

Prentice Hall  
**Biology**

*Miller*  
*Levine*

# 17-1 The Fossil Record





## What is the fossil record?



The fossil record provides evidence about the history of life on Earth. It also shows how different groups of organisms, including species, have changed over time.



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The fossil record provides incomplete information about the history of life.

Over 99% of all species that have lived on Earth have become **extinct**, which means that the species has died out.

Those species that still exist are referred to as being **extant**.

# How Fossils Form

Most fossils form in **sedimentary rock**.

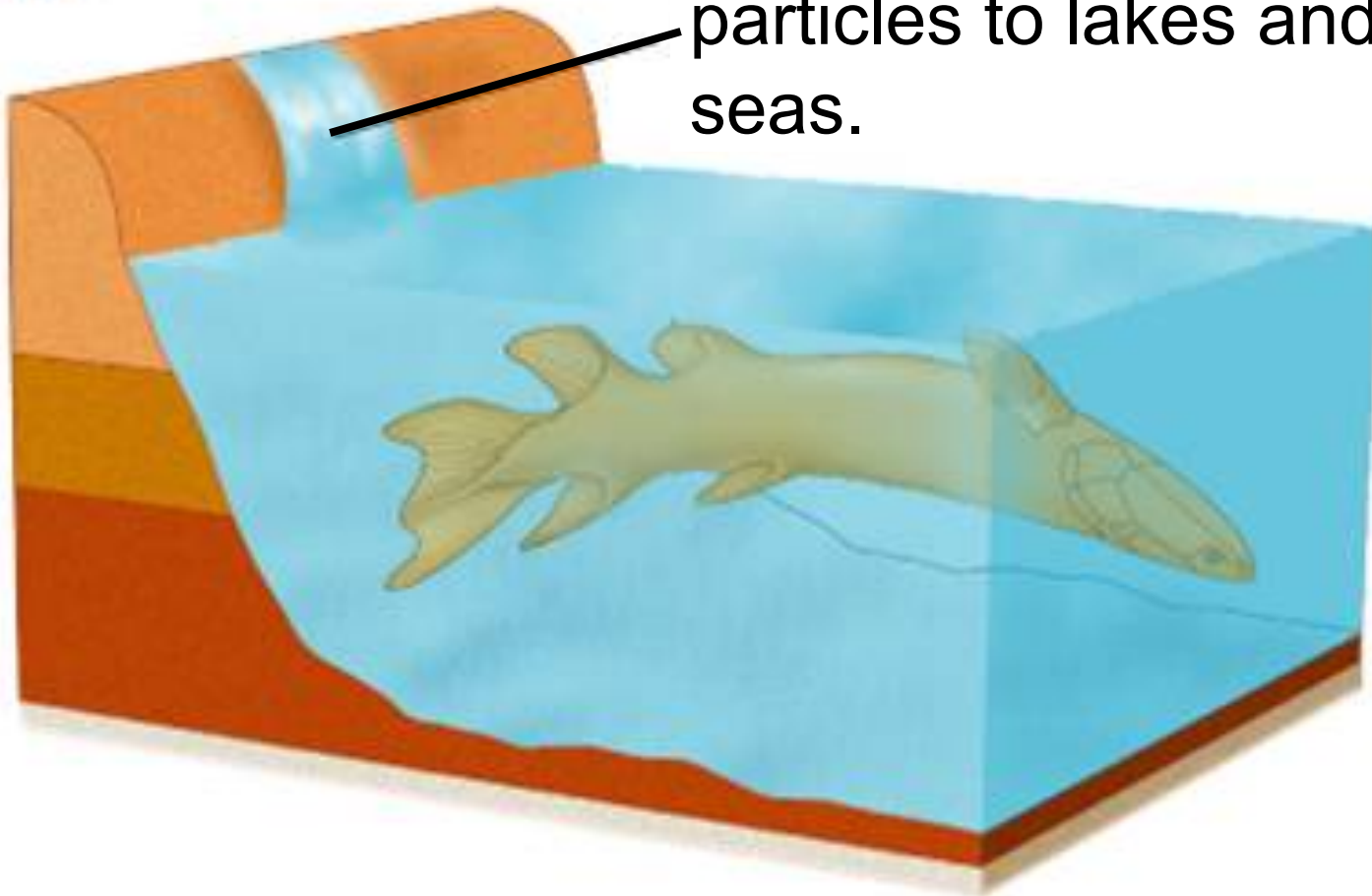
Sedimentary rock forms when exposure to the elements breaks down existing rock into small particles of sand, silt, and clay.



