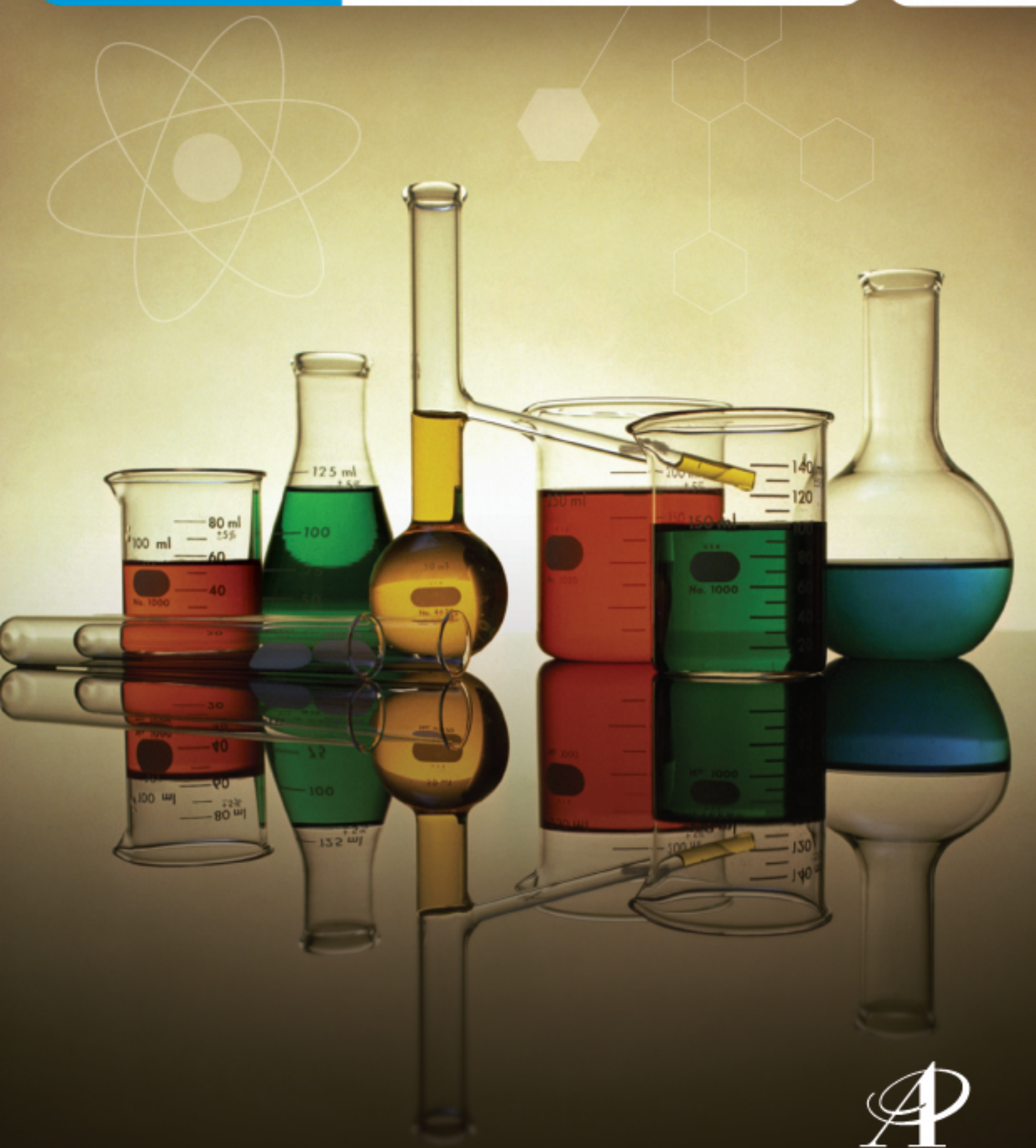




LIFE·PAC<sup>®</sup>

Science



Alpha Omega Publications<sup>®</sup>

# SCIENCE 809 BALANCE IN NATURE

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# BALANCE IN NATURE

If you could step away from earth for a moment, as the astronauts have done, you could easily see that the earth is an isolated planet. This planet can function only if all its systems are kept in balance. The sun is the only source of energy entering the system. Plants capture solar energy and convert carbon dioxide and water into food. This food supplies animals who digest it and give off carbon dioxide. Great advances have been made in agriculture that would startle the food gatherers of the past.

The elements of the earth are constantly recycled. Each element is part of a system and is used over and over again. Nitrogen, water, carbon, and oxygen are elements in

the main endless cycles that insure a constant supply for plant growth and animal nutrition. The decay cycle involves the breakdown of organic matter and prevents dead organic matter from stockpiling in the earth.

