

## 14.2 Community Interactions

### VOCABULARY

competition  
predation  
symbiosis  
mutualism  
commensalism  
parasitism

**KEY CONCEPT** Organisms interact as individuals and as populations.

### MAIN IDEAS

- ▶ Competition and predation are two important ways in which organisms interact.
- ▶ Symbiosis is a close relationship between species.

### ☀ Connect to Your World

Each day, two hot dog vendors sell virtually identical products to anyone who is hungry. They may be on different sides of the street, but they are still trying to sell hot dogs to the same hungry consumers. A vendor selling hot pretzels may also be trying to sell to the same customers, but with a slightly varied product. Just like these vendors, organisms constantly compete with one another.

### ▶ MAIN IDEA

## Competition and predation are two important ways in which organisms interact.

Two birds may fight over territories. A fish may prey on insects floating on the water. These are just two examples of the many interactions between species in an ecosystem.

### Competition

**Competition** occurs when two organisms fight for the same limited resources. There are two different types of competition: interspecific competition and intraspecific competition.

Even though they may have different niches, two species may still use similar resources. Interspecific competition occurs when two different species compete for a limited resource, such as space. In a lawn, for example, grass, dandelions, and many other plants all compete for nutrients and water.

Competition also occurs among members of the same species. This is known as intraspecific competition. Individuals of a particular species struggle against one another for limited resources. You can observe intraspecific competition during the spring breeding season of birds. A typical male will share a particular territory with males of different bird species but will not tolerate another male of its own species in the same area.

### Predation

Another way species interact with one another is through predation.

**Predation** is the process by which one organism captures and feeds upon another organism. Many organisms, such as the snake in **FIGURE 2.1**, have become highly adapted to hunting and killing their prey.

**FIGURE 2.1** Snakes are predators that swallow their prey whole. The hollow fangs of this timber rattlesnake inject venom to paralyze and kill its prey.





The timber rattlesnake, for example, is a predator that preys on small animals such as mice, voles, rabbits, and squirrels. Lying silent, hidden among leaf litter on the forest floor, the rattlesnake has found a niche as an ambush predator. A swift bite from the snake's fangs injects its venom. The venom attacks the nervous system and eventually paralyzes the prey. The snake swallows the paralyzed animal whole.

Herbivores can also be considered predators. The deer that eats grass in fields and leaves from trees is preying on the plants.

**Evaluate** How does natural selection shape predator–prey relationships?

**MAIN IDEA**

## Symbiosis is a close relationship between species.

A honeybee buzzes away from a flower with its reward of nectar. Small pollen grains have become attached to the bee's back. When the bee arrives at the next flower, the pollen fertilizes the egg of the next plant. In this way, a relationship, or symbiosis, between the bee and the flower has evolved. **Symbiosis** is a close ecological relationship between two or more organisms of different species that live in direct contact with one another. There are three major types of symbiosis: mutualism, commensalism, and parasitism.

### Mutualism

**Mutualism** is an interspecies interaction in which both organisms benefit from one another. The relationship between the lesser long-nosed bat and the saguaro cactus is another example of mutualism. During the spring, bats help pollinate the cacti through the indirect transfer of pollen as they fly from one cactus to another to feed on flower nectar. When the fruit ripens in the summer, bats become fruit eaters, as shown in **FIGURE 2.2**. The cactus benefits when bats spread its indigestible seeds across the desert.

### Commensalism

Another type of symbiotic relationship is commensalism. **Commensalism** is a relationship between two organisms in which one receives an ecological benefit from another, while the other neither benefits nor is harmed. Right now you may be a part of a commensal relationship. Buried deep in the hair follicles of your eyelashes are microscopic mites that feed on the secretions and dead skin cells of your body. These harmless organisms are called demodexes, and they have found their highly specialized niche in your hair follicles.

### Parasitism

Parasitism is a symbiotic relationship involving a species that directly harms its host. **Parasitism** is a relationship similar to predation in that one organism benefits while the other is harmed. But unlike a predator, which quickly kills and eats its prey, a parasite benefits by keeping its host alive for days or years. For example, the braconid wasp lays its eggs inside a caterpillar. When the larvae hatch, they eat the caterpillar from the inside out, consuming the nutrients they need to grow into adults.

**READING TOOLBOX**

**VOCABULARY**

The word *symbiosis* comes from the Greek word *sumbios*, which means “living together.”

**READING TOOLBOX**

**TAKING NOTES**

Mutualism, commensalism, and parasitism are distinct types of symbiosis. Add details with examples of your own.

