

# Study Guide

## CHAPTER 14

### Section 1: Fossil Evidence of Change

**In your textbook, read about Earth’s early history.**

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

- \_\_\_\_\_ 1. Solid Earth formed about 4.6 billion years ago.
- \_\_\_\_\_ 2. Young Earth was hotter than it is today.
- \_\_\_\_\_ 3. Minerals in old rock suggest that Earth’s early atmosphere had little or no free oxygen.
- \_\_\_\_\_ 4. The lightest elements in early Earth moved to the center of the planet.
- \_\_\_\_\_ 5. Gases in Earth’s early atmosphere probably included water vapor, nitrogen, carbon dioxide, carbon monoxide, hydrogen sulfide, hydrogen, and ozone.

**In your textbook, read about the geologic time scale.**

*Complete the table by checking the correct column(s) for each statement.*

Statement	Precambrian	Paleozoic Era	Mesozoic Era	Cenozoic Era
6. Autotrophic prokaryotes enrich the atmosphere with oxygen.				
7. Primates evolve and diversify.				
8. It is divided into three periods: Triassic, Jurassic, and Cretaceous.				
9. Many types of insects, land plants, and the first land vertebrates appear.				
10. Mammals appear.				
11. Dinosaurs roam the earth, and the ancestors of present-day birds evolve.				
12. Reptiles appear.				
13. Simple organisms, such as stromatolites, live in marine ecosystems.				

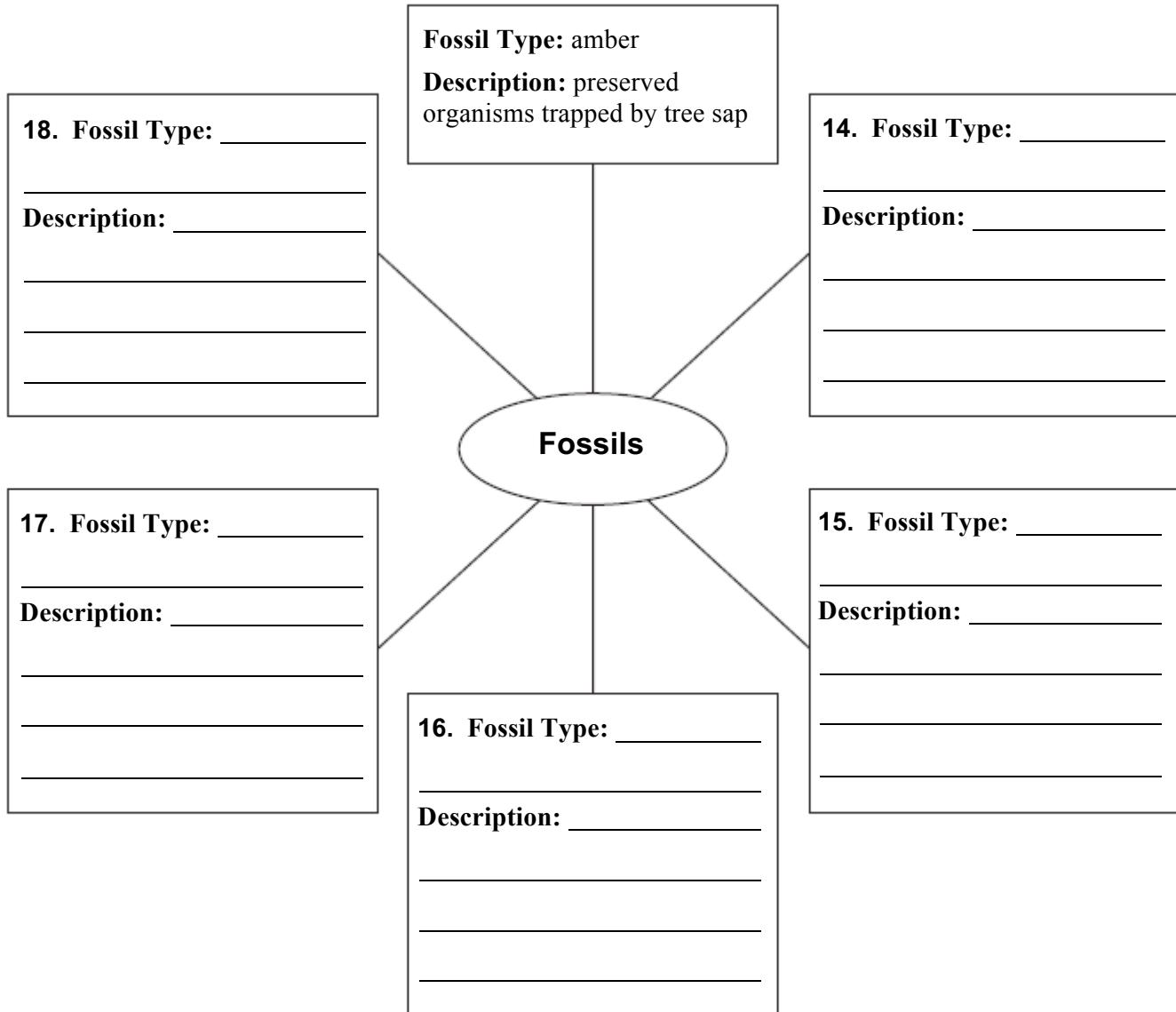
**Study Guide, Section 1: Fossil Evidence of Change** continued

In your textbook, read about the different categories of fossils.

