Chapter 2 Adaptation and Evolution

Multiple Choice

1. Darwin was interested in marine iguanas because
   a. they provided food for the expedition.
   b. their behavior interested him.
   c. they differed from land iguanas.
   d. a and b
   A. b and c
   Answer: e

2. An adaptation is a feature of the organism that
   a. increases its population size.
   b. increases its fitness.
   c. affects other organisms.
   d. does not include behavior.
   e. does not include morphology.
   Answer: b

3. Which of the following influenced Darwin's thinking about evolution?
   a. the theory of uniformitarianism
   b. the geology of volcanoes
   c. geographic variation in species
   d. all of the above
   e. none of the above
   Answer: d

4. Which of the following was not a component of Darwin's logical argument about natural selection?
   a. There is variation among individuals in a population.
   b. Few organisms achieve their reproductive potential.
   c. There is competition among individuals.
   d. New species arise primarily on islands.
   e. none of the above
   Answer: d

5. The gene pool is characterized by
   a. allele frequencies.
   b. mutations.
   c. its DNA sequences.
   d. Mendel's laws.
   e. none of the above
   Answer: a

6. For a population of 100 individuals in which 60 are homozygous dominant (AA), 20 are heterozygous (Aa), and 20 are homozygous recessive (aa), the value of p is
   a. 0.6.
   b. 0.2.
   c. 0.7.
   d. 0.5.
   e. 1.0.
   Answer: c

7. Which of the following is *not* an assumption of the Hardy-Weinberg model?
   a. Mating is random.
   b. no differential success of genotypes
   c. no competition among individuals
   d. no net movement of alleles
   e. no new mutations
   Answer: c

8. What is the significance of a population that is in Hardy-Weinberg equilibrium?
   a. It is not evolving.
   b. Selection and gene flow are in equilibrium.
   c. Each genotype occurs in equal frequency.
   d. The values of p and q are equal.
   e. none of the above
   Answer: a

9. Resistance to pesticides
   a. is an example of gene flow.
   a. arises by genetic drift.
   b. is the result of long-term changes in the pesticide.
   c. is independent of the selection coefficient.
   d. none of the above
   Answer: e

10. Genetic drift
    a. always opposes natural selection.
    b. is more significant in small populations.
    c. is the result of gene flow.
    d. depends on the fitness of the alleles.
    e. none of the above
    Answer: b

11. In disruptive selection,
    a. one tail of the distribution is favored.
    b. both tails of the distribution are favored.
    c. the center of the distribution is favored.
    d. the tails and center of the distribution are favored.

e. none of the above
Answer: b

12. Fitness is
    a. a property of the population.
    b. a property of the species.
    c. a property of the individual.
    d. independent of the environment.
    e. none of the above
    Answer: c

13. The significance of the Hardy-Weinberg equilibrium is that
    a. it demonstrates that evolution eventually stops.
    b. it demonstrates that natural selection is the only mechanism of evolution.
    c. it demonstrates that evolution only happens in large populations.
    d. its assumptions lead to mechanisms of evolution.
    e. none of the above
    Answer: d

14. Phenotypic plasticity
    a. is unimportant to evolution.
    b. is the direct result of the environment on the phenotype.
    c. is the direct result of the genotype on the phenotype.
    d. occurs in traits with high heritability.
    e. none of the above
    Answer: b

15. Darwin's theory
    a. resulted from his understanding of genetics.
    b. states that all features of organisms are adaptive.
    c. did not include genetic drift as a mechanism.
    d. was immediately accepted.
    e. none of the above
    Answer: c

16. An organism's phenotype
    a. is determined only by its genotype.
    b. is independent of its genotype.
    c. is an example of mutation.
    d. does not evolve.
    e. none of the above
    Answer: e

True/False

1. Directional selection eliminates the average individuals.

Answer: False

2. Heritability and the selection coefficient determine the rate of evolution.
   Answer: True

3. Mutation pressure changes the effective population size
   Answer: False

4. Ecotypes are the result of phenotypic plasticity.
   Answer: False

5. Darwin's theory of evolution was correct but incomplete.
   Answer: True

Fill in the Blank/Short Answer

1. Genetic drift is more pronounces when _____ is small; natural selection is more pronounced when _____ is large.
   Answer: N_e; selection coefficient and/or heritability

2. The panda's "thumb" is an example of _____.
   Answer: an imperfect adaptation

3. The _____ states that for some species the environment changes faster than adaptations can arise.
   Answer: Red Queen Hypothesis

4. In Wright's adaptive landscape, the vertical (y) axis depicts the _____ of the genotype.
   Answer: fitness

5. The sum of all alleles in a population constitutes the _____.
   Answer: gene pool

6. _____ is one factor that decreases the value of N_e.
   Answer: Skewed sex ration

7. If the value of p = 1.0 we say that the allele is _____.
   Answer: fixed

8. If the value of q = 0.78, the value of p is _____.
   Answer: 0.22

9. Ecotypes are most likely to arise if _____ and _____.
   Answer: natural selection is intense; the environment changes abruptly

10. In a population in H-W equilibrium in which p = 0.4 and q = 0.6, the frequency of the heterozygotes is _____.
    Answer: 0.48

11. If there are just two alleles at a locus, p + q must equal _____.
    Answer: 1.0

12. How was Darwin's theory of evolution incomplete?
    Answer: Darwin did not have a correct theory of inheritance. He did not recognize that evolution can occur by processes other than natural selection such as genetic drift and gene flow.