The Role of Organisms in Food Chains

Look at the plants in the food chains in Figure 2.1. Green plants and algae contain a chemical called chlorophyll. Chlorophyll traps the energy of the Sun, in order to create food through photosynthesis. You will learn more about the process of photosynthesis in chapter 3. Plants and algae are called **producers** because they produce food for themselves and others, using the Sun's energy and nutrients in the soil and air. At the beginning of every food chain, there must be a producer. Producers make life possible for all other organisms on Earth.

All other organisms are called **consumers**, because they consume (eat) the food made by the producers. Consumers come in all sizes and shapes and include grazing animals, fish, and animals that eat other animals. Look again at the food chains in Figure 2.1. The organism next to the producer always feeds on plants or algae. Plant-eating animals are called **herbivores**. Cows, snowshoe hares, deer, herring, and tadpoles are examples of this group of consumers. Figure 2.3 on the next page shows Arctic herbivores.

Word CONNECT

The word "herbivore" comes from the Latin words *herba* (herb or plant) and *vorare* (to devour). Using this knowledge, write what you think the Latin words *carnis* and *omnis* mean.

The next organism in the food chain eats the herbivore. These meat-eaters are called **carnivores** (see Figure 2.4). Canada lynxes, cod, minnows, and dragonflies are examples of carnivores. The carnivore at the end of the food chain is known as the top carnivore.

Sometimes the top carnivore feeds on other carnivores: for example, a hawk preys on smaller, insect-eating birds. In some cases, the top carnivore may also feed on herbivores: the lynx eats snowshoe hares, and the wolf eats moose. Figure 2.5 shows a complex ecosystem.

Figure 2.3 Musk oxen are Arctic herbivores. In winter, they scrape through the snow to find lichen, grass, and moss to eat.

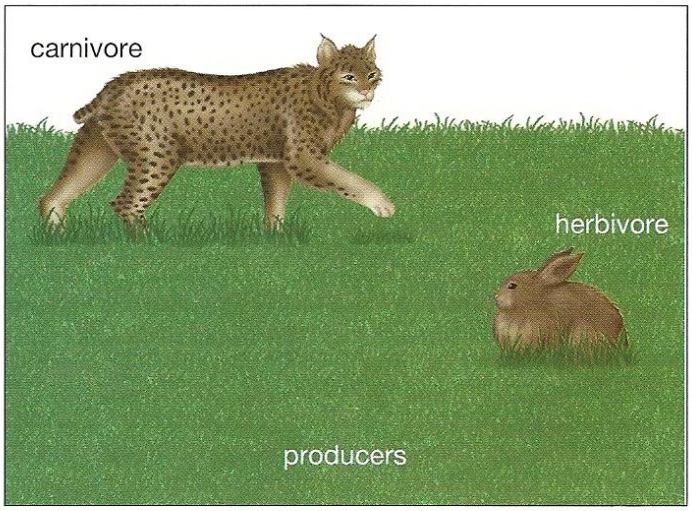

Figure 2.4 These organisms are typical producers and consumers.

Figure 2.5 A pond ecosystem. Producers in this ecosystem include algae and water lilies. Herbivores that feed on the producers include snails. Carnivores include frogs and turtles. Big fish, such as bass, are the top carnivores.

Predators are animals that kill and eat other animals called **prey**. Hawks and wolves are examples of predators. Predators usually eat only meat; however, some will eat almost anything if food is in short supply. Such animals, including bears and dogs, are called **omnivores**. How would you describe your place in the food chain?

At Home ACTIVITY

The Masked Bandit

Raccoons are ever-present omnivores in many Canadian communities. They make their nightly journeys through neighbourhoods, rummaging in garbage containers, rattling lids, and disturbing sleep. How can you describe their ecosystem and the way they fit into it?

What to Do

1. Research and answer the following questions.
   - **(a)** Why are there are so many raccoons in cities?
   - **(b)** What do raccoons eat in the "wild"?
   - **(c)** What enemies, if any, do raccoons have?
   - **(d)** How are raccoons suited to live in different habitats?
2. People have varying responses when confronted with raccoons on their property. Some people feed them. Some people try to ignore them. Some people arrange to have the raccoons trapped so that they can be released outside of the community. What are the advantages and disadvantages of each response for the community and for the raccoons?
3. Check with your local Humane Society to find out how captured or injured raccoons are handled. If raccoons are not common in your community, ask the same questions about another animal considered to be a nuisance.

