



Name Leonie Hoehner Period \_\_\_\_\_

## Chapter 51: Animal Behavior

### Overview

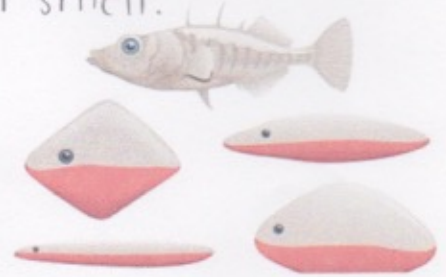
1. How is *behavior* defined?  
As an action carried out by muscles controlled by the nervous system in response to a stimulus

**Concept 51.1 Discrete sensory inputs can stimulate both simple and complex behaviors**

2. What is *ethology*?  
Ethology is the study of animal behavior.
3. What is the difference between *proximate* and *ultimate* causation?  
Proximate causation concerns how a behavior occurs, while ultimate causation is about why a behavior occurs in the context of natural selection.
4. Using red-crowned cranes, what is an example of a proximate causation question and an example of an ultimate causation question?  
- What causes the aggressive response of a male three-spined stickleback?  
- Why does the stickleback react to the red color this way?
5. Who are the three *ethologists* who shared in a Nobel Prize for their work in 1973? We will look at work by each of them.  
Niko Tinbergen, Karl von Frisch, Konrad Lorenz
6. What is a *fixed action pattern* (FAP)? Give an example.  
A FAP is a sequence of (unlearned) acts that are directly linked to a simple stimulus. In the case of the stickleback, males react aggressively to red color.
7. What is a *sign stimulus*? Give at least examples of sign stimuli.  
A sign stimulus is an external cue that can elicit a certain behavior, for example color or smell.

8. *Nicholas Tinbergen's* work with the stickleback fish is a classic study. Explain what he found. Use the terms *fixed action pattern* and *sign stimulus* in your response.

Tinbergen found that red color acts as a sign stimulus for male stickleback fish. The fish responded with a fixed action pattern that consisted of aggressive behavior towards the red object.



9. Define these behavior terms:

Definition	Example
<i>kinesis</i> Movement that is undirected	Fish swimming about randomly in a fish bowl
<i>taxis</i> Movement in response to stimulus	Bee moves to an enticing smell of a flower

10. Explain what is meant by a *circadian clock* and *circadian rhythms*. Identify two behaviors, either plant or animal, that demonstrate a circadian rhythm. (You may need to refer to Chapter 49 or Chapter 36 for examples.)

Circadian clocks and rhythms are internal mechanisms that maintain an activity cycle in an organism. Migration of birds ~~and~~ at certain times of the year and season of mating demonstrate these rhythms.

11. Discuss two navigational strategies used by birds to migrate.

Birds can use their position relative to the sun to track where they are or even sense their position relative to Earth's magnetic field.

12. Animals communicate in various ways. Discuss at least three specific examples using different organisms.

Many birds communicate through sound, noticeably for mating with other birds.

Humans communicate with their environment largely through sight.

Wolves communicate well through smell.

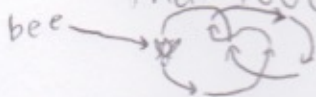
13. Notice the pictures that show fruit fly courtship behavior (see AP Biology Lab 11B, "Reproductive Behavior in Fruit Flies"). What different modes of communication are used by the fruit fly?



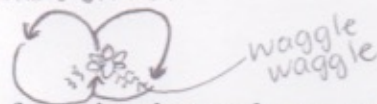
Chemical Communication → Tactile → Auditory

14. *Karl von Frisch* studied European honeybees. What are the two types of dances that a returning worker bee does, and what information does each dance convey? Use a labeled sketch to describe each dance.

Worker bee can do a round dance to indicate that food is close.



Worker bee does a waggle dance when food is distant, wagging its abdomen



15. What are *pheromones*? Give three specific types of information that can be transmitted through pheromones.

Pheromones are chemical substances used to communicate. Reproductive info, social order in a hive, and alarm signal.

**Concept 51.2 Learning establishes specific links between experience and behavior**

16. What is the difference between *innate* and *learned* behavior? Give an example of each. Innate behavior is fixed throughout a population (all bees huddle for warmth) and learned behavior is learned through life (don't eat that nectar on that flower, little bee!).

17. What is meant by *fitness*? How can *habituation* increase fitness? Habituation can increase fitness because it will stop unnecessary energy expenditures. Conserving energy for beneficial movements would constitute fitness.

18. Describe the process of *imprinting*, and explain what is meant by *sensitive* or *critical period*.

Imprinting is when a long-lasting bond to a specific object/individual is formed at a specific stage in life. The sensitive period is the limited phase in which this can occur.



19. Describe the classic study of *parental imprinting* done by *Konrad Lorenz*. Goslings spent their first few hours w/ Lorenz and imprinted on him once he moved away from the young, which is the stimulus. They followed him from then on.

20. What special challenges did researchers face in order to return whooping cranes to the wild? What would you have to wear if you worked with hatchlings? Why?

