



Chapter 19 Exercises

Review Questions

- What is the difference between micro- and macroevolution?
 - Microevolution describes the evolution of small organisms, such as insects, while macroevolution describes the evolution of large organisms, like people and elephants.
 - Microevolution describes the evolution of microscopic entities, such as molecules and proteins, while macroevolution describes the evolution of whole organisms.
 - Microevolution describes the evolution of organisms in populations, while macroevolution describes the evolution of species over long periods of time.
 - Microevolution describes the evolution of organisms over their lifetimes, while macroevolution describes the evolution of organisms over multiple generations.
- Population genetics is the study of _____.
 - how selective forces change the allele frequencies in a population over time
 - the genetic basis of population-wide traits
 - whether traits have a genetic basis
 - the degree of inbreeding in a population
- Which of the following populations is *not* in Hardy-Weinberg equilibrium?
 - a population with 12 homozygous recessive individuals (yy), 8 homozygous dominant individuals (YY), and 4 heterozygous individuals (Yy)
 - a population in which the allele frequencies do not change over time
 - $p^2 + 2pq + q^2 = 1$
 - a population undergoing natural selection
- One of the original Amish colonies came from a ship of colonists from Europe. The ship's captain, who had polydactyly, a rare dominant trait, was one of the original colonists. Today, we see a much higher frequency of polydactyly in the Amish population. This is an example of _____.
 - natural selection
 - genetic drift
 - founder effect
 - both b. and c.
- When male lions reach sexual maturity, they leave their group in search of a new pride. This can alter the allele frequencies of the population through which of the following mechanisms?
 - natural selection
 - genetic drift
 - gene flow
 - random mating
- Which of the following evolutionary forces can introduce new genetic variation into a population?
 - natural selection and genetic drift
 - mutation and gene flow
 - natural selection and nonrandom mating
 - mutation and genetic drift
- What is assortative mating?
 - when individuals mate with those who are similar to themselves
 - when individuals mate with those who are dissimilar to themselves
 - when individuals mate with those who are the most fit in the population
 - when individuals mate with those who are least fit in the population

8. When closely related individuals mate with each other, or inbreed, the offspring are often not as fit as the offspring of two unrelated individuals. Why?
 - a. Close relatives are genetically incompatible.
 - b. The DNA of close relatives reacts negatively in the offspring.
 - c. Inbreeding can bring together rare, deleterious mutations that lead to harmful phenotypes.
 - d. Inbreeding causes normally silent alleles to be expressed.
9. What is a cline?
 - a. the slope of a mountain where a population lives
 - b. the degree to which a mutation helps an individual survive
 - c. the number of individuals in the population
 - d. gradual geographic variation across an ecological gradient
10. Which type of selection results in greater genetic variance in a population?
 - a. stabilizing selection
 - b. directional selection
 - c. diversifying selection
 - d. positive frequency-dependent selection
11. When males and females of a population look or act differently, it is referred to as _____.
 - a. sexual dimorphism
 - b. sexual selection
 - c. diversifying selection
 - d. a cline
12. The good genes hypothesis is a theory that explains what?
 - a. why more fit individuals are more likely to have more offspring
 - b. why alleles that confer beneficial traits or behaviors are selected by natural selection
 - c. why some deleterious mutations are maintained in the population
 - d. why individuals of one sex develop impressive ornamental traits

Critical Thinking Questions

13. Solve for the genetic structure of a population with 12 homozygous recessive individuals (yy), 8 homozygous dominant individuals (YY), and 4 heterozygous individuals (Yy).
14. Explain the Hardy-Weinberg principle of equilibrium theory.
15. Imagine you are trying to test whether a population of flowers is undergoing evolution. You suspect there is selection pressure on the color of the flower; bees seem to cluster around the red flowers more often than the blue flowers. In a separate experiment, you discover blue flower color is dominant to red flower color. In a field, you count 600 blue flowers and 200 red flowers. What would you expect the genetic structure of the flowers to be?
16. Describe a situation in which a population would undergo the bottleneck effect and explain what impact that would have on the population's gene pool.
17. Describe natural selection and give an example of natural selection at work in a population.
18. Provide examples of two different kinds of clines.
19. Give an example of a trait that may have evolved as a result of the handicap principle and explain your reasoning.
20. List the ways in which evolution can affect population variation and describe how they influence allele frequencies.