

Name \_\_\_\_\_

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**AP: CHAPTER 22: DESCENT WITH MODIFICATION**

1. Identify the three significant historical themes that set the stage for Darwinian evolutionary theory.

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2. What were the two major points made in *The Origin of Species*?

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3. What were the conventional paradigms in the 1800's when Darwin developed his theories?

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4. What was the contribution of Carolus Linnaeus to the evolutionary theories?

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5. How did the study of fossils help Darwin shape his theories?

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6. How did geological gradualism and uniformitarianism influence Darwin?

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7. Identify the two principles of Lamarck's theory of evolution.

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8. How did the observations during his voyage on the Beagle influence Darwin's theories?

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9. Why were the Galápagos Islands so important to Darwin's observations?

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10. What are the elements for the formation of new species?

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11. What is the driving force behind the evolution of the 14 species of finches on the Galapagos?

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12. What was Wallace's role in the Theory of Natural Selection?

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13. What were the main points of *The Origin of Species*?

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14. Define Descent with Modification.

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15. How does the "tree analogy" represent the evolutionary relationships of creatures?

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16. Summarize the observations and inferences recognized as the backbone of evolution by natural selection.

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17. Observations:

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_

18. Inferences:

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

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19. How did Darwin's experience with artificial selection influence his theories of evolution?

\_\_\_\_\_  
\_\_\_\_\_

20. For each of the following, indicate how it is used as evidence of evolution by natural selection.

a. Paleontology \_\_\_\_\_

\_\_\_\_\_

b. Biogeography \_\_\_\_\_

\_\_\_\_\_

c. Resistance to insecticides \_\_\_\_\_

\_\_\_\_\_

d. Drug Resistance \_\_\_\_\_

\_\_\_\_\_

e. Homology \_\_\_\_\_

\_\_\_\_\_

f. Homologous structures \_\_\_\_\_

\_\_\_\_\_

g. Vestigial organs \_\_\_\_\_

\_\_\_\_\_

h. Embryology \_\_\_\_\_

\_\_\_\_\_

i. Biochemical similarity \_\_\_\_\_

\_\_\_\_\_

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### AP: CHAPTER 23: THE EVOLUTION OF POPULATIONS

1. How does the "modern synthesis" theory of evolution differ from Darwin's Theory of Natural Selection?

\_\_\_\_\_

\_\_\_\_\_

2. Population genetics puts a mathematical approach to the study of microevolution. Define each of the terms commonly used in population genetics.

a. population: \_\_\_\_\_

b. gene pool: \_\_\_\_\_

c. gene frequency: \_\_\_\_\_

3. What are the gene frequencies for the red and white flowers?

a.  $p =$  \_\_\_\_\_

b.  $q =$  \_\_\_\_\_

4. List the five conditions that must be met by a population to insure stability (no evolution).

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

d. \_\_\_\_\_

e. \_\_\_\_\_

5. Assuming Hardy-Weinberg distribution of genes in a population, write the equation that describes genotype frequencies.

\_\_\_\_\_

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6. Define the following:

a.  $p^2 =$  \_\_\_\_\_

b.  $2pq =$  \_\_\_\_\_

c.  $q^2 =$  \_\_\_\_\_

7. Work out these practice problems. Find both the gene and genotype frequencies:

a. In *Drosophila*, the allele for normal length wings is dominant over the allele for vestigial wings. In a population of 1,000 individuals, 160 show the recessive phenotype.

b. The allele for the hair pattern called "widow's peak" is dominant over the allele for no "widow's peak." In a population of 1,000 individuals, 360 show the dominant phenotype.

8. What is the H-W assumption that is broken when genetic drift occurs? Explain

\_\_\_\_\_  
\_\_\_\_\_

9. How does genetic drift apply to each of the following? Give an example of each.

a. Founders effect: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

b. Bottleneck effect \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

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10. How do each of the following break H-W assumptions?

a. natural selection: \_\_\_\_\_

\_\_\_\_\_

b. gene flow: \_\_\_\_\_

\_\_\_\_\_

c. mutation: \_\_\_\_\_

\_\_\_\_\_

d. selective mating: \_\_\_\_\_

\_\_\_\_\_

11. Why is genetic variation important to evolution?

\_\_\_\_\_

\_\_\_\_\_

12. How can populations vary along a geographic axis compared to isolated populations?

\_\_\_\_\_

\_\_\_\_\_

13. What is the role of mutations to forming variation?

\_\_\_\_\_

\_\_\_\_\_

14. What factors of sexual reproduction lead to variations within a population?

\_\_\_\_\_

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15. How does diploidy preserve variation?

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16. What is "balanced polymorphism?"

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17. How can parasites contribute to balanced polymorphism?

