

Practice Worksheet
Lecture 5 : Animal Behavior

Corresponding sections in Biological Science (Freeman, 3rd or 2nd ed.)

Chapter 46 : 46.1, 46.3,

Chapter 51 : 51.1, 51.2, 51.3, 51.4, 51.6

Review important information

1. What do we call communication ?
2. How do animals communicate ?
3. How does chemical communication work ?
4. What are pheromones and how does their molecular structure affect communication ?
5. What are efficient channels for animals to communicate in low-light environments ?
6. What is a photoreceptor ?
7. What are the two types of photoreceptors known in vertebrates, and how do they contribute to vision ?
8. What is the structure of the rhodopsin molecule ? Explain what happens in a rod cell when rhodopsin captures photons.
9. Give examples to illustrate the diversity of eye structure found in animals.
10. Explain what makes the human high far from perfect from an engineer's point of view.
11. Summarize what you know of the evolution of the eye.
12. What are the major selection pressures involved in the evolution of sensory systems in animals ?
13. How is our food intake regulated ? Explain the role of the hypothalamus and how some hormones (which ones ?) are involved.
14. Courtship behavior in male fruitflies is highly species-specific and stereotyped. What does the genetic analysis of this behavior tell us, however ?
15. What does the study of male songbirds show about sexual behavior ?
16. What is a society ?
17. Explain the parental care hypothesis.
18. What is altruism and why do we say that parental care is an altruistic behavior ?
19. How does kin selection work ?
20. Give some evidence for the influence of environmental structure and variation on the evolution of social behavior.
21. What do we call culture ?
22. Give examples showing that learning and culture are not unique to humans.

Test your knowledge

Q1. _____ signals are easy to produce, potentially diverse, and fast, but they are limited by light and distance. In low-light environments where individuals interact closely, _____ signals are common. _____ signals do not require light and are not easily obstructed, but they are short-lived. Complex information can be conveyed between fish by _____ signals.

- A. auditory
- B. electric
- C. visual

- D. chemical
- E. tactile

Q2. Vertebrates have two types of photoreceptors: _____ cells which are more sensitive to light, and _____ cells which are involved in color vision. _____ cells and _____ cells contains stack of membrane; _____ is a transmembrane protein complex that contains a non-protein _____ called _____. When _____ absorbs a photon, its conformation changes, and this triggers a _____ which results in a very large number of _____ _____ to _____. As a consequence, the membrane of the _____ cell _____.

- A. sodium channels
- B. potassium channels
- C. depolarizes
- D. hyperpolarizes
- E. rhodopsin
- F. opsin
- G. transducin
- H. open
- I. close
- J. light-absorbing group
- K. transduction cascade

Q3. In animals, eye structure varies from simple _____ in flatworms (that function as _____) to the _____ of arthropods (in which each _____ sends axons to CNS) to the _____ eye of vertebrates. The human eye is far from perfect! Light has to _____ of cells before reaching the _____, and there is a _____ where blood vessels and axons pass through the back of the eye. _____ indicate that the evolution of the _____ eye of vertebrates may have occurred by small _____ and _____ in half a million years. The molecular basis of vision, _____, is very ancient and has been _____ throughout animal evolution. Strong _____ pressures exist for the evolution of vision: _____, finding _____, and interacting in _____.

- A. rhodopsin
- B. light sensors
- C. computer simulations
- D. feeding
- E. lensed
- F. social groups
- G. cups
- H. blind spot
- I. selection
- J. cross several layers
- K. conserved
- L. photoreceptors
- M. mates
- N. ommatidium
- O. mutations
- P. compound eyes

Q4. Feeding behavior is regulated in the brain by the _____. Feedback signals involve _____ and _____ level in the blood, and _____ metabolism. _____ has been shown to play a key role in the _____ of body mass. In mice, injection of leptin results in reduced _____ and _____. This effect could not be demonstrated in humans. Instead, defects in leptin _____ seem to be involved in _____.

- A. food intake
- B. insulin
- C. receptors

- D. weight loss
- E. obesity
- F. regulation
- G. glucose
- H. hypothalamus
- I. leptin
- J. fat

Q5. Sexual reproduction can involve complex, _____ courtship behavior. Research in *Drosophila* (fruit flies) has allowed to dissect the _____ that regulates the _____ of such behavior. In females, the _____ of the key genes *fruitless* and *doublesex* is _____ by the protein produced by the *transformer* gene, and the _____ of the *transformer* gene is itself _____ by the *sex-lethal* gene. In males, neither *transformer* nor *sex-lethal* may express functional proteins. In birds, the _____ of the brain has also been shown to play a key role in sexual behavior. Male song is stimulated by _____, which causes the _____ in the brain to expand (with more _____ and greater neuron _____) during the reproductive season.

- A. growth
- B. neurons
- C. expression
- D. stereotyped
- E. regulated
- F. testosterone
- G. song region
- H. plasticity
- I. genetic network

Q6. A society is a _____ of individuals among which _____ and a _____ are evolved. The most widespread social system is the _____, that is, the association of _____ with one or more adults. According to the _____ hypothesis, _____ societies have evolved out of the _____ structure. Parental care is an _____ behavior: it involves a _____ to the 'recipient' (the offspring) at a _____ to the 'actor' (the parent). _____ (directing the _____ of an _____ behavior to _____ individuals) is a strong force driving the _____ of _____ and _____ forms of social life. The structure and variation of the _____ (e.g. how scarce or how sparsely distributed _____ are) is also a strong influence of the _____ of _____ and social organization.

- A. benefit
- B. kin selection
- C. division of labor
- D. environment
- E. evolution
- F. more complex
- G. resources
- H. altruistic
- I. group
- J. offspring
- K. cost
- L. related
- M. family
- N. parental care
- O. cooperation