# Fossil Formation

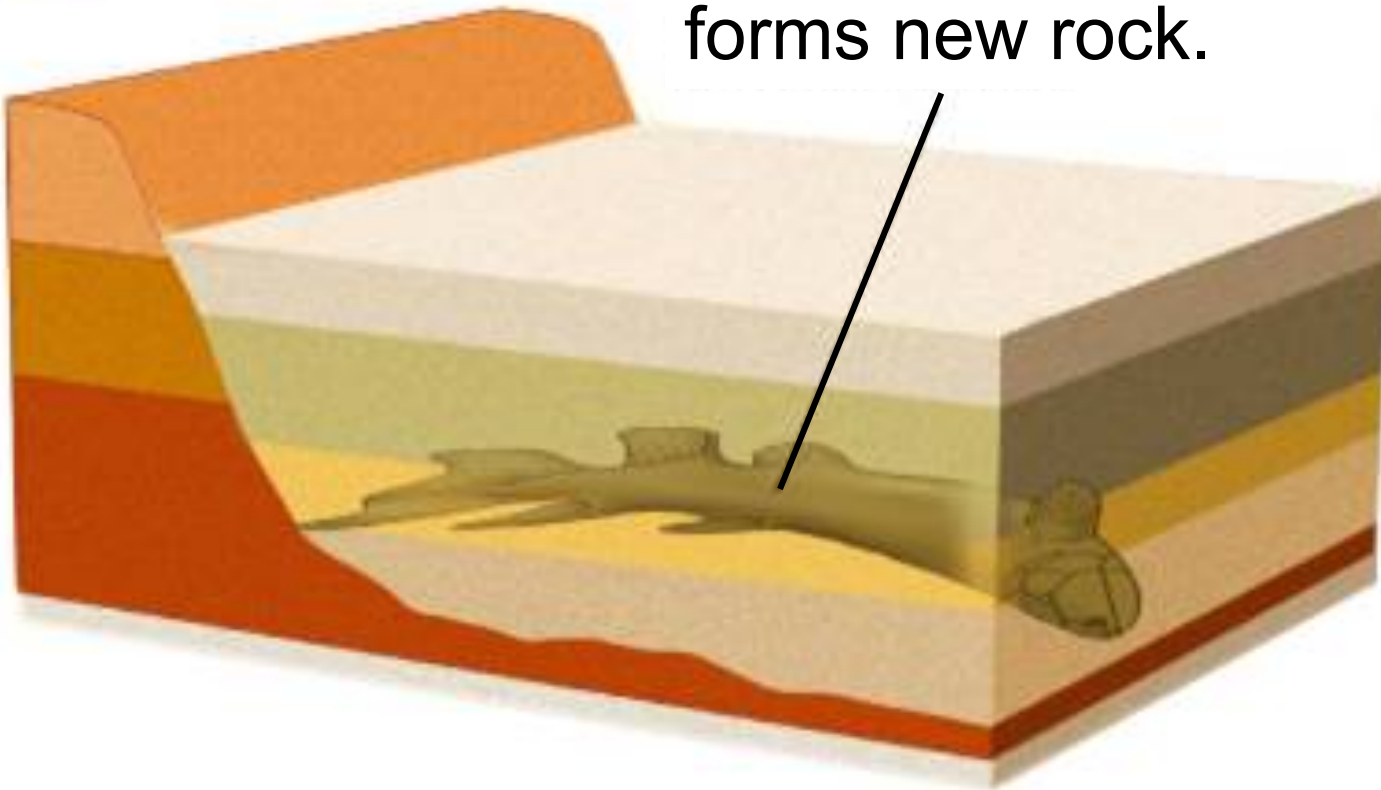
1

Water carries small rock particles to lakes and seas.



