

Ch 16. Evolution of Populations. Biology. Landis

Name _____

Section 16–1 Genes and Variation (pages 393–396)

This section describes the main sources of inheritable variation in a population. It also explains how phenotypes are expressed.

Darwin's Ideas Revisited (page 393)

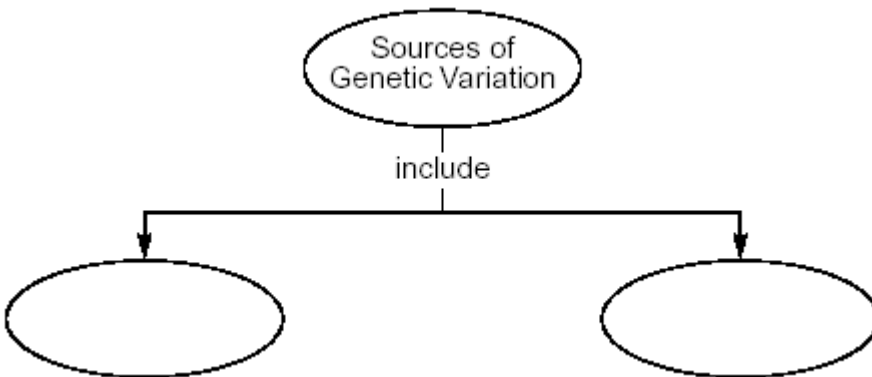
1. Was Mendel's work on inheritance published before or after Darwin's lifetime?
2. Which two important factors was Darwin unable to explain without an understanding of heredity?

Gene Pools (page 394)

3. A collection of individuals of the same species in a given area is a(an)
4. The combined genetic information of all members of a particular population is a(an)
5. For populations, define the relative frequency of alleles?

Sources of Genetic Variation (pages 394–395)

6. Complete the concept map.



7. What is a mutation and why do mutations occur?

8. Circle the letter of each choice that is true about mutations.

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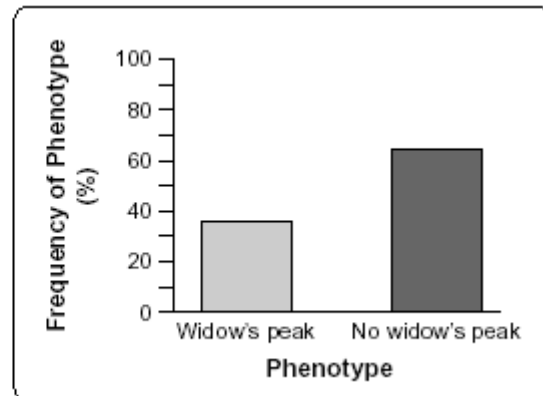
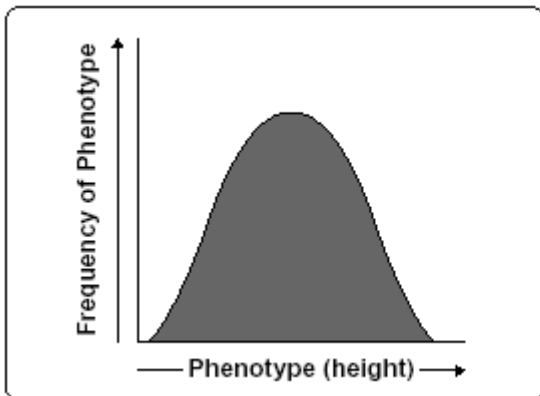
- a. They can be limited to a single base of DNA.
- b. They always affect lengthy segments of a chromosome.
- c. They always affect an organism's phenotype.
- d. They always affect an organism's fitness.

9. Are most inheritable differences due to gene shuffling that occurs during the production of gametes? If not, what is the source of most inheritable differences?

Single-Gene and Polygenic Traits (pages 395–396)

10. Are most traits are controlled by a single gene? **EXPLAIN!**

11. Label the two graphs to show which one represents a single-gene trait and which one represents a polygenic trait.



Section 16–2 Evolution as Genetic Change (pages 397–402)

This section explains how natural selection affects different types of traits. It also describes how populations can change genetically by chance as well as the conditions that prevent populations from changing genetically.

Natural Selection on Single-Gene Traits (pages 397–398)

12. Can natural selection on single gene traits lead to changes in allele frequencies?
13. If a trait made an organism less likely to survive and reproduce, what would happen to the allele for that trait?

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14. If a trait had no effect on an organism's fitness, what would happen to the allele for that trait?

