Communities

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CHAPTER 1 Communities

Lesson Objectives

- Define community.
- Explain how predation affects predator and prey populations.
- Describe outcomes of intraspecific and interspecific competition.
- Identify three types of symbiotic relationships.

Lesson Vocabulary

- commensalism
- community
- competition
- host
- keystone species
- mutualism
- parasite
- parasitism
- predation
- predator
- prey
- symbiosis

Introduction

A community is the biotic component of an ecosystem. It consists of the populations of all the species that live in the same area. Populations in communities often interact with each other. Community interactions are important factors in natural selection. They help shape the evolution of the interacting species. Types of community interactions include predation, competition, and symbiosis. You'll read about each type of interaction in this lesson.

Predation

Predation is a relationship in which members of one species consume members of another species. The consuming species is called the predator. The species that is consumed is called the prey. In **Figure** 1.1, the wolves are predators, and the moose is their prey.

FIGURE 1.1
Pack of wolves preying on a moose

Predator and Prey Populations

A predator-prey relationship tends to keep the populations of both species in balance. Look at the graph in **Figure** 1.2. As the prey population increases, there is more food for the predators. So after a slight lag time, the predator population also increases. As the number of predators increases, more prey are captured. This causes the prey population to decrease, followed by the predator population decreasing again.

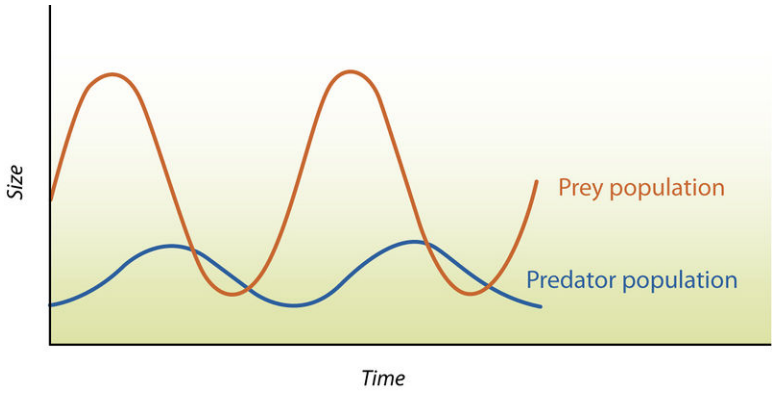

FIGURE 1.2
Predator-Prey populations.

Keystone Species

Some predator species play a special role in their community. They are called keystone species. When the population size of a keystone species changes, the populations of many other species are affected. Prairie dogs, pictured in **Figure** 1.3, are an example of a keystone species. Their numbers affect most of the other species in their community. Prairie dog actions improve the quality of soil and water for plants, upon which most other species in the community depend.

Adaptations to Predation

Both predators and prey have adaptations to predation that evolve through natural selection. Predator adaptations help them capture prey. Prey adaptations help them avoid predators. A common adaptation in both predator and prey species is camouflage. You can see an example in **Figure** 1.4. You can also see some amazing examples in this

FIGURE 1.3
Prairie dogs are a keystone species in their community.

video: http://www.ted.com/talks/david_gallo_shows_underwater_astonishments?language=en

Multimedia

MEDIA
Click image to the left or use the URL below.
URL: http://www.ck12.org/flx/render/embeddedobject/140775

FIGURE 1.4
There is a well-camouflaged frog in this photo. Do you see it?

Competition

Competition is a relationship between organisms that depend on the same resources. The resources might be food, water, or space. Competition can occur between organisms of the same species or between organisms of different species.

- Competition within a species is called intraspecific competition. It leads to natural selection within the species, so the species becomes better adapted to its environment.

- Competition between different species is called interspecific competition. It might lead to the less well-adapted species going extinct. Or it might lead to one or both species evolving specialized adaptations. For example, competing species might evolve adaptations that allow them to use different food sources. You can see an example in **Figure** 1.5.

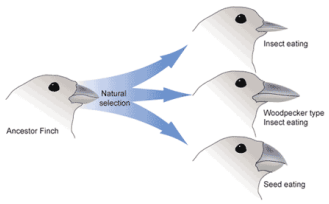

FIGURE 1.5
These species of birds have evolved different types of beaks to exploit different food sources. This allows them to live in the same area without competing for food.

Symbiosis

Symbiosis is a close relationship between two species in which at least one species benefits. For the other species, the relationship may be beneficial, harmful, or neutral. There are three types of symbiosis: mutualism, parasitism, and commensalism.

Mutualism

Mutualism is a symbiotic relationship in which both species benefit. An example of mutualism is pictured in **Figure** 1.6. The clownfish in the photo is hiding among the tentacles of a sea anemone. The tentacles have stingers that can inject poison in the anemone's prey. The clownfish is protected from the stingers by mucus that covers its body.

How do the two species benefit from their close relationship? The anemone provides the clownfish with a safe place to live by keeping away predatory fish. The clownfish also feeds on the remains of the anemone's prey. In return, the clownfish helps the anemone catch food by attracting prey with its bright colors. Its feces also provide nutrients to the anemone.

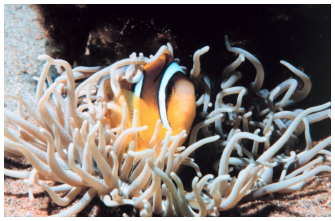

FIGURE 1.6
A clownfish takes refuge among the tentacles of a sea anemone.

Parasitism

Parasitism is a symbiotic relationship in which one species benefits and the other species is harmed. The species that benefits is called the parasite. The species that is harmed is called the host. Many species of animals are parasites, at least during some stage of their life cycle. Most animal species are also hosts to one or more parasites.

A parasite generally lives in or on its host. An example of a parasite that lives in its host is the hookworm. **Figure** 1.7 shows two hookworms living inside a human host's intestines. The hookworms obtain nutrients and shelter from their host, which is harmed by the loss of nutrients and blood.

Some parasites kill their host, but most do not. It's easy to see why. If a parasite kills its host, the parasite may also die. Instead, parasites usually cause relatively minor damage to their host.

FIGURE 1.7
Hookworm parasites inside their human host's intestines

Commensalism

Commensalism is a symbiotic relationship in which one species benefits while the other species is not affected. An example is the relationship between birds called cattle egrets and cattle (see **Figure** 1.8). Cattle egrets feed on insects. They follow cattle herds around to take advantage of the insects stirred up by the feet of the cattle. The egrets get ready access to food from the relationship, whereas the cattle are not affected.

FIGURE 1.8
A cattle egret "hangs out" near cattle to catch insects stirred up by the cattle's feet.

Lesson Summary

- A community is the biotic component of an ecosystem. It consists of the populations of all the species that live in the same area.
- Predation is a relationship in which members of one species, called the predator, consume members of another species, called the prey.
- Competition is a relationship between organisms that depend on the same resources. Competition can occur between members of the same species or between members of different species.
- Symbiosis is a close relationship between two species in which at least one species benefits. Types of symbiosis include mutualism, parasitism, and commensalism.

Lesson Review Questions

Recall

1. Define community.
2. Describe two potential outcomes of interspecific competition.
3. Identify three types of symbiosis.

Apply Concepts

4. After a rainy summer and excessive weed growth, a population of mice has doubled in size because of a greater food supply. The main predators of the mice are owls. Predict how the owl population in the same community is likely to change.

Think Critically

5. Explain how camouflage could benefit both predator and prey species.
6. Why do parasites usually not kill their host?

Points to Consider

A community is the biotic component of an ecosystem.

1. What is an ecosystem?
2. What are some examples of ecosystems?

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