

Chapter 02 Population Genetics

Multiple Choice Questions

1. The first person to publish a theory that species change over time was
- A. Plato
 - B. Lamarck**
 - C. Darwin
 - D. Wallace
 - E. Mendel

Bloom's Level: 1. Remember

Learning Outcome: 02.01

Topic: Evolutionary Ecology

2. Charles Robert Darwin
- A. had a thorough understanding of genetics.
 - B. sailed on a three year survey around the world.
 - C. examined fossil beds in China.
 - D. formulated a theory of natural selection.**
 - E. knew little of geological change.

Bloom's Level: 1. Remember

Learning Outcome: 02.01

Topic: Evolutionary Ecology

3. Malthus proposed that because the earth was not overrun by humans they must be limited by
- A. food shortage, disease, war.
 - B. natural selection.
 - C. survival of the fittest.
 - D. evolution.
 - E. Adaptation.**

Bloom's Level: 1. Remember

Learning Outcome: 02.01

Topic: Evolutionary Ecology

4. Over long periods of time, natural selection leads to
- A. mutation.
 - B. adaptation.**
 - C. hybridization.
 - D. dominance.
 - E. true breeding lines.

Bloom's Level: 1. Remember

Learning Outcome: 02.01

Topic: Evolutionary Ecology

5. In polluted areas _____ forms of peppered moths are _____ conspicuous to birds on _____ tree trunks.
- A. normal; more; lichen-covered
 - B. melanic; less; lichen-covered
 - C. melanic; less; dark-colored**
 - D. melanic; more; dark-colored
 - E. all the above statements are false

Bloom's Level: 2. Understand

Learning Outcome: 02.01

Topic: Evolutionary Ecology

6. An individual with two identical copies of a gene is said to be
- A.** homozygous
 - B. heterozygous
 - C. dominant
 - D. recessive
 - E. segregated

Bloom's Level: 2. Understand

Learning Outcome: 02.01

Topic: Evolutionary Ecology

7. What is NOT one of the nucleotide bases that make-up double-stranded DNA base pairs?
- A. Adenine
 - B.** Proline
 - C. Thymine
 - D. Guanine
 - E. Cytosine

Bloom's Level: 1. Remember

Learning Outcome: 02.02

Topic: Evolutionary Ecology

8. When a chromosome breaks in two places and the middle segment turns around and reattaches with the same pieces, we call this a(n)
- A. Duplication
 - B. Transversion
 - C. Deletion
 - D.** Inversion
 - E. Translocation

Bloom's Level: 1. Remember

Learning Outcome: 02.02

Topic: Evolutionary Ecology

9. The Hardy-Weinberg equation states that $p^2 + 2pq + q^2 = 1$; the genotype frequency of heterozygotes is represented by

- A. p^2
- B. $2pq$**
- C. q^2
- D. $p^2 + q^2$
- E. $p^2 + 2pq$

Bloom's Level: 2. Understand

Learning Outcome: 02.03

Topic: Evolutionary Ecology

10. In a population of 100 four-o'clock flowers there are 40 red-flowered plants ($C^R C^R$), 38 pink-flowered plants ($C^R C^W$), and 22 white-flowered plants ($C^W C^W$). What is the frequency of the C^W allele in this population?

- A. 0.41 or 41%**
- B. 0.6 or 60%
- C. 0.4 or 40%
- D. 0.09 or 9%
- E. 0.52 or 52%

Bloom's Level: 4. Analyze

Learning Outcome: 02.03

Topic: Evolutionary Ecology

11. The percentage of individuals exhibiting a recessive disease in a population is 0.04, which is 4% based on a Hardy-Weinberg equilibrium. What percentage of individuals would be expected to be heterozygous carriers?

- A. 48
- B. 40
- C. 60
- D. 24
- E. 4

Bloom's Level: 1. Remember

Learning Outcome: 02.03

Topic: Evolutionary Ecology

12. In the Hardy-Weinberg equation, the letters p and q represent

- A. frequencies of alleles in a population.
- B. the number of individuals of different phenotypes in a population.
- C. the number of individuals of different genotypes in a population.
- D. the frequencies of individuals of different genotypes in a population.
- E. the square of individuals of different genotypes in a population.

Bloom's Level: 4. Analyze

Learning Outcome: 02.03

Topic: Evolutionary Ecology

13. Below is a list of phenomenon that can occur in a population, which of these would violate the conditions for the Hardy-Weinberg equation?

- A. The population is large.
- B. Mating is nonrandom.
- C. Migration does not occur between different populations.
- D. Natural selection is not occurring.
- E. No new mutations arise.

Bloom's Level: 1. Remember

Learning Outcome: 02.03

Topic: Evolutionary Ecology

14. If a population does not satisfy the Hardy-Weinberg equilibrium model, what may you assume about that population?

- A. Evolutionary mechanisms are effecting the population.
- B. Evolution is not occurring.
- C. No new mutations are occurring, only nonrandom mating.
- D. No migration is occurring.
- E. Evolutionary mechanisms are affecting the population and evolution is occurring.

Bloom's Level: 5. Evaluate

Learning Outcome: 02.03

Topic: Evolutionary Ecology

15. If a population is not in Hardy-Weinberg equilibrium, this implies that

- A. the population is going extinct.
- B. the population is very ancient.
- C. one or more of the conditions required for equilibrium are being violated.
- D. the population is abnormal.
- E. one or more of the conditions required for equilibrium are being violated and the population is evolving.

