

CHAPTER 22

DESCENT WITH MODIFICATION: A DARWINIAN VIEW OF LIFE

Learning objectives

The Historical Context for Evolutionary Theory

1. Explain the mechanism for evolutionary change proposed by Charles Darwin in *On the Origin of Species*.
2. Define **evolution** and **adaptation**.
3. Compare and contrast Aristotle's *scala naturae* to Carolus Linnaeus' classification scheme.
4. Describe the theories of catastrophism, gradualism, and uniformitarianism.
5. Explain the mechanism for evolutionary change proposed by Jean Baptiste Lamarck. Explain why modern biology has rejected Lamarck's theories.

The Darwinian Revolution

6. Describe how Darwin's observations on the voyage of the HMS *Beagle* led him to formulate and support his theory of evolution.
7. Explain how the principle of gradualism and Charles Lyell's theory of uniformitarianism influenced Darwin's ideas about evolution.
8. Explain what Darwin meant by "descent with modification".
9. Explain what evidence convinced Darwin that species change over time.
10. Explain how Linnaeus's classification scheme fit Darwin's theory of evolution by natural selection.
11. Describe the four observations and two inferences that lead Darwin to propose natural selection as a mechanism for evolutionary change.
12. Explain how an essay by the Rev. Thomas Malthus influenced Charles Darwin.
13. Distinguish between artificial selection and natural selection.
14. Explain why an individual organism cannot evolve.
15. Explain why natural selection can act only on heritable traits.

The Evidence for Evolution

16. Describe the experiments that supported Endler's hypothesis that differences in color patterns in male guppies are due to selective pressure based on predation.
17. Describe how natural selection favors the evolution of drug-resistant pathogens.
18. Explain how the fossil record may be used to test our current understanding of evolutionary patterns.
19. Explain how the existence of homologous and vestigial structures can be explained by Darwin's theory of natural selection.
20. Explain how evidence from biogeography supports the theory of evolution by natural selection.
21. Explain the problem with the statement that Darwinism is "just a theory". Distinguish between the scientific and colloquial use of the word "theory".