2

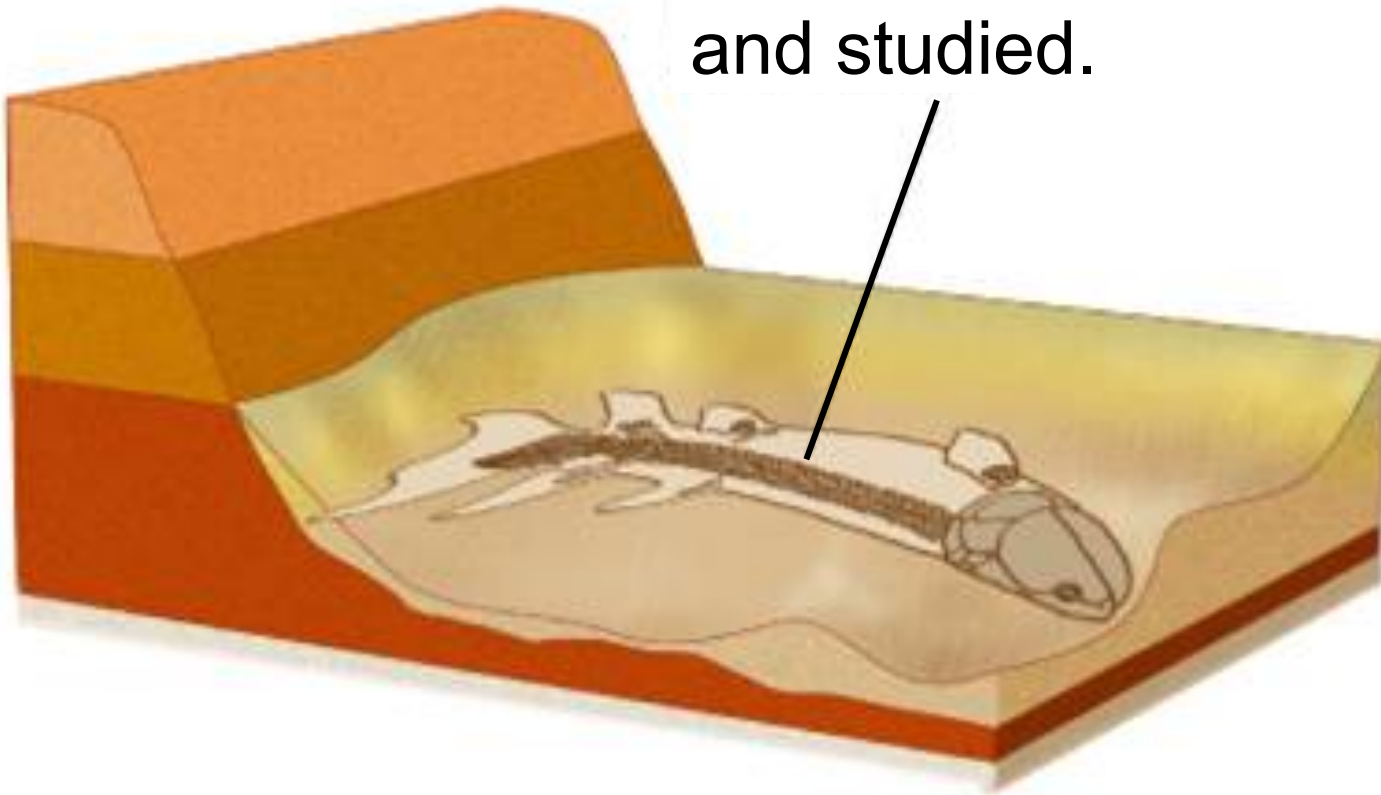
Dead organisms are buried by layers of sediment, which forms new rock.





3

The preserved remains may be later discovered and studied.



