

# Chapter 14

## The History of Life

### Reinforcement and Study Guide

#### Section 14.1 The Record of Life

*In your textbook, read about the early history of Earth.*

For each statement below, write **true** or **false**.

- \_\_\_\_\_ 1. Earth is thought to have formed about 4.6 billion years ago.
- \_\_\_\_\_ 2. The conditions on primitive Earth were very suitable for life.
- \_\_\_\_\_ 3. Geological events on Earth set up conditions that would play a major role in the evolution of life on Earth.
- \_\_\_\_\_ 4. By the end of the Mesozoic, the continents took on their modern shape.
- \_\_\_\_\_ 5. The first organisms appeared on land between 3.9 and 3.4 billion years ago.

*In your textbook, read about a history in the rocks.*

For each statement in Column A, write the letter of the matching item in Column B.

Column A	Column B
_____ 6. A footprint, trail, or burrow, providing evidence of animal activity	<b>a.</b> petrified fossil
_____ 7. A fossil embedded in tree sap, valuable because the organism is preserved intact	<b>b.</b> imprint
_____ 8. An exact stone copy of an original organism, the hard parts of which have been penetrated and replaced by minerals	<b>c.</b> trace fossil
_____ 9. Any evidence of an organism that lived long ago	<b>d.</b> cast
_____ 10. The fossil of a thin object, such as a leaf or feather, that falls into sediments and leaves an outline when the sediments hardened	<b>e.</b> amber-preserved
_____ 11. An empty space left in rock, showing the exact shape of the organism that was buried and decayed there	<b>f.</b> fossil
_____ 12. An object formed when a mold is filled in by minerals from the surrounding rock	<b>g.</b> mold

## Section 14.1 The Record of Life

*In your textbook, read about the age of a fossil.*

Answer the following questions.

13. Explain how relative dating works.

---



---



---

14. What is the limitation of relative dating?

---

15. What dating technique is often used by paleontologists to determine the specific age of a fossil?

---

16. How do scientists use this dating technique to determine the ages of rocks or fossils?

---



---

*In your textbook, read about a trip through geologic time.*

Complete the table by checking the correct column for each statement.

Statement	Era			
	Pre-Cambrian	Paleozoic	Mesozoic	Cenozoic
17. The first photosynthetic bacteria form dome-shaped structures called stromatolites.				
18. Primates evolve and diversify.				
19. Divided into three periods: Triassic, Jurassic, and Cretaceous				
20. An explosion of life, characterized by the appearance of many types of invertebrates and plant phyla				
21. Mammals appear.				
22. Dinosaurs roam Earth, and the ancestors of modern birds evolve.				
23. Flowering plants appear.				
24. Amphibians and reptiles appear.				

**Chapter**  
**14**
**The History of Life, *continued***
**Reinforcement and Study Guide**
**Section 14.2 The Origin of Life**

*In your textbook, read about origins: the early ideas.*

Use each of the terms below just once to complete the passage.

microorganisms	vital force	Louis Pasteur	biogenesis
nonliving matter	S-shaped	disproved	Francesco Redi
organisms	broth	microscope	spontaneous generation
spontaneously	air		

Early scientists believed that life arose from **(1)** \_\_\_\_\_ through a process they called **(2)** \_\_\_\_\_. In 1668, the Italian physician **(3)** \_\_\_\_\_ conducted an experiment with flies that **(4)** \_\_\_\_\_ this idea. At about the same time, biologists began to use an important new research tool, the **(5)** \_\_\_\_\_. They soon discovered the vast world of **(6)** \_\_\_\_\_. The number and diversity of these organisms was so great that scientists were led to believe once again that these organisms must have arisen **(7)** \_\_\_\_\_. By the mid-1800s, however, **(8)** \_\_\_\_\_ was able to disprove this hypothesis once and for all. He set up an experiment, using flasks with unique **(9)** \_\_\_\_\_ necks. These flasks allowed **(10)** \_\_\_\_\_, but no organisms, to come into contact with a broth containing nutrients. If some **(11)** \_\_\_\_\_ existed, as had been suggested, it would be able to get into the **(12)** \_\_\_\_\_ through the open neck of the flask. His experiment proved that organisms arise only from other **(13)** \_\_\_\_\_. This idea, called **(14)** \_\_\_\_\_, is one of the cornerstones of biology today.

**Determine if the statement is true. If it is not, rewrite the italicized part to make it true.**

**15.** Biogenesis *explains* how life began on Earth.

\_\_\_\_\_

**16.** For life to begin, simple *inorganic* molecules had to be formed and then organized into complex molecules.

\_\_\_\_\_

**17.** Several billion years ago, Earth's atmosphere had no free *methane*.

\_\_\_\_\_

## Section 14.2 The Origin of Life

18. Primitive Earth's atmosphere may have been composed of water vapor, carbon dioxide, and *nitrogen*. \_\_\_\_\_
19. In the early 1900s, Alexander Oparin proposed a widely accepted hypothesis that life began *on land*. \_\_\_\_\_
20. *Pasteur* hypothesized that many chemical reactions occurring in the atmosphere resulted in the formation of a primordial soup. \_\_\_\_\_
21. In 1953, Miller and Urey tested Oparin's hypothesis by simulating the conditions of *modern* Earth in the laboratory. \_\_\_\_\_
22. Miller and Urey showed that organic compounds, including *nucleic acids* and sugars, could be formed in the laboratory, just as had been predicted. \_\_\_\_\_
23. This "life-in-a-test-tube" experiment of Miller and Urey provides support for some modern hypotheses of *biogenesis*. \_\_\_\_\_
24. Sidney Fox took Miller and Urey's experiment further and showed how amino acids could cluster to form *protocells*. \_\_\_\_\_

*In your textbook, read about the evolution of cells.*

**Answer the following questions.**

25. Describe the likely characteristics of the first organisms on Earth.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
26. What is an autotroph? What factors helped them thrive on Earth?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
27. What present-day organisms may be similar to the first autotrophs? Why?  
\_\_\_\_\_  
\_\_\_\_\_
28. What change occurred in Earth's atmosphere after the evolution of photosynthesizing prokaryotes? Why?  
\_\_\_\_\_  
\_\_\_\_\_