Whooping cranes need to be able to recognize their own species, so exposing them to their own sights and sounds is necessary. If I worked with hatchlings I would have to wear a crane suit so the cranes

could form pair-bonds with other cranes, directing normal imprinting behavior.

21. There are several types of learning. What occurs in *spatial learning*?  
In spatial learning, a memory that reflects the environment's spatial structure is established. Location indicators can help w/this learning.
22. What are two types of *associative learning*? Which type did *Ivan Pavlov* use to get a dog to salivate at the sound of a bell?  
Classical and operant conditioning are types of associative learning. Pavlov used classical conditioning to get a dog to associate the sound of a bell with receiving food.
23. What occurs in *operant conditioning*?  
In operant conditioning, the animal associates a behavior with a reward or punishment and then repeats or avoids that behavior accordingly.
24. What is *cognition*? Give three examples of cognition in animal species; include at least one bird behavior.  
Cognition is the process of knowing involving awareness, reasoning, recollection, and judgment. Honeybees can distinguish "same" from "different", chimpanzees can use boxes to reach a banana, and birds find ways to get to food out of reach if one method fails.
25. Many bird songs are learned during a *critical period*. What will happen if a white-crowned sparrow does not hear the song of its species during this time?  
The sparrow would not be able to develop the adult song of its species.

**Concept 51.3 Both genetic makeup and environment contribute to the development of behaviors**

26. Based on *cross-fostering* and *human twin studies*, what are the two factors that contribute significantly to behavior?

Genetics

Social/Physical Environment

27. This concept looks at some very interesting ways that genetic changes affect behavior. Several important case studies that show a genetic component to behavior are presented. Take time to read and enjoy them. The study of voles and their mating behaviors is often discussed in other science articles. To return to fruit fly mating, a single gene called *fru* controls male mating behavior. If males lack a functional *fru* gene (short for *fruitless*), what happens?

They probably won't be able to mate normally.  
Males will not court or mate.

And what occurs if females are genetically manipulated to express this gene?

~~Mating occurs normally?~~

Females court other females.

\* This example was not in the chapter

Nevermind, in a different section

**Concept 51.4 Selection for individual survival and reproductive success can explain most behaviors**

28. What is *foraging behavior*?

Foraging behavior is when an animal employs methods to search for, recognize, and obtain food.

29. What is proposed by the *optimal foraging theory*? Explain it in terms of cost and benefit, and cite two examples from your text.

Optimal foraging model assumes that natural selection should favor foraging behavior that minimizes the costs of foraging and maximizes the benefits. Northwestern crow has a specific height from which to crack the snail shell most efficiently and mule deer feed in a place where predation is unlikely.

30. To demonstrate that you understand the principle of optimal foraging, describe a food source that you would not be likely to exploit.

A coconut. (Too high in the tree, too hard to crack open)

31. Explain each of these mating systems:

**promiscuity**

Mating without strong pair-bonds

**monogamy**

One male mates with one female (long-term relationship)

**polygamy**

One individual mates w/ several others

**polygyny**

One male mates w/ many females

**polyandry**

One female mates w/ several males

32. Explain two factors that may be important in determining the evolution of these systems, and apply each factor to a particular species.

Sexual dimorphism may be important, since mating system varies with this concept. A monogamous relationship does not require a very showy appearance on either side.

Western gulls are difficult to distinguish → monogamous.

Parental care also influences the systems, since a combined effort to raise young would promote monogamy, not polygamy.

33. Let's return to an earlier idea. What is *sexual selection*? (Chapter 23)  
Sexual selection relies on differences in reproductive success among individuals as a consequence of differences in mating success.

34. There are two types of sexual selection. Explain each of them.

**intersexual selection**

Mate chosen by characteristics of opposite sex

**intrasexual selection**

Mate chosen through competition among one sex

35. What is *agonistic behavior*? Give one example of this behavior that is not in your book.  
Agonistic behavior is a contest that determines which competitor gets food or mates. Lions fight for their pride (haha double meaning!) and must be stronger or larger.

**Concept 51.5 Inclusive fitness can account for the evolution of altruistic social behavior**

36. What is *altruism*?

Altruism describes a behavior that reduces an animal's individual fitness but increases the fitness of other individuals in the population.

37. Explain the evolutionary advantage to a population of having members who exhibit *altruistic behavior*.

Members who exhibit altruistic behavior can increase the chance of some of their genes being carried on to the next generation by saving or helping close relatives. Reproduction = success ☺

38. *Altruism* may reduce the fitness of an individual—for example, by making that individual more obvious to a predator. Explain this behavior using the concept of *inclusive fitness*.

This individual will provide aid that enables other close relatives to potentially produce more offspring. The reward outweighs the risk, in this case.

39. Explain the logic behind geneticist *J.B.S. Haldane's* comment that he would lay down his life for two brothers or eight cousins.

Haldane would share half of his genes with those of one brother. Two brothers equal one whole, then. However the amount of genes Haldane shares with ~~cousins~~ one cousin would only amount to one eighth. Therefore, 8 cousins equal one whole as well. Haldane wants to die for what he is worth...