

Designing Experiments

Your teacher will give you a slice of potato. Predict what percentage of the potato's mass is water. Then come up with a plan to test your prediction. For materials, you will be given a hair dryer and a balance. Obtain your teacher's approval before carrying out your plan. How does your result compare with your prediction?

FIGURE 4

Water, Food, and Living Space

This environment meets the needs of the many animals that live there. **Inferring** How do plants meet their needs for food?

The Needs of Living Things

Though it may seem surprising, flies, bacteria, and all other organisms have the same basic needs as you. **All living things must satisfy their basic needs for water, food, living space, and stable internal conditions.**

Water All living things need water to survive. In fact, most organisms can live for only a few days without water. Organisms need water to obtain chemicals from their surroundings, break down food, grow, move substances within their bodies, and reproduce.

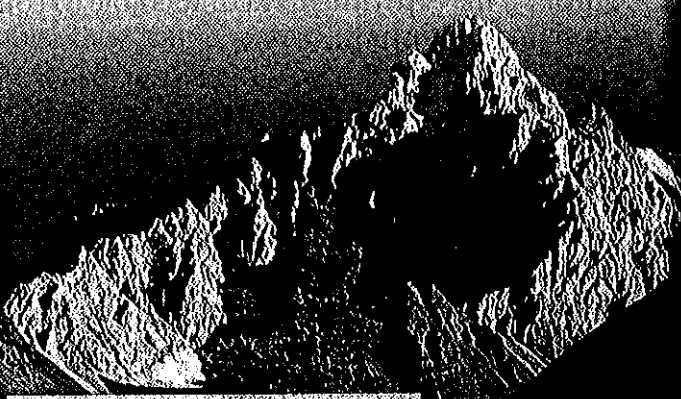
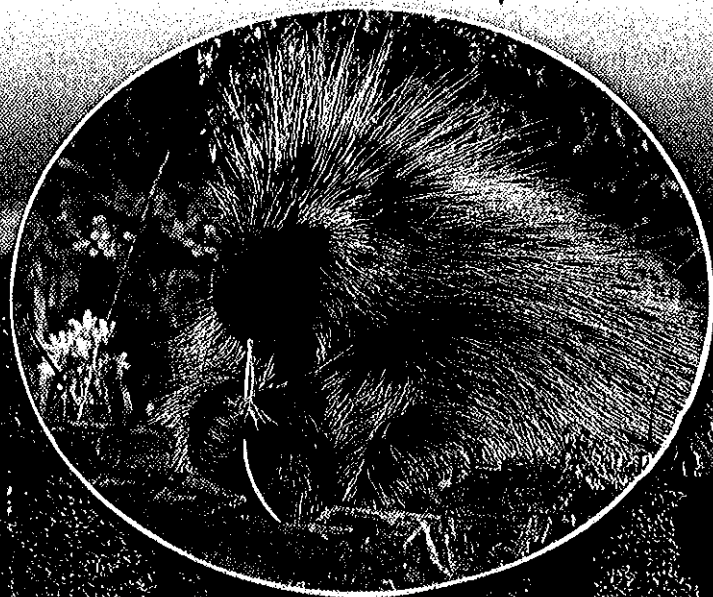
Food Recall that organisms need a source of energy to live. They use food as their energy source. Organisms differ in the ways they obtain energy. Some organisms, such as plants, capture the sun's energy and use it to make food. Organisms that make their own food are called **autotrophs** (AW toh trohfs). *Auto-* means "self" and *-troph* means "feeder." Autotrophs use the food they make to carry out their own life functions.

Organisms that cannot make their own food are called **heterotrophs** (HET uh roh trohfs). *Hetero-* means "other." Heterotrophs obtain their energy by feeding on others. Some heterotrophs eat autotrophs and use the energy in the autotroph's stored food. Other heterotrophs consume heterotrophs that eat autotrophs. Therefore, a heterotroph's energy source is also the sun—but in an indirect way. Animals, mushrooms, and slime molds are examples of heterotrophs.



Reading
Checkpoint

Why are plants called autotrophs?



The porcupine, a heterotroph, feeds on green plants.

...and all other living things need living space,

...In fact, most organisms need water. Organisms in their surroundings, within their bodies,

...of energy to live. Organisms differ in the way they get energy, such as plants, capture energy from the sun. Organisms that cannot capture energy (aw toh trohfs). "Autotrophs" use their own energy to perform life functions.

Organisms that cannot make their own food are called heterotrophs. "Hetero" means "other." Heterotrophs depend on others. Some heterotrophs get the energy in the food they eat. Heterotrophs consume heterotrophs. For example, a heterotroph's energy comes from another heterotroph. Animals, for example, are heterotrophs.

