

CHAPTER 1 INTRODUCTION: THEMES IN THE STUDY OF LIFE

LEARNING OBJECTIVES

Exploring Life on Its Many Levels

1. Briefly describe the unifying themes that characterize the biological sciences.
2. Diagram the hierarchy of structural levels in biological organization.
3. Explain how the properties of life emerge from complex organization.
4. Describe the two major dynamic processes of any ecosystem.
5. Distinguish between prokaryotic and eukaryotic cells.
6. Describe the basic structure and function of DNA.
7. Describe the dilemma of reductionism.
8. Discuss the goals and activities of systems biology. List three research developments that have advanced systems biology.
9. Explain the importance of regulatory mechanisms in living things. Distinguish between positive and negative feedback.

Evolution, Unity, and Diversity

10. Distinguish among the three domains of life. List and distinguish among the three kingdoms of multicellular, eukaryotic life.
11. Explain the phrase "life's dual nature of unity and diversity."
12. Describe the observations and inferences that led Charles Darwin to his theory of evolution by natural selection.
13. Explain why diagrams of evolutionary relationships have a treelike form.

The Process of Science

14. Distinguish between discovery science and hypothesis-based science. Explain why both types of exploration contribute to our understanding of nature.
15. Distinguish between quantitative and qualitative data.

16. Distinguish between inductive and deductive reasoning.
17. Explain why hypotheses must be testable and falsifiable but are not provable.
18. Describe what is meant by a controlled experiment.
19. Distinguish between the everyday meaning of the term *theory* and its meaning to scientists.
20. Explain how science is influenced by social and cultural factors.
21. Distinguish between science and technology. Explain how science and technology are interdependent.