

TOPIC: THE FOSSIL RECORD

Fossils

- ◆ History of life on earth is told mostly through _____.
- ◆ Fossils: _____ evidence of organisms of the past → studied by paleontologists.

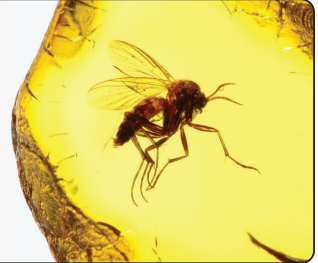
Sedimentary rock:

organisms are buried
in _____.



Amber:

tree resin captures
_____ organism intact.



Trace:

burrows,
_____, etc.



Ice, frozen soil, & acid bogs:

preserves tissues
& biomolecules (____).



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Biases in the Fossil Record

- ◆ Fossil record is _____. Certain organisms are _____ or _____ represented.
- ◆ Easier to find fossils if the organism:

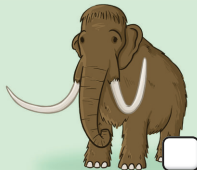
Lived in habitats with _____.

☐☐

Had _____ tissues.

☐☐

Was alive more _____.

☐☐

Was _____.

☐☐

EXAMPLE

For each pair below, circle which fossil would be more likely to be represented in the fossil record. Cross out the fossil that would be less likely to be represented. Then, briefly explain why.

a) A sea sponge from 2 billion years ago.

b) An early mammal from 200 million years ago.

Reason: _____

a) A bee on a tree that produces resin.

b) A dragonfly on a cactus in the desert.

Reason: _____

a) A snail in the intertidal.

b) A slug in the forest.

Reason: _____

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PRACTICE

Which of the following would you think is most easily found as a fossil by a paleontologist?

- a) A tiger skeleton.
- b) A mineralized leaf.
- c) An early prokaryote.
- d) A shark tooth.

PRACTICE

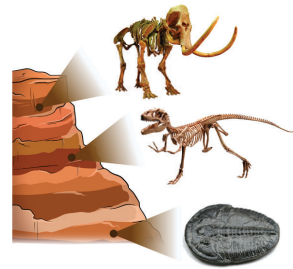
What is an advantage to studying fossils that are frozen in ice or soil?

- a) Frozen fossils are more likely to contain intact DNA or other biological molecules.
- b) Frozen fossils are extremely common compared to other fossils.
- c) Frozen fossils are less delicate than other fossil types and, therefore, last longer.
- d) Frozen fossils are more likely to contain minerals that have replaced soft tissues.

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Dating Fossils

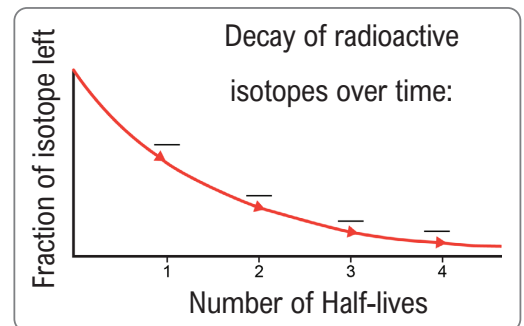
- ◆ The fossil record can give us two types of dates:
- ◆ **Relative date:** based on what _____ a fossil is found in.



- ◆ **Absolute dates:** specific date based on the _____ of radioactive isotopes.
- **Half-life:** time it takes for $\frac{1}{2}$ of radioactivity to decay; length depends on the _____.

$$\frac{\text{Radioactive isotope in sample}}{\text{Starting amount}} = \text{date calculation.}$$

- **C14 dating (radiocarbon dating):** _____ dating of organisms.
 - Ratio of C14:C12 $\rightarrow$ date up to $\sim$ _____ years ago.
- Other **radioisotopes** (e.g. Uranium 238): dating of surrounding _____.
 - Isotopes in _____ rock/ash can give older dates.



EXAMPLE

The half-life of Carbon-14 is 5730 years. If a bone is determined to have $\frac{1}{8}$ the normal ratio of C14 to C12, how old would you predict that organism to be?

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PRACTICE

What type of fossil dating technique would be most accurate for a trilobite from ~400 million years ago?

- a) Carbon-14 dating of the fossils itself.
- b) Carbon-14 dating of the surrounding volcanic ash.
- c) Uranium-238 dating of the surrounding volcanic ash.
- d) Uranium-238 dating of the fossils itself.

PRACTICE

Fossil A is found two layers of strata below a layer that contains volcanic ash. Fossil B is from a different organism and is found immediately above the layer of ash. The ash has been dated to be about 125 million years old. Which statement below is correct about the age of the fossils?

- a) Fossil B is 125 million years old, but we have no information about the age of fossil A.
- b) Fossil A must be older than 125 million years old, while fossil B is less than 125 million years old.
- c) Fossil A must be younger than 125 million years old, but we have no information about the age of fossils found above the ash layer.
- d) Fossil B must be older than fossil A, while fossil A must be less than 125 million years old.