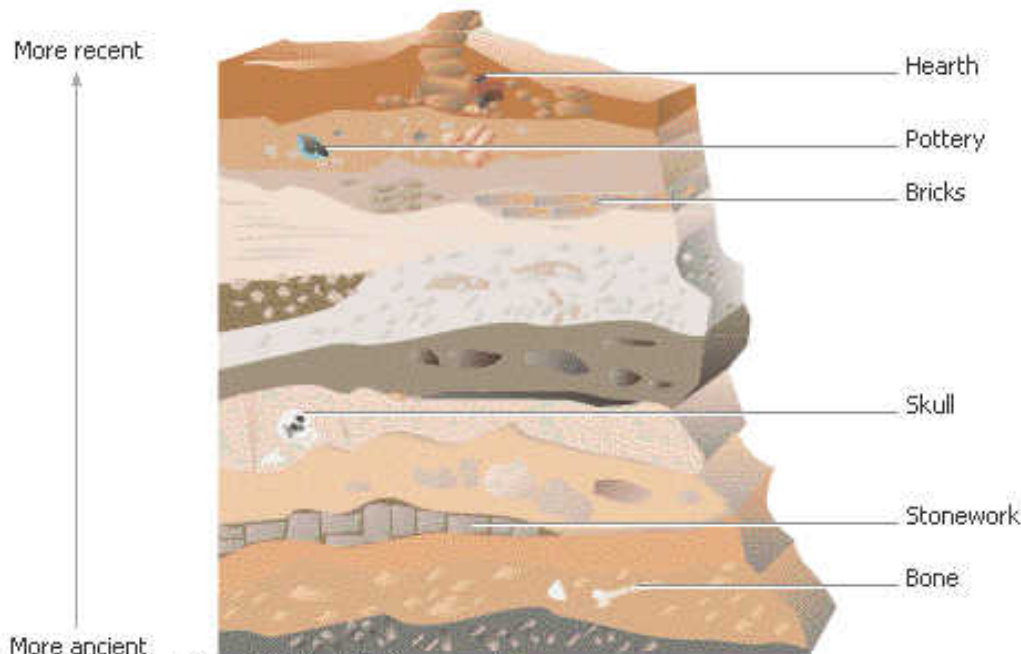
# Interpreting Fossil Evidence

Paleontologists determine the age of fossils using **relative dating** or **radioactive dating**.