Natural controls keep animal and plant populations in balance. Humans have brought pressure on both the environment and the natural resources. They are the only species able to control the environment and to make decisions that will affect the future. Scientists and concerned citizens are searching for answers, and the Bible declares (Proverbs 29:18), "Where there is no vision the people perish...."

## OBJECTIVES

**Read these objectives.** The objectives tell you what you will be able to do when you have successfully completed this LIFE PAC®.

When you have finished this LIFE PAC, you should be able to:

1. Explain the leaf structures involved in photosynthesis.
2. List the nine requirements for plant growth.
3. Write a balanced equation for photosynthesis.
4. List the three major advances of modern agriculture.
5. Describe the hybrid plants and tell why they are so important.
6. Tell why some people are hungry and what can be done to help solve the problems of hunger.
7. Describe the relationship between Rhizobium bacteria, legume plants, and soil fertility.
8. Name the two important groups of decomposers and tell two values of decay.
9. Describe how water is recycled through precipitation, ground water, and transpiration.
10. Describe how the carbon dioxide of animal respiration and the oxygen of photosynthesis are involved in a cycle.
11. Define ten ecological terms.
12. Cite four human pressures on the environment and give an example of each.
13. List eight natural resources and give one way of conserving each resource.

**Survey the LIFEPAK.** Ask yourself some questions about this study. Write your questions here.

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## I. PHOTOSYNTHESIS AND FOOD

The earth is an isolated planet. Energy comes from the sun, but nothing else enters or leaves planet *Earth*. Plants are basic to the existence of animals. Plants can use the energy from the sun and can produce complex molecules that serve as food for all animals. Plants also provide a constant source of oxygen for animal respiration.

Great advances in agriculture have been made since ancient people gathered berries and roots for survival. Today food production has increased with the use of machinery, farm chemicals, and **hybrid** plants. Scientists are constantly searching for improved techniques. Not all nations share equally in this new technology.

### SECTION OBJECTIVES

**Review these objectives.** When you have completed this section, you should be able to:

1. Explain the leaf structures involved in photosynthesis.
2. List the nine requirements for plant growth.
3. Write a balanced equation for photosynthesis.
4. List the three major advances of modern agriculture.
5. Describe hybrid plants and tell why they are so important.
6. Tell why some people are hungry and what can be done to help solve the problems of hunger.

### VOCABULARY

**Study these words** to enhance your learning success in this section.

**catalyst** (kat' u list). A substance that brings about a change without being altered.

**chlorophyll** (klôr' u fil). The green pigment found in most plants.

**chloroplast** (klôr' u plast). A special cell body containing chlorophyll.

**epidermis** (ep' u dêr' mis). The outer layer of cells on the leaf.  
**glucose** (glü' kôs). The simple sugar formed during photosynthesis.  
**guard cell** (gärd sel). A special cell that regulates the stomata.  
**hybrid** (hî' brid). The result of a cross between two unlike animals or plants.  
**photosynthesis** (fô' tu sin' thu sis). The process of plants converting carbon dioxide and water into glucose and oxygen.  
**protein** (prô' tèn). An organic molecule containing nitrogen.  
**starch** (stärch). A chain of simple sugar units.  
**stoma** (plural stomata) (stô' mu). Small pore in a leaf.  
**sugar** (shüg' ur). A simple organic compound of carbon, hydrogen, and oxygen such as the glucose molecule produced in photosynthesis.  
**trace elements** (träs el' u munts). A group of elements that are needed in very small amounts for plant growth.  
**transpiration** (tran' spu rā' shun). The loss of water through stomata.

**Note:** All vocabulary words in this LIFE PAC appear in **boldface** print the first time they are used. If you are unsure of the meaning when you are reading, study the definitions given.

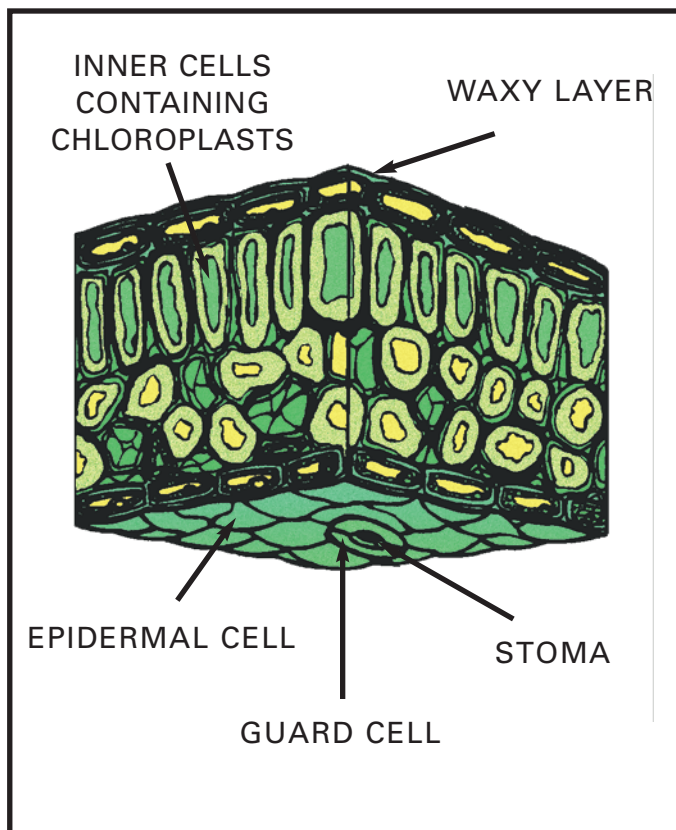
**Pronunciation Key:** hat, āge, cāre, fār; let, ēqual, tērm; it, īce; hot, ōpen, ōrder; oil; out; cup, pūt, rüle; child; long; thin; /TH/ for then; /zh/ for measure; /u/ represents /a/ in about, /e/ in taken, /i/ in pencil, /o/ in lemon, and /u/ in circus.

