that we need.

Test what you have learned using the Leaves and Photosynthesis Worksheet

Leaves and Photosynthesis Worksheet

1. What are the three jobs of the leaf?

- a.
- b.
- c.

2. Match the following terms with their description below. Place the letter by the term next to the correct description.

- a. Photosynthesis
- b. Chloroplasts
- c. Respiration
- d. Stomata
- e. Transpiration
- f. Epidermis

___ the skin of the leaf

___ how water evaporates from a plant

___ the process that produces food for the plant

___ the mouth of the leaf

___ filled with chlorophyll and gives plants their green color

___ a way that a plant produces energy during the day and night

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a the process that produces food for the plant

d the mouth of the leaf

b filled with chlorophyll and gives plants their green color

c a way that a plant produces energy during the day and night