

Lesson Self-Check

CAN YOU EXPLAIN IT?

FIGURE 18: Naked mole rats live in a eusocial colony.



Naked mole rats live underground, as moles do. Each solitary, underground colony typically has only one reproductive female, the queen, and a few breeding males. The remainder of the colony consists of non-reproducing individuals that spend their entire lives as workers, maintaining and protecting the colony, gathering food, and taking care of the queen's offspring.



Explain Refer to the notes in your Evidence Notebook to explain why animals, such as naked mole rat workers, evolved not to reproduce.

Many of the eusocial insects investigated in this lesson are haplodiploid. Naked mole rats, however, are diploid animals. Their colonies, though, are still made up of closely related animals. These animals often live in areas where it is difficult for individuals to survive on their own. For example, naked mole rats live in colonies of 70 to 80 individuals. Most of the colony are the queen's siblings or offspring. Non-reproducing adults are either soldiers or workers. Soldiers defend the colony, while workers work together as a chain gang to dig through the soil to find edible tubers.

This eusocial behavior may have evolved due to the amount of work needed to find food. If leaving the colony leads to starvation, kin selection may favor staying in the burrow to work together as a group instead.

CHECKPOINTS

Check Your Understanding

1. How does a behavior that actually increases risk to an individual, such as pronking in springboks, ensure that genes will be passed along to offspring? Select all correct answers.
 - a. The behavior draws attention to the herd.
 - b. The behavior alerts the herd.
 - c. The behavior confuses predators.
 - d. The behavior uses energy.
 - e. The behavior decreases opportunity costs.

2. Classify each behavior as innate or learned.
 - a. Chimpanzees use tools to fish for termites.
 - b. Newly hatched sea turtles crawl into the sea.
 - c. Bats fly out of caves at night to eat mosquitoes.
 - d. Bears fish for salmon out of a running stream.
 - e. Birds avoid eating monarch butterflies because they taste bad.
 - f. Penguins dance ecstatically to attract a mate.
 - g. Honeybees associate certain colors and fragrances with nectar.
 - h. Cockroaches run for dark spaces when lights are turned on.

3. Which of the following best explains how behaviors, such as swarming and flocking, help protect organisms?
 - a. Individuals in swarms or flocks act as decoys to distract predators.
 - b. Working together in swarms or flocks requires less energy.
 - c. The movement and size of the swarm or flock confuses predators.
 - d. Swarms and flocks can overtake larger predators.

4. Which of the following characteristics is the best criteria for classifying a colony as eusocial?
 - a. Female workers engage in group foraging.
 - b. Opportunistic mating occurs randomly between males and females.
 - c. Within the colony there are only a few breeding females.
 - d. The colony is characterized by the defensive behavior of females.

5. A female ground squirrel may send out a call warning her offspring that a predator is near. Often, the mother sacrifices her own life since the predator can more easily locate her from the call. Even though this behavior results in death, it is beneficial to her in that:
 - a. half of her alleles are preserved in each offspring.
 - b. all of her alleles are preserved in each offspring.
 - c. the predator may be less likely to attack the population again.
 - d. the alleles that caused her behavior will no longer be in the gene pool.

6. How does cooperative behavior contribute to the survival of animals?
 - a. Cooperative behavior puts one individual at risk for the survival of the whole group.
 - b. Cooperative behavior benefits one individual, which will be reciprocated in the future.
 - c. Cooperative behavior enables individuals to work together toward a common goal that will benefit the group.
 - d. Cooperative behavior engages all members of a group to work together for the benefit of a few.

7. Use the following terms to classify each type of behavior: *communication, reciprocity, altruism, defensiveness, migration*. You may use each response more than once.
 - a. A bat shares a part of its food with another.
 - b. A monkey brings attention to itself when sounding an alarm to the group.
 - c. Bison respond to a threat stimuli from the environment.
 - d. Ants leave a pheromone trail to food.
 - e. Black bears leave an established territory to find new sources of food.
 - f. Nonbreeding female workers care for the queen's offspring.
 - g. A male peacock fans its feathers and struts.

MAKE YOUR OWN STUDY GUIDE

8. Identify the most likely costs of each behavior using the following terms: *opportunity costs, risk costs, energy costs.*
- A group of bats tend to their young rather than flying out to gather food.
 - Two worker termites guard the entrance to the mound.
 - A leopard chases down a gazelle in an attempt to eat it.
9. An antelope is grazing on the savanna and feels thirsty. It takes a drink from a nearby watering hole. As the antelope drinks, another antelope in the herd signals danger. The antelope and herd members sprint away. After running, the antelope feels hot and goes to lie in the shade.
- Identify each of the following as a stimulus or a response. If you identify it as a stimulus, decide if it is an internal or external stimulus.
- feels thirsty
 - drinks water
 - sprints away
 - lies in shade
 - feels hot
10. Two separate groups of chimpanzees, living in separate regions, both use tools to gather honey. One group uses long sticks as tools to gather honey from a log and the other uses chewed leaves to collect the honey. Which of the following would best explain these two behaviors used for the same purpose?
- cultural transmission
 - cooperation
 - transitive behavior
 - migratory behavior
11. Which of the following best explains how a certain behavior may be more likely to be selected for and evolve as an innate behavior?
- The behavior is easily learned.
 - The behavior has very low risk and opportunity costs.
 - The benefits of the behavior for survival outweigh the costs.
 - The behavior is in response to a stimulus.



In your Evidence Notebook, design a study guide that supports the main ideas from this lesson:

A behavior is anything an organism does in response to a stimulus and helps the organism maintain homeostasis in a changing environment.

A behavior is selected for if the benefit of the behavior outweighs the cost or risk.

Behaviors may be classified as innate or learned. Innate behaviors are those that are instinctive and are heritable. Learned behaviors are acquired through observation, practice, and experience and may be culturally specific.

Remember to include the following information in your study guide:

- Use examples that model main ideas.
- Record explanations for the phenomena you investigated.
- Use evidence to support your explanations. Your support can include drawings, data, graphs, laboratory conclusions, and other evidence recorded throughout the lesson.

Consider how any behavior that increases the survival of an individual or its reproductive success will likely be passed from one generation to the next.