

Name: _____

AP Biology

Chapter 19 Active Reading Guide

Descent with Modification

As you study this chapter, read several paragraphs at a time to catch the flow of ideas and understand the reasoning that is being described. In some places, the text describes a narrative or story of events that led to Darwin's theory of evolution. Therefore, first read the narrative to absorb the big picture and then return to answer the few questions that accompany this material.

Overview

1. Define evolution broadly and then give a narrower definition, as discussed in the overview.

Section 1

This section takes a look at the historical setting and influences on Darwin, and it sets the stage for our formal study of evolution.

2. How did each of the following sources view the origin of species?
Aristotle and Scala Naturae:

The Old Testament:

Carolus Linnaeus:

3. Explain the role of fossils in rock strata as a window to life in earlier times.
4. How would Georges Cuvier have explained the appearance of the record of life shown in the rock strata?

5. James Hutton and Charles Lyell were geologists whose ideas strongly influenced Darwin's thinking. What were the ideas each of them contributed?
James Hutton:

Charles Lyell:

6. What is the importance of the principle of uniformitarianism?
7. Jean-Baptiste de Lamarck proposed a mechanism for how life changes over time. Explain the two principles of his mechanism.
use and disuse:

inheritance of acquired characteristics:

8. Although Lamarck's mechanism of evolution does not explain the changes in species over time, his thinking has been influential. What is considered to be the great importance of his ideas?

Section 2

9. Charles Darwin proposed that the mechanism of evolution is natural selection and that it explains how adaptations arise. What are adaptations? Give two examples of adaptations.
10. Explain the process of natural selection.

11. Let's try to summarize Darwin's observations that drive changes in species over time:

Observation	Cite and Example
1. Variations in traits exist.	
2. These variations (traits) are heritable.	
3. Species overproduce.	
4. There is competition for resources; not all offspring survive.	

12. From these four observations, what two inferences did Darwin make?

1.

2.

13. It is important to remember that differences in heritable traits can lead to differential reproductive success. This means that the individuals who have the necessary traits to promote survival in the current environment will leave the most offspring. How can this differential reproductive success affect the match between organisms and their environment?

14. To demonstrate your understanding of this section, complete the following sentence:

_____ do not evolve. _____ evolve.

Hold the ideas in this section firmly in your brain! If you are ever asked to explain Darwin's theory of evolution by natural selection (a common AP essay question), do not pull out the phrase "survival of the fittest." Instead, cite the points made in question 11 and explain the inferences that are drawn from them.

Section 3

15. Use Figure 19.14 in your text to explain how research with soapberry bugs demonstrated observable evolutionary change.
16. MRSA is in the news today because it is becoming increasingly more common. What is it?
17. How did it become so dangerous? Explain the evolution of MRSA's resistance to methicillin.
18. Do antibiotics cause bacteria to become resistant? Explain your response.
19. Let's make a list of the four evidences for evolution that are described in this concept. Give an example of each.

Evidence for Evolution	Example
Direct observations of evolutionary change	
Homology	
Fossil Record	
Biogeography	

20. How does the fossil record give evidence for evolution?
21. What is meant by each of the following terms? Give an example of each.
- Homologous structures
- Vestigial structures
- Analogous structures

22. How do homologous structures give evidence for evolution?
23. What is summarized in an evolutionary tree?
24. Figure 19.20 in your text shows an evolutionary tree. What is indicated by each branch point in the figure?
25. Organisms that are only distantly related can resemble each other. Explain convergent evolution, and describe how analogous structures can arise.
26. Convergent evolution might be summarized like this: Similar problem, similar solution. Can you give two examples of convergent evolution?

Study Tip

Homologous structures show evidence of relatedness (whale fin, bat wing).

Analogous structures are similar solutions to similar problems but do not indicate close relatedness (bird wing, butterfly wing).

27. What is biogeography? How is it affected by continental drift and the presence of endemic species?

Let's wrap up all of these ideas with a final summary.

ORGANIZE YOUR THOUGHTS

1. Evolution is change in species over time.
2. Heritable variations exist within a population.
3. These variations can result in differential reproductive success.
4. Over generations, this can result in changes in the genetic composition of the population.

And remember: Individuals do not evolve! Populations evolve.