Complete the graphic organizer by writing a fossil type and a description in each square. Use these choices:

- detailed mineral replicas
- impression of an organism, can be filled with minerals
- mummified or frozen remains
- petrified or permineralized
- trace fossils

- footprints, burrows, fossilized feces
- molds and casts
- original material
- replacement
- wood pores filled with minerals



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# The History of Life

## Section 1 Fossil Evidence of Change

**Main Idea** \_\_\_\_\_ **Details** \_\_\_\_\_

**Skim** Section 1 of the chapter. Write a question that comes to mind from reading the headings and the illustration captions.

1. \_\_\_\_\_

**Review Vocabulary**

Use your book or dictionary to define extinction.

*extinction*

**New Vocabulary**

Use the terms in the left column to complete the paragraph below.

*Cambrian explosion*

*eon*

*epoch*

*era*

*fossil*

*geologic time scale*

*half-life*

*K-T boundary*

*law of superposition*

*paleontologist*

*period*

*plate tectonics*

*radiometric dating*

*relative dating*

Scientists measure Earth's geological and biological events using the \_\_\_\_\_, which is divided into \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_. The \_\_\_\_\_ was a period of rapid change during which the ancestors of most animal groups emerged. A layer of soot found between rock layers worldwide, known as the \_\_\_\_\_, might indicate that a large meteorite collided with Earth.

The theory of \_\_\_\_\_ describes Earth's surface as large plates that move over Earth's thick, liquid interior. These plates are made up of rocks. \_\_\_\_\_ are scientists who study \_\_\_\_\_. They determine the relative age of rocks using \_\_\_\_\_, which compares the sequence of rock layers. The \_\_\_\_\_ states that younger rock layers are deposited on top of older rock layers. Another method of determining the age of rocks is \_\_\_\_\_, which measures the decay of radioactive isotopes. The rate of decay is measured using \_\_\_\_\_, the amount of time required for half of a radioactive isotope to decay.

**Section 1 Fossil Evidence of Change** (continued)

**Main Idea** \_\_\_\_\_ **Details** \_\_\_\_\_

**The Geologic Time Scale**

*I found this information on page \_\_\_\_\_.*

**Summarize** *the four time periods of the geologic time scale using the table below.*

Geologic Time	Major Biological Events	Organisms that Appeared	Other Facts
		unicellular life, eukaryotic cells, small marine animals	includes Earth's formation, almost 90% of Earth's entire history
	Cambrian explosion at beginning of Paleozoic, mass extinction at end		
		dinosaurs, small mammals, flowering plants, birds	
	following extinction of dinosaurs, mammals diversify		

**Rephrase** *the current theory on the cause of the mass extinction at the end of the Mesozoic era.*

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**SUMMARIZE**

Discuss how paleontologists use relative and radiometric dating to support the geologic timescale.

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# Study Guide

## CHAPTER 14 Section 2: The Origin of Life

In your textbook, read about ideas on the origin of life.

Match the definition in Column A with the term in Column B. The terms may be used more than once.

### Column A

- \_\_\_\_\_ 1. Lynn Margulis proposed this idea to explain the origin of organelles.
- \_\_\_\_\_ 2. Energy from sunlight and lightning allowed the first organic molecules to form.
- \_\_\_\_\_ 3. Only living organisms can produce other living organisms.
- \_\_\_\_\_ 4. Life arises from nonlife.
- \_\_\_\_\_ 5. Prokaryotic cells were involved in the formation of eukaryotic cells.
- \_\_\_\_\_ 6. Francesco Redi performed a controlled experiment with flies and maggots to test this idea on the origin of life.
- \_\_\_\_\_ 7. Stanley Miller and Harold Urey simulated early atmospheric conditions to test this idea on the origin of life.

### Column B

- A. spontaneous generation
- B. theory of biogenesis
- C. endosymbiont theory
- D. primordial soup hypothesis

In your textbook, read about the early ideas of origins.

Refer to the drawing of Francesco Redi's experiment. Respond to each statement.



8. Tell what Redi observed in each flask as the meat decayed.

\_\_\_\_\_

9. Recall what his experiment showed.

\_\_\_\_\_

## Study Guide, Section 2: The Origin of Life continued

In your textbook, read about the present-day ideas of origins.

Respond to each statement.

10. **Name** two places on early Earth where organic molecules could have been synthesized.

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11. **Tell** what was produced in the experiment performed by Miller and Urey.  
**State** what the significance of this product was.

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12. **Recall** why a framework, such as a particle of clay, is necessary for protein assembly.

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In your textbook, read about the present-day ideas of origins and cellular evolution.

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

<b>amino acids</b>	<b>archaea</b>	<b>clay particles</b>	<b>coding</b>	<b>eukaryotic</b>
<b>prokaryotic</b>	<b>proteins</b>	<b>replication</b>	<b>RNA</b>	<b>template</b>

For life to exist, molecules called (13) \_\_\_\_\_ must form. These are made of chains of (14) \_\_\_\_\_. They might have first formed when amino acids stuck to (15) \_\_\_\_\_ to aid their bonding. Clay might also have provided a protein molecule pattern known as a(n) (16) \_\_\_\_\_. Today, scientists know that the (17) \_\_\_\_\_ for sequences of amino acids is provided by DNA or (18) \_\_\_\_\_. This allows for (19) \_\_\_\_\_ of proteins. Scientists hypothesize that the first cells were (20) \_\_\_\_\_ and were similar to the (21) \_\_\_\_\_ that live in extreme climates today. Many scientists believe that (22) \_\_\_\_\_ cells evolved from these early prokaryotic cells.

In your textbook, read about cellular evolution.

Complete the table by checking the correct column(s) for each description.

Description	Prokaryotes	Eukaryotes
23. Lacking most organelles		
24. Have no nucleus		
25. Are larger cells		
26. Include archaea		
27. Contain organelles and complex internal membranes		