Natural Selection on Polygenic Traits (pages 398–399)

15. List the three ways that natural selection can affect the distributions of phenotypes.

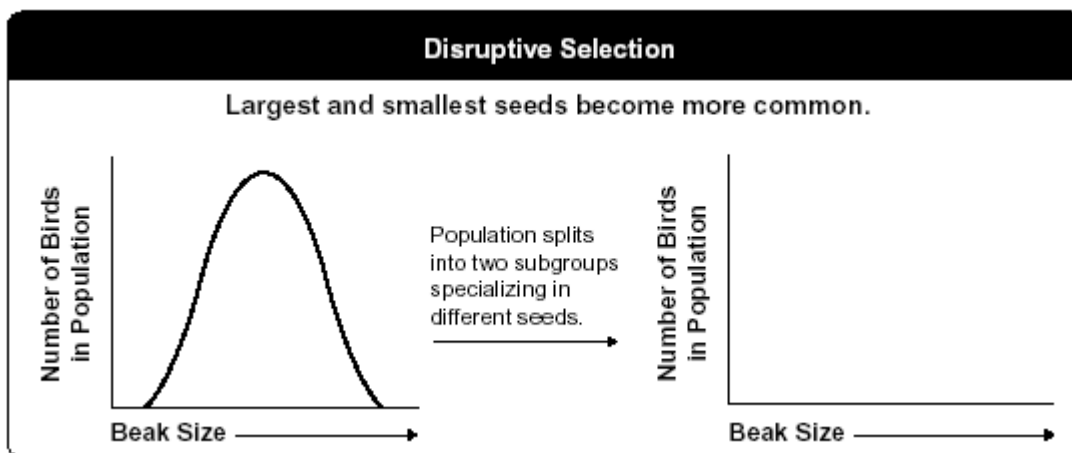
Match the type of selection with the situation in which it occurs.

Type of Selection

- 16. Directional
- 17. Stabilizing
- 18. Disruptive

Situation

- a. Individuals at the upper and lower ends of the curve have higher fitness than individuals near the middle.
 - b. Individuals at one end of the curve have higher fitness than individuals in the middle or at the other end.
 - c. Individuals near the center of the curve have higher fitness than individuals at either end.
19. An increase in the average size of beaks in Galápagos finches is an example of what type of selection?
20. Draw the missing graph to show how disruptive selection affects beak size.



Genetic Drift (page 400)

21. Is natural selection the only source of evolutionary change?
22. Random change in allele frequencies in small populations is

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called

23. A situation in which allele frequencies change as a result of the migration of a small subgroup of a population is known as the

Evolution Versus Genetic Equilibrium (pages 401–402)

24. What does the Hardy-Weinberg principle state?

25. The situation in which allele frequencies remain constant is called

26. List the five conditions required to maintain genetic equilibrium.

Section 16–3 The Process of Speciation (pages 404–410)

This section explains how species evolve and describes the process of speciation in the Galápagos Islands.

Introduction (page 404)

27. What is speciation?

Isolating Mechanisms (pages 404–405)

28. Can individuals in different species have the same gene pool?

29. What does it mean for two species to be reproductively isolated from each other?

30. What must happen in order for new species to evolve?

31. List three ways that reproductive isolation occurs.

32. When does behavioral isolation occur?

33. Give an example of behavioral isolation.

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34. When does geographic isolation occur?

35. Give an example of geographic isolation.

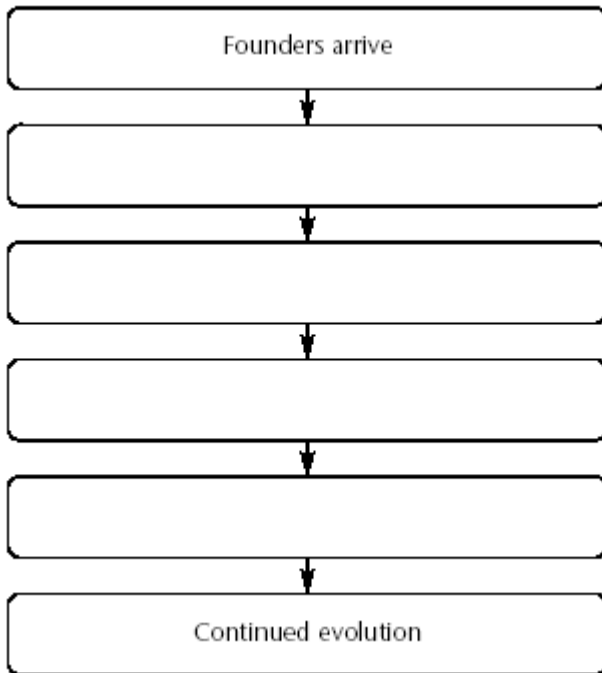
36. What is an example of temporal isolation?

Testing Natural Selection in Nature (pages 406–407)

37. Can the basic mechanisms of evolutionary change be observed in nature?

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38. Circle the letter of each hypothesis about the evolution of Galápagos finches that was tested by the Grants.
- a. The finches' beak size and shape has enough inheritable variation to provide raw material for natural selection.
 - b. The different finch species are the descendants of a common mainland ancestor.
 - c. Differences in the finches' beak size and shape produce differences in fitness that cause natural selection to occur.
 - d. The evolution of the finches is proceeding slowly and gradually.
39. Circle the letter of each observation that was made by the Grants.
- a. Differences in beak size were more important for survival during the wet season.
 - b. When food for finches was scarce, individuals with the largest beaks were less likely to survive.
 - c. Big-beaked birds tended to mate with small-beaked birds.
 - d. Average beak size increased dramatically.
40. Complete the flowchart to show how speciation probably occurred in the Galápagos finches.



41. How could differences in beak size lead to reproductive isolation?

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42. Is the following sentence true or false? During the dry season, individual birds that are most different from each other have the highest fitness.

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