

Chapter 1 Reading Guide: Exploring Life

How to use this reading guide: Look over the entire reading guide—read each question to prepare yourself for reading the chapter. Read the chapter carefully and thoroughly. Make sure to look at all of the figures and pictures and read their captions. Then...answer the questions posed below.

Inquiring About Life

1. Why is this the “most exciting” era for biology? Give a few examples.

Biologists explore life from the microscopic to the global scale

2. Life is marvelous—but what is it? Life is characterized by certain properties that allow us to distinguish life from non-life (this totally blows my mind because we use this to define life and as the “rules” we use to look for life (“little green men”) in space—BIO ROCKS!!!). Fill-in the chart with the appropriate information.

Property of Life	Description	Biological Example

Theme: New Properties Emerge at Successive Levels of Biological Organization

3. Life is highly organized!!! It requires great amounts of energy to maintain this order. Using figure 1.3, beginning at the level of the molecule and working your way up to the biosphere, explain how life is organized. (give an example at each level)

4. How does reductionism make the study of biology easier?

- a. What limitations does it have?
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5. What are emergent properties? To what can they be attributed? Give an example.
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6. What is the ultimate goal of systems biology? Give a couple of examples of “systems biology” questions.
 - b. How is it being utilized in...
 - i. Ecology
 - ii. Molecular and cellular biology
 - c. What key research developments have made systems biology possible?
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7. Name and describe two basic types of cells. What is similar to both? What is unique?
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8. Order requires instructions to build and maintain it. How are the biological instructions encoded?
 - d. Describe this molecule’s structure (what is it made of?)
 - e. Describe how this molecule encodes the instructions.
 - f. How does the “language of life” compare across ALL life forms? How did this come about?
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9. Compare DNA with protein. How are they related to each other? What does each do?
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10. What is energy conversion? Describe how energy conversions are involved in living things.

Let's Recap...

Theme	Description	Example	How might it be related to at least one other theme?

Evolution accounts for life's unity and diversity

11. Charles Darwin proposed a mechanism for evolution in his book "On the Origin of Species" and he asserted that the evolutionary history of species was "descent with modification."

g. Explain how it captures the duality in life.

h. Give a brief description of what natural selection is, how it causes descent with modification and how it accounts for species diversity.

12. The three domains you learned about in concept 1.3 can be represented in the tree of life as the three main branches. On the eukaryotic branch, three of the subbranches are the kingdoms Plantae, Fungi, and Animalia. Evidence supports the view that fungi and animals are more closely related to each other than either of these kingdoms is to plants. Draw a simple branching pattern that symbolizes the relationship between these three eukaryotic kingdoms.

13. Today, many scientists based on new biochemical evidence, utilize a new system of classification called "domains." Describe the 3 domains and how the division into domains is made.

14. How are the “domains” divided into smaller and smaller groupings? As these smaller groupings are made, what happens to the number of organisms in each group?

15. What are the four major kingdoms of eukaryotes? To what domain do they belong?

16. Ecosystems are dynamic places in which the living organisms are in constant interactions with the non-living parts of the environment. What two major processes are involved?

17. What is the “special place” that cells occupy? Explain what this means.

Biological systems are much more than the sum of their parts

18. Feedback mechanisms are used to control many biological processes. Contrast positive and negative feedback. Give a biological example of each.

Biologists explore life across its great diversity of species

19. What is taxonomy? Why is it useful?

Biologists use various forms of inquiry to explore life

20. What is science?

i. How is inquiry related to science?

21. Distinguish between “discovery-science” and “hypothesis-based” science.

j. What processes and methods are involved in each?

k. What type of data results from each?

l. When would you use each type?

22. Contrast inductive reasoning with deductive reasoning.

23. Using the “snake mimicry” example, explain how to set up a controlled experiment.