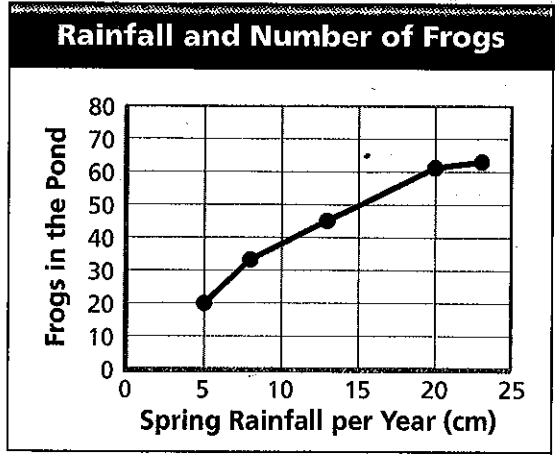
Heterotrophs?

Math Analyzing Data

Frogs and Rainfall

Frogs need a moist environment, such as a pond, to survive. For five years, a scientist counted the frogs in a pond. The scientist also measured the spring rainfall.

- 1. Reading Graphs** What data are plotted on the horizontal axis? What units were used?
- 2. Interpreting Data** What was the greatest number of frogs that the scientist recorded? How much rain fell that spring?
- 3. Making Generalizations** What is the relationship between the number of frogs and the amount of spring rain? What do you know about living things that might help explain that relationship?



Living Space All organisms need a place to live—a place to get food and water and find shelter. Whether an organism lives in the freezing Antarctic or the scorching desert, its surroundings must provide what it needs to survive.

Because there is a limited amount of space on Earth, some organisms must compete for space. Trees in a forest, for example, compete with other trees for sunlight above ground. Below ground, their roots compete for water and minerals.

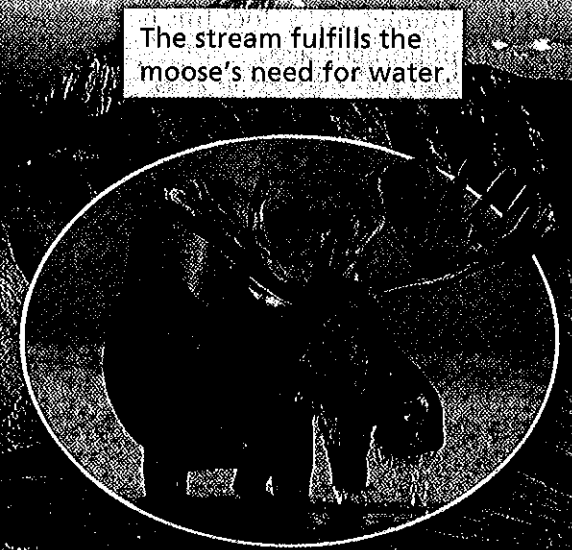




FIGURE 5

Homeostasis

Sweating helps your body maintain a steady body temperature. Your body produces sweat during periods of strenuous activity. As the sweat evaporates, it cools your body down.

Stable Internal Conditions Organisms must be able to keep the conditions inside their bodies stable, even when conditions in their surroundings change significantly. For example, your body temperature stays steady despite changes in the air temperature. The maintenance of stable internal conditions is called **homeostasis** (hoh mee oh STAY sis).

Homeostasis keeps internal conditions just right for cells to function. Think about your need for water after a hard workout. When water levels in your body decrease, chemicals in your body send signals to your brain, causing you to feel thirsty.

Other organisms have different mechanisms for maintaining homeostasis. Consider barnacles, which as adults are attached to rocks at the edge of the ocean. At high tide, they are covered by water. At low tide, however, the watery surroundings disappear, and barnacles are exposed to hours of sun and wind. Without a way to keep water in their cells, they would die. Fortunately, a barnacle can close up its hard outer plates, trapping some water inside. In this way, a barnacle can keep its body moist until the next high tide.



Reading
Checkpoint

What is homeostasis?

Section 1 Assessment



Target Reading Skill Using Prior Knowledge

Review your graphic organizer and revise it based on what you just learned in the section.

Reviewing Key Concepts

- a. Reviewing** List the six characteristics of living things.

b. Inferring A bird sitting in a tree flies away as you walk by. Which of the life characteristics explains the bird's behavior?

c. Applying Concepts Explain why the tree, which does not move away, is also considered a living thing.
- a. Defining** What was meant by the idea of *spontaneous generation*?

b. Explaining Why is this idea incorrect?

c. Summarizing How did Pasteur's experiment help show that spontaneous generation does not occur?

- a. Identifying** What four things do all organisms need to survive?

b. Describing Which need is a fox meeting by feeding on berries?

c. Applying Concepts The arctic fox has thick, dense fur in the winter and much shorter fur in the summer. How does this help the fox maintain homeostasis?

Lab
zone

At-Home Activity

Observing Life With a family member, observe a living thing, such as a family pet, a houseplant, or a bird outside your window. Record your observations as you study the organism. Prepare a chart that shows how the organism meets the four needs of living things discussed in this section.