

**CHAPTER 3**

# The Process of Science: Studying Animal Behavior

## Summary of Key Concepts

### Concept 3.1 Biologists study behavior through observations and experiments. (pp. 48–52)

*Animal behavior* refers to what an animal does as it interacts with its environment. Biologists observe animal behavior and ask questions about it. For example, a biologist might ask whether an animal is born knowing how to perform a particular behavior or whether the behavior must be learned. Scientists usually cannot use controlled experiments when they study animals in the wild. Instead, scientists can test their hypotheses through further observation, such as Jane Goodall’s studies of chimpanzees. In other cases, scientists can conduct controlled experiments in an animal’s natural environment, such as Niko Tinbergen’s studies of digger wasps.

Biologists study both immediate causes and ultimate causes of animal behavior. The *immediate cause* of an animal’s behavior usually answers “how” questions. For example, the immediate cause of a wasp finding its nest is the wasp’s ability to recognize landmarks. The *ultimate cause* of a behavior usually answers “why” questions. The ultimate cause of the nest-finding behavior might be that it helps the wasp survive and reproduce.

1. What is animal behavior? \_\_\_\_\_  
\_\_\_\_\_
2. Give examples of an immediate cause and an ultimate cause of an animal behavior. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Concept 3.2 Experiments show that both genes and environment affect behavior. (pp. 53–56)

All of an animal’s behaviors depend on some combination of genes and environment. Some behaviors are controlled mainly by genes. They are performed correctly by all individuals of a species, even if they have no previous experience with the behavior. Such a behavior is called an *innate behavior*. One type of innate behavior is a *fixed action pattern (FAP)*. A FAP is a behavior that occurs as an unchangeable sequence of actions. Once the sequence begins, it is always carried through in the same order until the end of the sequence is reached. Many innate behaviors coordinate with rhythmic changes in the environment. For example, flying squirrels are active at night and sleep from dawn to dusk. This type of innate rhythm with a cycle of about 24 hours is called a *circadian rhythm*. Other behaviors have seasonal rhythms, such as migration.

3. What is innate behavior? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Give an example of a behavior with a circadian rhythm. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Concept 3.3 Learning is behavior based on experience. (pp. 57–61)**

A change in an animal’s behavior resulting from experience is called *learning*. *Habituation* is a simple form of learning in which an animal learns not to respond to a repeated stimulus. An example of habituation is the way you eventually stop paying attention to the ticking of a clock. Many behaviors have both learned and unlearned parts. An example is imprinting. *Imprinting* is learning that is limited to a critical time period in an animal’s life and that is usually irreversible. Learning that a particular stimulus or response is linked to a reward or punishment is called *conditioning*. For example, a cat may learn to associate the sound of a can opener with mealtime. At a level above conditioning is insight. *Insight* is the ability to respond appropriately to a new situation without previous experience. Insight involves the ability to analyze problems and to test possible solutions.

Many young animals engage in play behavior. Some researchers think that play allows young animals to practice behaviors required for survival. Others think that play behavior provides exercise for the young animals.

5. How are learning and habituation related? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
6. When does imprinting occur and how long does it last? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
7. Give an example of conditioning. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
8. What are two possible functions of play behavior in young animals?  
\_\_\_\_\_  
\_\_\_\_\_

**Concept 3.4 Social behaviors are important adaptations in many species. (pp. 62–65)**

Interactions between two or more individuals of the same species are called social behaviors. An example is competitive behavior. Animals that live in social groups must sometimes compete for resources such as food. Actual physical struggles or threatening behaviors are classified as *aggressive behavior*. Aggressive behaviors may lead to a ranking of animals in the group, from most dominant to most submissive. This ranking is called a *dominance hierarchy*. Many animals try to defend an area called a *territory* from other members of the species. In some species, animals perform *courtship rituals*, elaborate behaviors that take place before mating. Some courtship rituals help an animal attract a mate. An example is a male peacock displaying its tail feathers. All social behaviors depend on some form of signaling, or *communication*, among animals. Animals communicate using sounds, odors,

visual displays, and touches. When animals in a group work together in a way that is good for the group, the behavior is called *cooperation*. An example is a pack of wolves together capturing a large prey animal.