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graph TD; Symbiosis --> Mutualism; Symbiosis --> Commensalism; Symbiosis --> Parasitism;
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## FIGURE 2.2 Symbiotic Relationships

The interactions between species in an ecosystem can take many different forms. A symbiotic relationship involves interactions between organisms of different species that live in direct contact.

- Organism is harmed
- 0 Organism is not affected
- + Organism benefits

### Parasitism

- **Hornworm caterpillar**  
The host hornworm will eventually die as its organs are consumed by wasp larvae.



- + **Braconid wasp**  
Braconid larvae feed on their host and release themselves shortly before reaching the pupae stage of development.

### Commensalism

- 0 **Human** Our eyelashes are home to tiny mites that feast on oil secretions and dead skin. Without harming us, up to 20 mites may be living in one eyelash follicle.



- + **Demodicids** Eyelash mites find all they need to survive in the tiny follicles of eyelashes. Magnified here 225 times, these creatures measure 0.4 mm in length and can be seen only with a microscope.

### Mutualism

- + **Lesser long-nosed bat** The bat depends on night-blooming cacti as its primary source of food. Cacti are a rich source of fruit and nectar, staples of the bat's diet.

- + **Saguaro cactus** As the bat feeds on the cactus' fruit, it also ingests the seeds. These indigestible seeds are dispersed to new locations as the bat flies across the desert.

### CRITICAL VIEWING

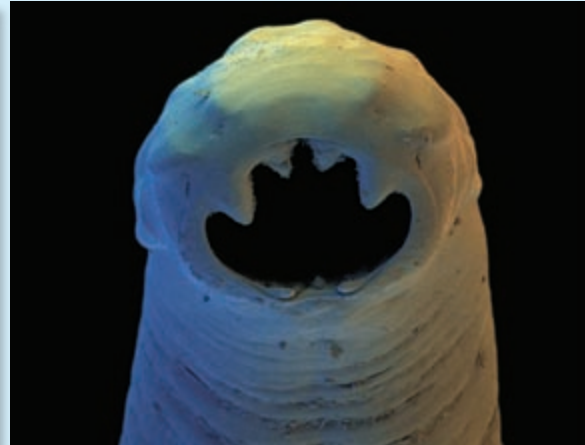
How might the symbiotic relationship change if eyelash mites destroyed hair follicles?

## FIGURE 2.3 Human Parasites: Inside and Out

Humans can get parasites in many ways. Leeches attach to the exposed skin of humans. By penetrating human skin, hookworms find their home in the digestive tract.



Many leeches feed on the blood of a host organism. Freshwater leeches such as this one can grow to lengths of 12 cm or more.



Hookworms are endoparasites with sharp teeth that attach to the intestinal wall of a host organism and absorb nutrients for food. (colored SEM; magnification 200×)

**Hypothesize** Why is it important for ectoparasites to stay undetected by their hosts?

### CONNECT TO

#### INVERTEBRATES

Leeches and hookworms are classified as invertebrates. In **Invertebrate Diversity**, you will learn more about invertebrate diversity.

The needs of a parasite are met by a host—the victim of the parasite. There are two different ways that parasites can use their host. An ectoparasite makes its home on the exterior of an organism, attaching itself to the outside of the host and usually feeding on its fluids. Common ectoparasites include fleas, ticks, and leeches, such as the one seen in **FIGURE 2.3**. Many types of ectoparasites are also known to carry a wide variety of diseases that can affect their host. Parasites can also be found inside of living organisms. Endoparasites live in the tissues and organs of a host where, safely hidden, they feed on the nutrients ingested by their host. Large endoparasites, such as tapeworms and hookworms, and smaller protozoan endoparasites can kill their host if not treated.

**Connect** What type of symbiosis is the relationship between a dog and its owner?



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PREMIUM CONTENT

## 14.2 Formative Assessment

### REVIEWING MAIN IDEAS

1. During the fall spawning of salmon, grizzly bears fight over space on the banks of a river. What type of **competition** is this?
2. Describe and give examples of the three types of **symbiosis**.

### CRITICAL THINKING

3. **Compare and Contrast** How are **predation** and **parasitism** similar? How do they differ?
4. **Synthesize** After a lion has made a kill, birds will sometimes arrive to pick at the leftover carcass. Which are the predators: the birds, the lion, or both? Why?

### CONNECT TO

#### ANIMAL BEHAVIOR

5. You have probably heard the saying “There is safety in numbers.” Why might traveling in a large group be beneficial to prey species?