

Earth History and Clues from Fossils

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Printed: January 6, 2015

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CHAPTER

1

Earth History and Clues from Fossils

- Fossils are full of information about Earth's past and are essential for unraveling earth history.



Seashells at 20,000 feet!

On his voyage on the *Beagle*, Charles Darwin noticed many things besides just the Galapagos finches that made him famous. Another important discovery was shell beds high in the Andes Mountains. How did they get there? He determined that they must mean that mountains rise slowly above the ocean, an idea that was being championed at the time by Charles Lyell. If this is the case, Darwin reasoned, the mountains and Earth must be extremely old.

Clues from Fossils

Fossils are our best form of evidence about Earth history, including the history of life. Along with other geological evidence from rocks and structures, fossils even give us clues about past climates, the motions of plates, and other major geological events. Since the present is the key to the past, what we know about a type of organism that lives today can be applied to past environments.

History of Life on Earth

That life on Earth has changed over time is well illustrated by the fossil record. Fossils in relatively young rocks resemble animals and plants that are living today. In general, fossils in older rocks are less similar to modern organisms. We would know very little about the organisms that came before us if there were no fossils. Modern technology has allowed scientists to reconstruct images and learn about the biology of extinct animals like dinosaurs!



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Environment of Deposition

By knowing something about the type of organism the fossil was, geologists can determine whether the region was terrestrial (on land) or marine (underwater) or even if the water was shallow or deep. The rock may give clues to whether the rate of sedimentation was slow or rapid. The amount of wear and fragmentation of a fossil allows scientists to learn about what happened to the region after the organism died; for example, whether it was exposed to wave action.

Geologic History

The presence of marine organisms in a rock indicates that the region where the rock was deposited was once marine. Sometimes fossils of marine organisms are found on tall mountains indicating that rocks that formed on the seabed were uplifted.

Climate

By knowing something about the climate a type of organism lives in now, geologists can use fossils to decipher the climate at the time the fossil was deposited. For example, coal beds form in tropical environments but ancient coal beds are found in Antarctica. Geologists know that at that time the climate on the Antarctic continent was much warmer. Recall from the chapter Plate Tectonics that Wegener used the presence of coal beds in Antarctica as one of the lines of evidence for continental drift.

Index Fossils

An **index fossil** can be used to identify a specific period of time. Organisms that make good index fossils are distinctive, widespread, and lived briefly. Their presence in a rock layer can be used to identify rocks that were deposited at that period of time over a large area.

The fossil of a juvenile mammoth found near downtown San Jose California reveals an enormous amount about these majestic creatures: what they looked like, how they lived, and what the environment of the Bay Area was like so long ago.

Find out more at <http://science.kqed.org/quest/video/science-on-the-spot-lupe-the-mammoth-comes-to-life/> .



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Summary

- Fossils tell a lot about the environment during the time they were deposited.
- Climate is one important thing that can be indicated by fossils since organisms have specific conditions in which they can live.
- An index fossil must be distinctive, widespread and short-lived so that it can identify a specific period of time.

Practice

Use this resource to answer the questions that follow.

<https://www.youtube.com/watch?v=Z5DWKTNqByM>

1. What shows up in rocks that are 3.8 billion years old?
2. What is found in rocks that are 3.5 billion years old?
3. When do the first large lifeforms show up and what are they?
4. What happens around 500 million years ago?
5. What big thing happens 400 million years ago? What are the organisms like?
6. What happens about 300 million years ago?
7. What happened about 250 million years ago and what caused it?
8. What are the next 150 million years like?
9. What happens 66 million years ago?
10. What does that set the stage for?
11. When and where do the first human ancestors appear?
12. When did humans arrive in North America?
13. Where did a lot of that story come from?

Review

1. How does a single fossil or set of fossils help geologists to decipher the geological history of an area?
2. How is an index fossil used to identify a time period?
3. Why are the fossils of marine organisms sometimes found in rock units at the tops of high mountains? What evidence would you look for to determine if this reason is plausible?