Activity 2 Lights Out! Photosynthesis

You will need to set up the experiment LIGHTS OUT on the first day and finish the activity four or more days later.

INSTRUCTIONS:
Discover what happens if you change the patterns of a plant's light source. *Without enough sunlight, plants cannot use the process of photosynthesis to produce food.*
Materials:

- Small shrub, tree, or house plant
- Cardboard or aluminum foil
- Scissors
- Paper clips

1. Pick a shrub, tree, or houseplant that you can use for an experiment.

2. Using the cardboard or aluminum foil, cut out some geometrical shapes like a circle, square, or triangle. Make sure your shapes are big enough to make a patch that will cover nearly half of the plant leaf.

3. Paperclip each shape on a different leaf.

4. If you use a house plant, place it near a south, west, or east window where it will get plenty of sunlight. Make notes about the weather each day and add them to your observations.

5. After four days, remove the shapes from the leaves and observe each of the leaves that had a shape covering it.

6. Compare the areas on the leaf that were covered with the shape to other parts of the leaf.

Questions: have the students journal their responses.

1. What happened to the leaves? Describe the effects the lack of sunshine has on leaves. What has or hasn't happened in the different parts of the leaf?

2. What is the best environment for a house plant? Why?

3. Where have you seen effects like these in nature?

4. Where would you expect to find fewer plants outside because of a lack of sunlight?

As a small reinforcement exercise on photosynthesis, have the students complete the photosynthesis worksheet that can be downloaded from this website: http://www.teachervision.fen.com/tv/printables/botr/botr_022_11-11.pdf

The following is a basic scientific explanation for what happened to the plant during the 'Lights Out' activity.

"Of all the organisms in the natural world, green plants are the only ones that manufacture their own food. This process is called photosynthesis and begins when light strikes the plant's leaves (both sunlight and artificial light can power this process). Cells in the plant's leaves, called chloroplasts, contain a green pigment called chlorophyll which interacts with sunlight to split the water in the plant into its basic components.

Carbon dioxide enters the leaf through holes called stomata and combines with the stored energy in the chloroplasts through a chemical reaction to produce a simple sugar. The sugar is then transported through tubes in the leaf to the roots, stems and fruits of the plants. Some of the sugar is used immediately by the plant for energy; some is stored as starch; and some is built into a more complex substance, like plant tissue or cellulose.

Fortunately for us, plants often produce more food than they need, which they store in stems, roots, seeds or fruit. We can obtain this energy directly by eating the plant itself or its products, like carrots, rice or potatoes. Photosynthesis is the first step in the food chain which connects all living things. Every creature on earth depends to some degree on green plants.

The oxygen that is released by the process of photosynthesis is an essential exchange for all living things. Forests have been called the 'lungs of the earth' because animals inhale oxygen and exhale carbon dioxide in the process of breathing, and plants take in carbon dioxide and give off oxygen in the process of photosynthesis."

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