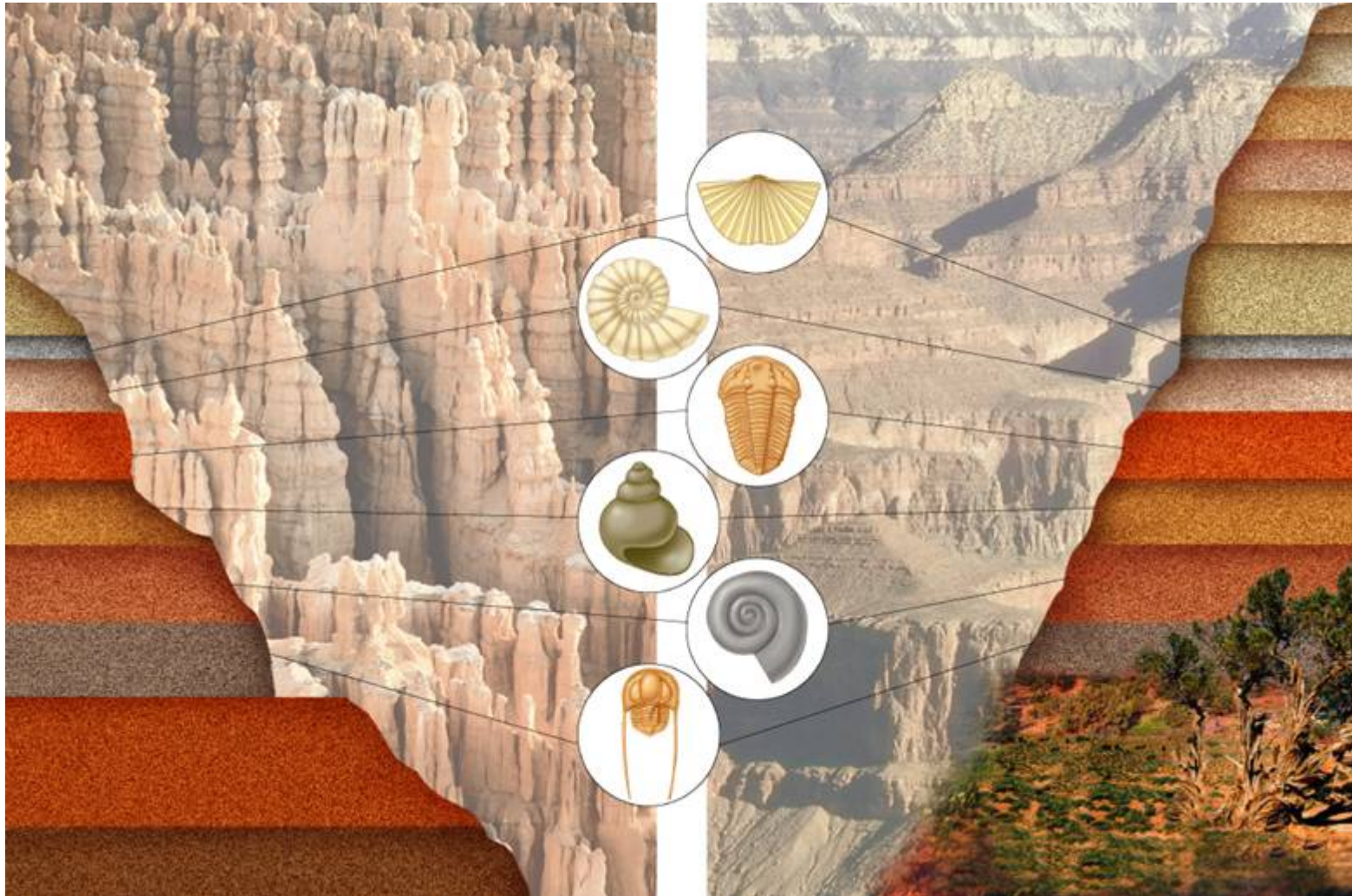
## Relative Dating

In **relative dating**, the age of a fossil is determined by comparing its placement with that of fossils in other layers of rock.

Rock layers form in order by age—the oldest on the bottom, with more recent layers on top.



# Relative Dating



Index fossils are used to compare the relative ages of fossils.

An **index fossil** is a species that is recognizable and that existed for a short period but had a wide geographic range.

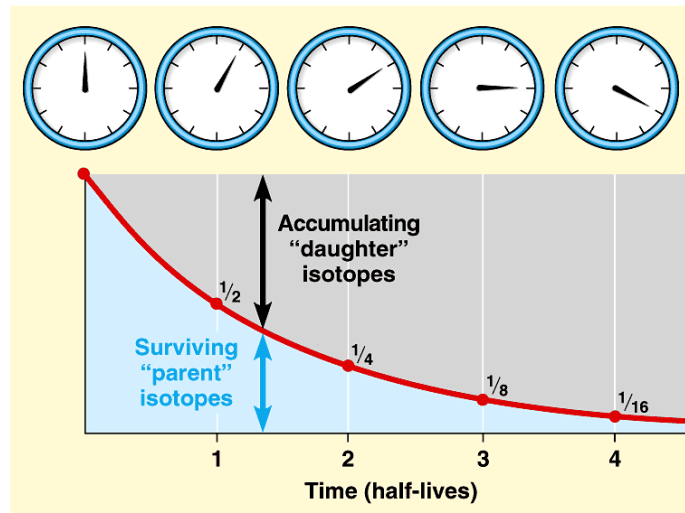


## Radioactive Dating

Scientists use radioactive decay to assign an absolute age to rocks.