What Did You Find Out?

1. Compare your findings with what others learned. Work with a partner to write some "guidelines" for city dwellers on the best way to deal with raccoons.
2. With a partner, develop a question of your own about raccoons, then find a way to answer it, either by direct observation or through research.

The Clean-Up Squads: Scavengers and Decomposers

Have you ever wondered why you seldom see a dead carcass in a natural environment? If dead organisms stayed whole, the earth would soon be covered in bodies! In every community, there must be "clean-up squads" that get rid of garbage and sewage. In a biological community, the clean-up squads are consumers called **scavengers** and **decomposers**.

Figure 2.6 Carrion beetles at work

Scavengers

Many different organisms help to remove carcasses. Scavengers are organisms that eat dead or decaying plant or animal matter. For example, carrion beetles dig under the body of a dead bird or mammal, causing it to sink into the ground, as shown in Figure 2.6. The carrion beetles then lay their eggs in the carcass. What a legacy these beetles leave for their young — a huge supply of meat! Similarly, snails act as scavengers when they eat dead fish in an aquarium. (Snails can also act as herbivores when they eat living plants and algae.) Gulls act as scavengers when they eat dead material washed ashore along a beach. (Gulls are also carnivores when they eat earthworms in a freshly ploughed field.)

Decomposers

Have you ever seen old food in your refrigerator go mouldy? If so, you have witnessed decomposers at work. Decomposers differ from scavengers in that they do not actually eat dead material. Instead, they break down dead or waste material, such as rotting wood or manure. Decomposers like the ones in Figure 2.7, absorb some of the nutrients from the broken-down material into their own cells. The remaining nutrients recycle back into the ecosystem. Many bacteria and fungi are decomposers. Although bacteria are micro-organisms (too small to see without a microscope), some fungi are quite large and visible. In fact, you can see common fungi called mushrooms in any grocery store or vegetable market.

Though many decomposers are micro-organisms, they play major roles in everyday life. A scientist named Alexander Fleming observed that bacteria did not grow near moulds. His observations were used to develop penicillin, an antibiotic that fights disease-causing bacteria. People use their knowledge of how micro-organisms work in other beneficial ways, too. For example, moulds are used to ferment blue cheese, while bacteria are used to make sauerkraut and are added to milk to make yogurt. Yeast is another type of mico-organism, used to make bread dough rise as shown in Figure 2.8. Do you think people who were first offered blue cheese or sauerkraut knew what they were eating?

Decomposers also play a key role in breaking down much of our kitchen waste. We can assist this process by composting lettuce leaves, apple cores, carrot peelings, and other kitchen wastes in a composter like the one shown in Figure 2.9. When we compost, we let nature's decomposers turn our kitchen wastes into rich soil we can use for fertilizing the garden. In the next investigation, you will experiment with composters.

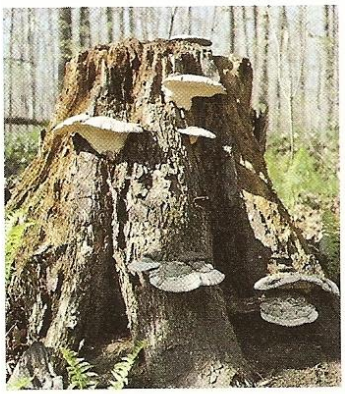

Figure 2.7 Bracket fungus digests the dead cells of tree bark.

Figure 2.8 Yeast is used in bread making to cause the dough to rise.

Figure 2.9 Kitchen wastes can be composted in a backyard composter.

STRETCH Your Mind

You may have seen a robin eat a worm, but have you ever seen a worm eat a robin? Try to explain how this might happen.

DidYouKnow?

The wreck of the *Titanic* could disappear completely from the ocean floor by 2030. Bacteria are removing the iron from its hull at a rate of one tenth of a tonne a day.

INTERNET CONNECT

www.school.mcgrawhill.ca/resources/

Find out more about bracket fungi by researching them on the Internet. Go to the web site above, then to **Science Resources**, and then to **SCIENCEPOWER 7** to know where to go next. Find answers to these questions: How do bracket fungi attach themselves to a tree? Under what conditions do they grow most successfully? If you were to scrape a bracket fungus off a tree, would it regrow in the same spot? Make up at least one question of your own.

Skill POWER

For tips on using the Internet effectively, turn to page 497.