MAIN IDEA

Species can shape each other over time.

Species interact with each other in many different ways. For example, they may compete for the same food source or be involved in a predator-prey relationship. Most of these interactions do not involve evolutionary changes. However, sometimes the evolutionary paths of two species become connected.

Beneficial Relationships Through Coevolution

The bull-thorn acacia is a plant species with branches covered in hollow thorns. Although the thorns protect the plant from being eaten by large animals, small herbivores such as caterpillars can fit between them. To the rescue comes *Pseudomyrmex ferrugineus,* a species of stinging ants. As shown in **FIGURE 6.3**, these ants live inside the thorns and feed on the plant's nectar. The ants protect the plant by stinging animals that try to eat the leaves.

This relationship is much more than a simple cooperation between two species. The acacia and the ants share an evolutionary history. The hollow thorns and nectar-producing leaves of the acacia and the stinging of the ants have evolved due to the relationship between the two species. Relatives of these species that are not involved in this type of relationship do not have these traits. Such relationships form through **coevolution,** the process in which two or more species evolve in response to changes in each other.

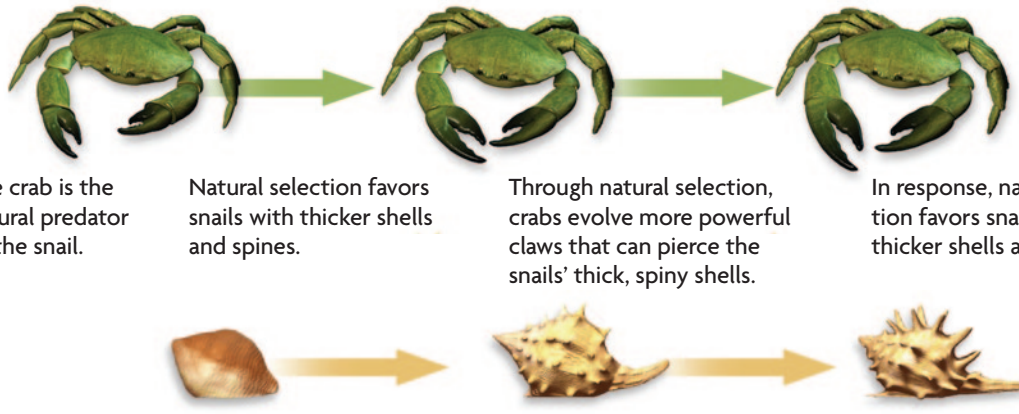
FIGURE 6.3 The relationship between this ant and the acacia plant has developed through coevolution. The ant lives inside the hollow thorn and protects the acacia by stinging any potential predators.

Evolutionary Arms Races

Coevolution can also occur in competitive relationships. These interactions can lead to "evolutionary arms races," in which each species responds to pressure from the other through better adaptations over many generations.

For example, many plants produce defense chemicals in the soil to discourage other plants from growing nearby and competing for resources. Natural selection then favors competing plants that can overcome the effects of the chemicals. After many generations, most competitors have some level of resistance and are again able to grow near the defensive plant. Natural selection then favors plants that have evolved even more potent chemicals. In another case, the thick shells and spines of murex snails are an adaptive response to predation by crabs. In turn, crabs have evolved powerful claws that are strong enough to crack the snails' shells.

Predict **What do you think will happen in future generations of crabs and snails?**



The crab is the natural predator of the snail.

Natural selection favors snails with thicker shells and spines.

Through natural selection, crabs evolve more powerful claws that can pierce the snails' thick, spiny shells.

In response, natural selection favors snails with even thicker shells and spines.