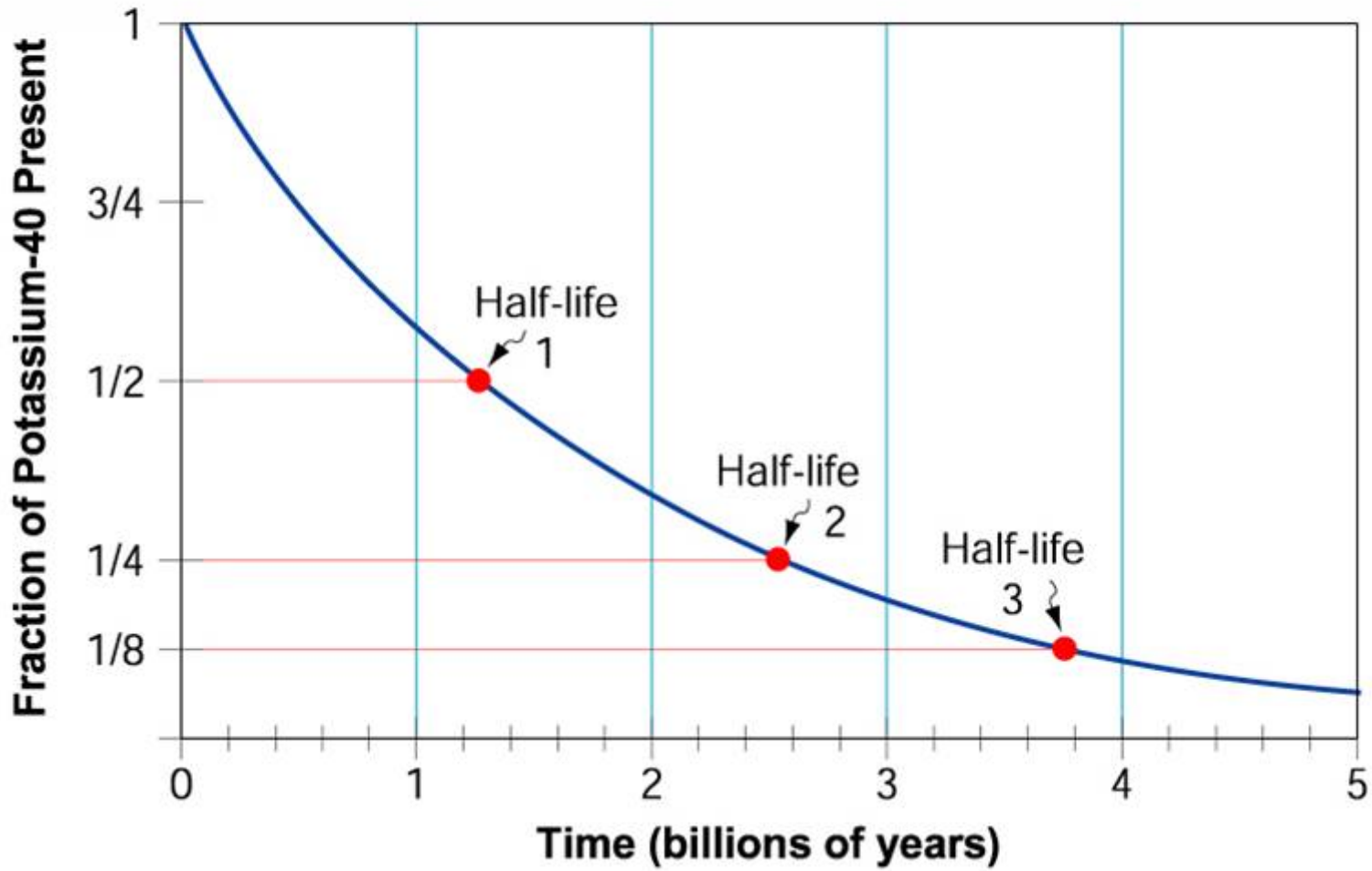
**Radioactive dating** is the use of half-lives to determine the age of a sample.

A **half-life** is the length of time required for half of the radioactive atoms in a sample to decay.



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## Radioactive Decay of Potassium-40