9. What are two types of social behavior in animals? \_\_\_\_\_  
 \_\_\_\_\_
10. List ways animals communicate. \_\_\_\_\_  
 \_\_\_\_\_
11. What is cooperation? \_\_\_\_\_  
 \_\_\_\_\_

### Reading Skills Practice

**Outlining** Make an outline of the information on competitive behaviors on pages 62–63. In your outline, include a definition of each of the bold-faced Key Terms.

### Vocabulary Review and Reinforcement

In 1–6, fill in the blanks with the appropriate terms from the chapter.

A digger wasp is born “knowing” how to build a nest. This is an example of

1. \_\_\_\_\_ behavior. Some animals change their behavior as a result of experience. When this happens, it is called 2. \_\_\_\_\_.
- Newly hatched graylag geese formed an irreversible bond with a man named Karl Lorenz. The learning process that led to this bond is called
3. \_\_\_\_\_. Interactions between two or more members of the same species are called 4. \_\_\_\_\_ behavior. This type of behavior depends on some form of signaling, or 5. \_\_\_\_\_, such as odors or visual displays. A group of musk oxen forming a protective ring around their young is an example of 6. \_\_\_\_\_.

In 7–13, write the letter of the correct definition on the line next to each term.

- |                               |   |
|-------------------------------|---|
| _____ 7. ultimate cause       | a. cause that explains the current reasons for a behavior   |
| _____ 8. circadian rhythm     | b. innate rhythm with a cycle of about 24 hours   |
| _____ 9. immediate cause      | c. ability to respond appropriately to a new situation without previous experience                    |
| _____ 10. aggressive behavior | d. cause that explains how a behavior helps an organism survive and reproduce                         |
| _____ 11. insight             | e. physical struggles or threatening behaviors between animals  |
| _____ 12. courtship ritual    | f. area that individuals defend and from which other members of the same species are usually excluded |
| _____ 13. territory           | g. elaborate behaviors performed before mating  |

**WordWise**

Match each definition in the left column with the correct Key Term in the right column. Then write the number of each term in the appropriate box below. When you have filled in all the boxes, add up the numbers in the columns, rows, and two diagonals. All the sums should be the same.

- |  |  |
|--|--|
| <p><b>A.</b> what an animal does as it interacts with its environment</p> <p><b>B.</b> behavior that is performed correctly by all individuals of a species, even if they have no previous experience with the behavior</p> <p><b>C.</b> innate behavior that occurs as an unchangeable sequence of actions</p> <p><b>D.</b> change in an animal's behavior resulting from experience</p> <p><b>E.</b> learning that is limited to a specific time period in an animal's life and that is usually irreversible</p> <p><b>F.</b> learning that a particular stimulus or response is linked to a reward or punishment</p> <p><b>G.</b> behavior in which individuals work together in a way that is beneficial to the group</p> <p><b>H.</b> simple form of learning in which an animal learns not to respond to a repeated stimulus</p> <p><b>I.</b> ranking of the most dominant to most submissive individuals within a group</p> | <p><b>1.</b> innate behavior</p> <p><b>2.</b> cooperation</p> <p><b>3.</b> conditioning</p> <p><b>4.</b> dominance hierarchy</p> <p><b>5.</b> imprinting</p> <p><b>6.</b> animal behavior</p> <p><b>7.</b> learning</p> <p><b>8.</b> fixed action pattern</p> <p><b>9.</b> habituation</p> |
|--|--|

A _____	B _____	C _____	= _____
D _____	E _____	F _____	= _____
G _____	H _____	I _____	= _____
= _____	= _____	= _____	= _____