Bloom's Level: 1. Remember

Learning Outcome: 02.03

Topic: Evolutionary Ecology

16. A large effective population size is important so that a species

- A. can maintain an adequate range.
- B. does not change its trophic relationship.
- C. will not lose large amounts of genetic diversity in the near future.
- D. can minimize edge effects.
- E. can remain endemic to a small area.

Bloom's Level: 1. Remember

Learning Outcome: 02.04

Topic: Evolutionary Ecology

17. In which plant mating system would genetic variability decline slowest?

- A. self fertilization.
- B. mating with brothers or sisters.
- C. mating with cousins.
- D. mating with second cousins.
- E. mating with unrelated individuals.

Bloom's Level: 1. Remember

Learning Outcome: 02.04

Topic: Evolutionary Ecology

18. A recent genetic analysis has shown that at one point, as few as _____ Florida panthers were alive.

- A. 6
- B. 20
- C. 40
- D. 80
- E. 120

Bloom's Level: 5. Evaluate

Learning Outcome: 02.04

Topic: Evolutionary Ecology

19. The decline in the numbers of greater prairie chickens in Illinois in the late 20th century was a striking example of

- A. genetic drift.
- B. inbreeding.
- C. an extinction vortex.
- D. a and b
- E. b and c

Bloom's Level: 1. Remember

Learning Outcome: 02.04

Topic: Evolutionary Ecology

20. Inbreeding and small population size of a threatened species can combine to form a downward spiral from which a species cannot easily recover. This is known as a(n)

- A. extinction vortex
- B. random change of allele frequencies.
- C. random mutation.
- D. accelerated evolution of new traits.
- E. Bottleneck effect.

Bloom's Level: 2. Understand

Learning Outcome: 02.01

Topic: Evolutionary Ecology

21. Studies on the Glanville fritillary butterfly in Finland showed that just one generation of brother-sister mating causes

- A. increased number of eggs to be laid.
- B. increased hatching of eggs.
- C. reduced caterpillar survival.
- D. increased caterpillar parasitism.
- E. increased genetic variability.

Bloom's Level: 1. Remember

Learning Outcome: 02.04

Topic: Evolutionary Ecology

22. Robert Lacey showed that in a population of 120 individuals, at least _____ immigrant(s) every generation would be sufficient to counter genetic drift.

- A. 0.1
- B. 0.5
- C. 1
- D. 2
- E. 5

Bloom's Level: 1. Remember

Learning Outcome: 02.04

Topic: Evolutionary Ecology

23. Elephant seals have a smaller effective population size than real population size due to the effects of
- A. inbreeding.
 - B. genetic drift.
 - C. a harem mating structure.**
 - D. an extinction vortex.
 - E. All of these

Bloom's Level: 1. Remember

Learning Outcome: 02.04

Topic: Evolutionary Ecology

True / False Questions

24. The best explanation for species distributions is that each region supports the fauna and flora best adapted to it.
- FALSE**

Bloom's Level: 1. Remember

Learning Outcome: 02.01

Topic: Evolutionary Ecology

25. The inheritance of acquired characteristics suggests that a person who became strong through lifting weights would pass this trait on to his or her children.
- TRUE**

Bloom's Level: 1. Remember

Learning Outcome: 02.01

Topic: Evolutionary Ecology

26. Alfred Russel Wallace was a co-discoverer of evolutionary theory.

TRUE

Bloom's Level: 2. Understand

Learning Outcome: 02.01

Topic: Evolutionary Ecology

Matching Questions

27. Match the type of chromosome mutation with its effect.

- | | |
|------------------|---|
| 1. Duplication | loss of part of the chromosome <u>2</u> |
| 2. Deletion | added amount of some genes <u>1</u> |
| 3. Inversion | chromosome breakage, re-positioning and re-fusing <u>3</u> |
| | the exchange of segments between two non-homologous |
| 4. Translocation | chromosomes <u>4</u> |

Bloom's Level: 1. Remember

Learning Outcome: 02.02

Topic: Evolutionary Ecology

28. Match the scientist with their discovery

- | | |
|------------|---|
| 1. Darwin | natural selection <u>1</u> |
| 2. Mendel | theory of population growth <u>3</u> |
| 3. Malthus | transformism <u>4</u> |
| 4. Lamarck | inheritance <u>2</u> |

Bloom's Level: 1. Remember

Learning Outcome: 02.01

Topic: Evolutionary Ecology

29. Match the continents with their fauna

- | | | |
|------------------|--|----------|
| 1. South America | sloths, anteaters, armadillos, monkeys with prehensile tails | <u>1</u> |
| 2. Australia | zebra, giraffes, lions, baboons, okapi, armadillo | <u>3</u> |
| 3. Africa | bats, Tasmanian devil, wombat, duck-billed platypus, echidna | <u>2</u> |

Bloom's Level: 2. Understand

Learning Outcome: 02.04

Topic: Evolutionary Ecology

30. Match the following names with their definitions.

- | | | |
|------------------------------|---|----------|
| 1. Allee effect | mating between closely related individuals | <u>4</u> |
| 2. Effective population size | random changes in allele frequencies over time | <u>3</u> |
| 3. Genetic drift | the number of individuals that contribute genes to future populations | <u>2</u> |
| 4. Inbreeding | the likelihood that, in a small population, some individuals will fail to mate successfully | <u>1</u> |

Bloom's Level: 1. Remember

Learning Outcome: 02.04

Topic: Evolutionary Ecology