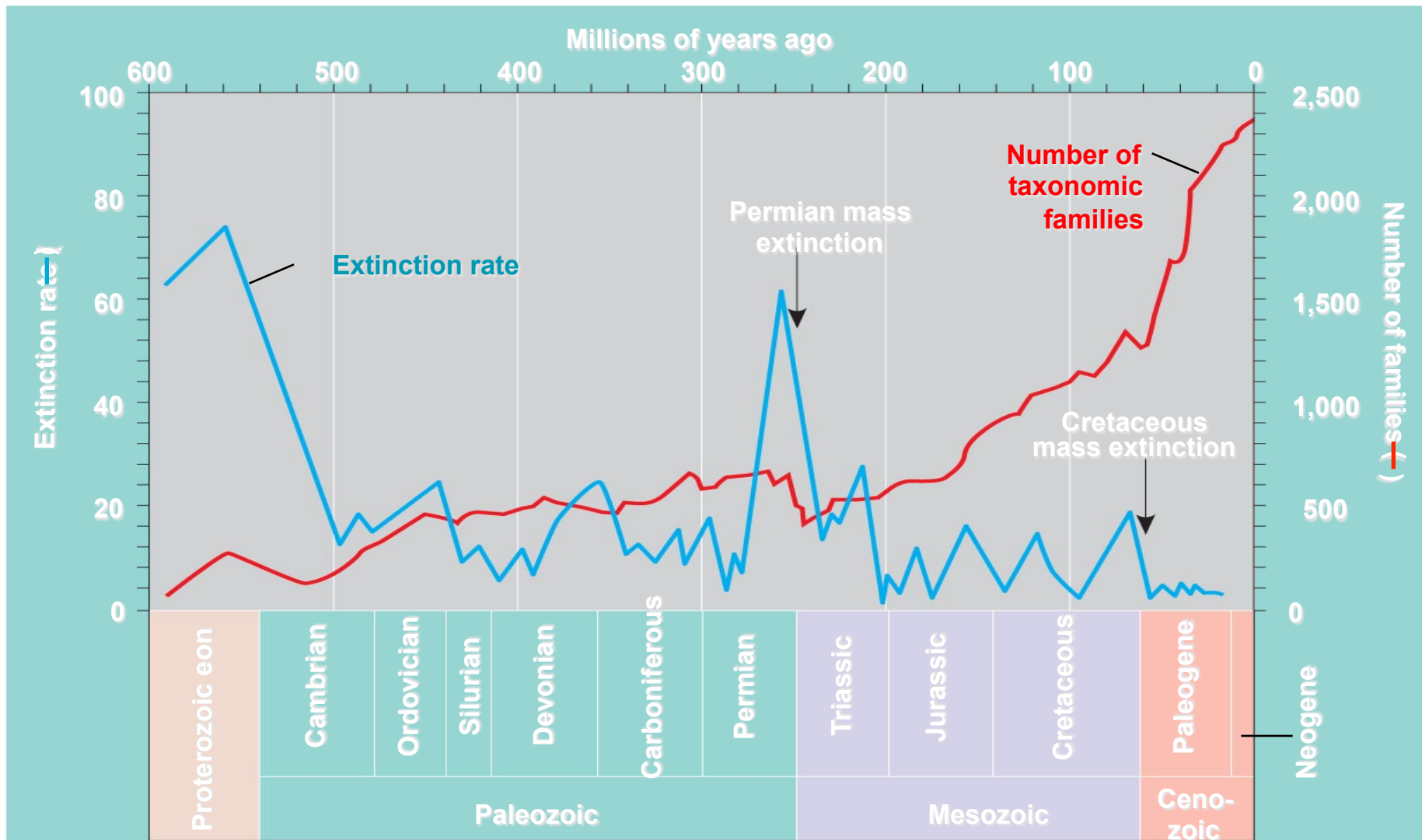


**The basic divisions of the geologic time scale are eras and periods.**





# 17-1 The Fossil Record → Extinction Rate



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Geologic time begins with Precambrian Time, which covers about 88% of Earth's history.

Geologic Time Scale		
Era	Period	Time (millions of years ago)
Precambrian Time	Vendian	650–544

## Eras

Geologists divide the time between Precambrian time and the present into three **eras**:

- Paleozoic Era
- Mesozoic Era
- Cenozoic Era

Geologic Time Scale		
Era	Period	Time (millions of years ago)
Paleozoic	Permian	290–245
	Carboniferous	360–290
	Devonian	410–360
	Silurian	440–410
	Ordovician	505–440
	Cambrian	544–505

<b>Geologic Time Scale</b>		
<b>Era</b>	<b>Period</b>	<b>Time (millions of years ago)</b>
<b>Mesozoic</b>	<b>Cretaceous</b>	<b>145–65</b>
	<b>Jurassic</b>	<b>208–145</b>
	<b>Triassic</b>	<b>245–208</b>

Geologic Time Scale		
Era	Period	Time (millions of years ago)
Cenozoic	Quaternary	1.8 – present
	Tertiary	65 – 1.8