## PHOTOSYNTHESIS

**Photosynthesis** is a complex chemical reaction that takes place mainly in the leaves of plants. Special bodies called **chloroplasts** contain the **chlorophyll** necessary for energy absorption.

**The Structure.** The leaf is the basic center for photosynthesis. Most leaves are flat with a large surface area. Leaves are also often oriented to the sun to capture available light. The surface, or **epidermal** layer, of leaf cells is covered with a waxy layer that reduces water loss. Photosynthesis occurs in the inner cells of the leaf where the chlorophyll is found.

Chlorophyll is the green pigment found in the interior cells of most leaves. It acts as a **catalyst** during photosynthesis. A catalyst is a substance that changes the rate of a reaction without being altered itself. Chlorophyll is responsible for absorbing energy from light and passing it through a cycle. This cycle converts the energy into a form the plant can use and



**Figure 1: Cross Section of a Typical Leaf**

store. Chlorophyll is located in small cell bodies called chloroplasts. Chloroplasts are found in the interior cells of leaves and in one type of surface cell.

Plants can also have orange and yellow pigments. In the autumn chlorophyll is no

longer produced by the leaf; therefore, the yellow and orange pigments show through. Some leaves also produce a red pigment under cool fall conditions. This pigment gives the typical red autumn color of maples and sumacs.



**Try this investigation.**

<b>These supplies are needed:</b>	cropper
microscope	leaves from two unlike plants
new single-edged razor blade	cover slip
glass slide	water



**Follow these directions and complete the activities.** Put a check in the box when each step is completed.

- 1. Roll a leaf lengthwise into a tight roll.
- 2. Carefully cut thin slices of the leaf roll. Make some slices so thin that you almost end up with nothing.
- 3. Mount the thinnest pieces in water. Drop on the glass slide and cover with a cover slip. The leaf sections should look like tiny threads. If they are larger, keep slicing until you have thinner pieces.
- 4. Search through the microscope until you find a section that looks like Figure 1.

1.1



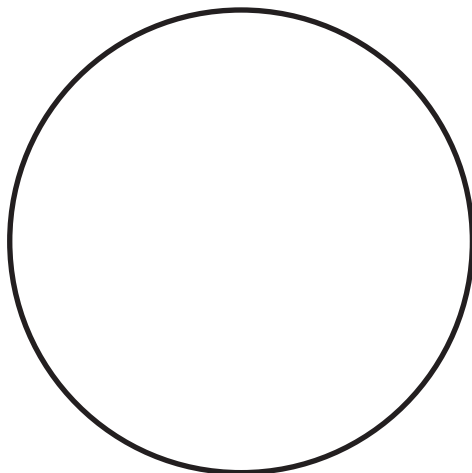
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Initial Date

1.2

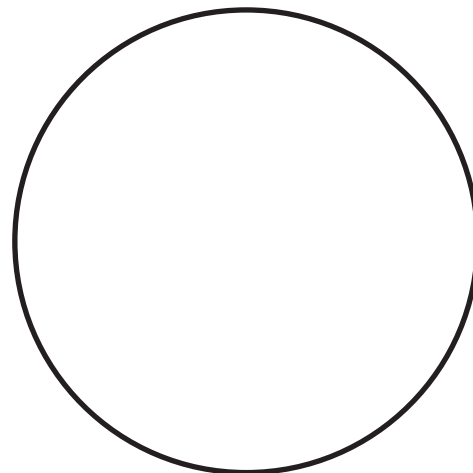


5. Repeat Steps 1 through 4 using a leaf from another type of plant. Draw the second leaf in the space provided.

Teacher check \_\_\_\_\_  
Initial Date



**Leaf 1**



**Leaf 2**