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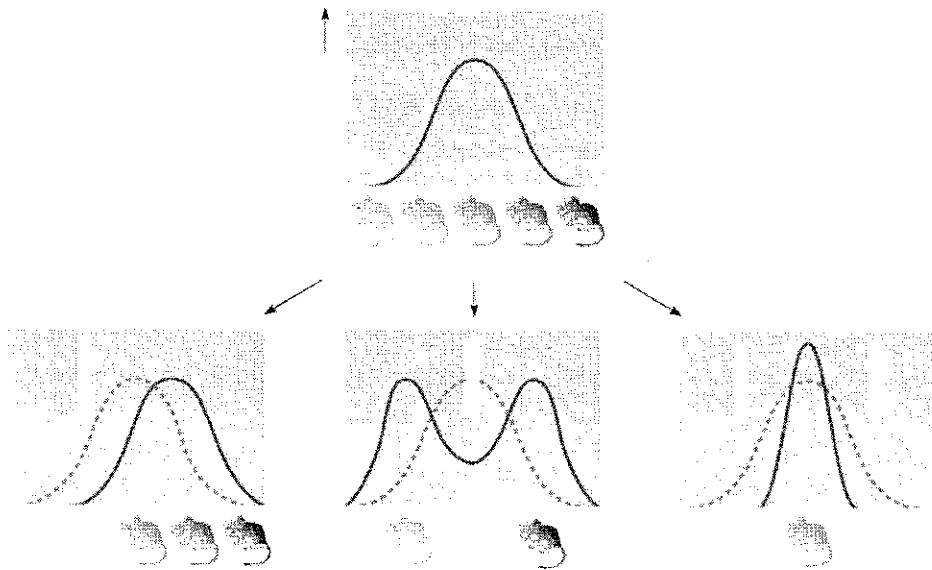
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18. In a biological sense, what is fitness?

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19. Label the following graphs of variation in color with the type of selection.





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20. What is the effect of sexual selection?

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21. For each of the following, give an example or describe what is meant by the statement.

a. Natural selection cannot fashion perfect organisms: \_\_\_\_\_

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b. Evolution is limited by historical constraints: \_\_\_\_\_

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c. Adaptations are often compromises: \_\_\_\_\_

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d. Not all evolution is adaptive: \_\_\_\_\_

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e. Selection can only edit existing variations: \_\_\_\_\_

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### AP: CHAPTER 24: THE ORIGIN OF SPECIES

1. Define the term species.

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2. How do the patterns of speciation differ?

a. anagenesis \_\_\_\_\_

b. cladogenesis \_\_\_\_\_

3. What is thought to be essential for the formation of distinct species rather than a continuum from one form of life to another?

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4. Define and give an example for each of the following barriers that cause isolation.

a. prezygotic Barriers \_\_\_\_\_

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b. habitat Isolation \_\_\_\_\_

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c. behavioral Isolation \_\_\_\_\_

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d. temporal Isolation \_\_\_\_\_

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Name \_\_\_\_\_

e. mechanical isolation \_\_\_\_\_

\_\_\_\_\_

f. gamete isolation \_\_\_\_\_

\_\_\_\_\_

g. postzygotic barriers \_\_\_\_\_

\_\_\_\_\_

h. hybrid inviability \_\_\_\_\_

\_\_\_\_\_

i. hybrid sterility \_\_\_\_\_

\_\_\_\_\_

5. Define the Modes of Speciation

a. allopatric speciation \_\_\_\_\_

\_\_\_\_\_

b. sympatric speciation \_\_\_\_\_

\_\_\_\_\_

6. How does the antelope squirrel demonstrate allopatric speciation?

\_\_\_\_\_

\_\_\_\_\_

7. What does the concept of "ring species" demonstrate? Give an example.

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8. How do island chains encourage adaptive radiation?

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9. What are the two intrinsic factors that result in sympatric speciation?

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10. How can polyploidy lead to speciation?

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11. Why are allopolyploid hybrids usually sterile?

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12. What did Hugo de Vries discover in the evening primrose?

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13. What is thought to be the two factors demonstrating sympatric speciation in the cichlids of Lake Victoria, in East Africa?

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14. Compare gradualism and punctuated equilibrium.

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15. How does microevolution differ from macroevolution?

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16. Identify a couple of factors that could lead to the pattern of evolution we see as divergence?

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17. What does the Mollusk eye demonstrate?

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18. What does the evolution of the horse demonstrate?

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19. Define each of the following evolutionary trends:

a. convergent evolution \_\_\_\_\_

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b. analogous traits \_\_\_\_\_

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c. parallel evolution \_\_\_\_\_

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d. co-evolution \_\_\_\_\_

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