**movie**  
click to start

# Clock Model of Earth's History

First multicellular organisms

Cenozoic Era

Mesozoic Era

Paleozoic Era

Precambrian Time

Radiation of mammals

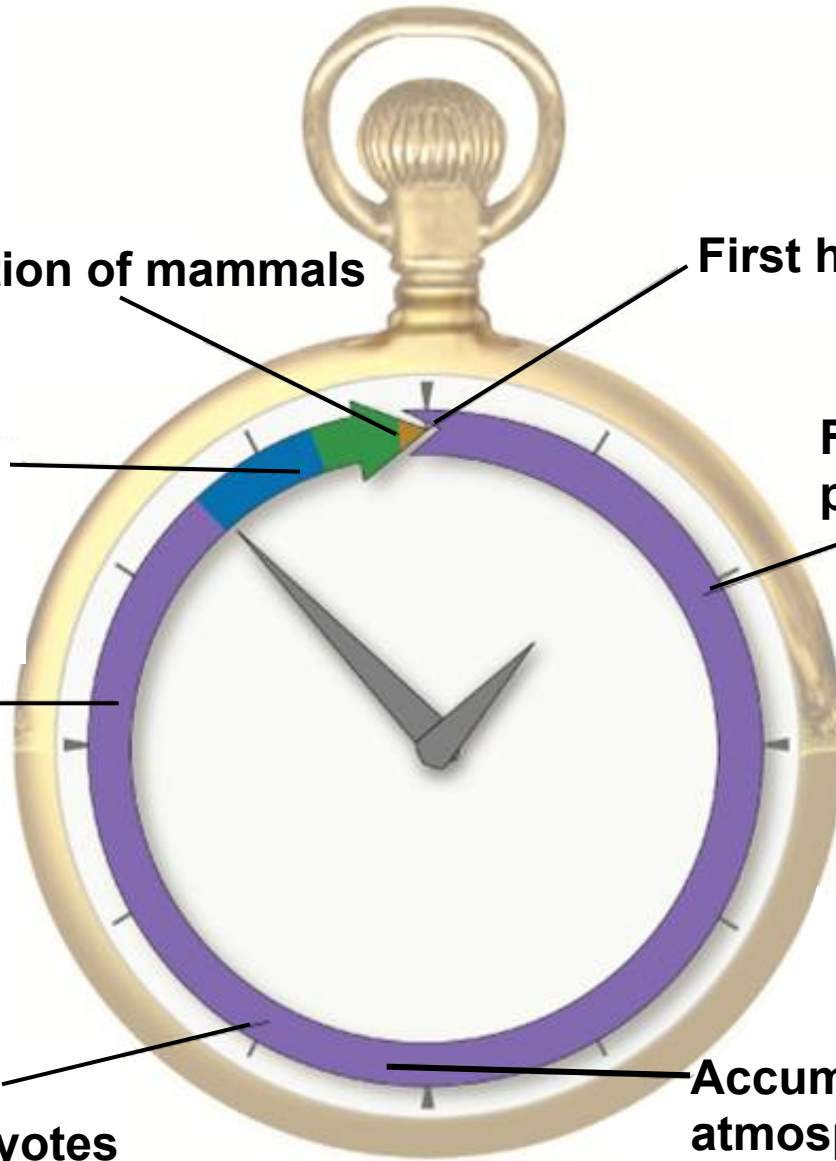
First humans

First land plants

First prokaryotes

First eukaryotes

Accumulation of atmospheric oxygen





# 17-1 Section QUIZ

Continue to:

**Section QUIZ**

- or -

Click to Launch:



## 17-1 Section QUIZ

- 1** Which of the following statements about fossils is NOT true?
- a. Most fossils form in sedimentary rock.
  - b. Fossils occur in a particular order.
  - c. Only a small portion of fossils are from extinct organisms.
  - d. Fossils can be used in relative dating of rock formations.

- 2 The fossil record consistently shows evidence that
- a. all forms of life have existed in all geologic eras.
  - b. living organisms have only been on Earth for a short time.
  - c. living things have changed over time.
  - d. ancient life-forms are much the same as forms found living today.

## 17-1 Section QUIZ

- 3** Index fossils assist paleontologists in dating rocks because they represent species that
- were widely distributed and existed for a very long time.
  - existed in a single location for a short period of time.
  - were widely distributed and existed for a short time.
  - existed in a single location for a very long time.

## 17-1 Section QUIZ

**4** Determining the age of a fossil by comparing its placement with fossils in other layers of rock is called

- a. carbon-14 dating.
- b. fossil-indexing.
- c. relative dating.
- d. absolute dating.

## 17-1 Section QUIZ

- 5** According to the geologic time scale, geologic time begins with
- a. Precambrian Time.
  - b. the Paleozoic Era.
  - c. the Quaternary Period.
  - d. the Cambrian Era.

**END OF SECTION**