

Fossils

Definition:

The remains, traces, impressions, or any other evidence of plants and animals preserved in rock.

❖ When plants and animals die they get buried in sediment. The soft parts usually decay with the hard parts being fossilized when the sediment turns to solid rock.

❖ Conditions necessary for fossilization include:

- 1) Hard body parts.
- 2) Rapid burial.



❖ Fossils provide the basis by which the subdivisions of the Geologic Timescale are divided.

- ❖ Fossilization is dependant on special conditions
- ❖ the record of life in the geologic past is biased.
- ❖ The fossil record shows a lot of organisms that contained hard parts and lived in environments of high sedimentation.
- ❖ However, many other life forms that did not meet the special conditions for fossilization exist in the fossil record.

❖ Fossils have been recognized for centuries, but it was not until the early 1800's that an English scientist, William Smith, *noticed that the same fossils were identified in the same rock types.*

❖ This evidence was the background work for one of the fundamental principles of historical geology known as the Principle of Fossil Succession.

❖ This principle states, *“fossil organisms succeed one another in a definite and determinable order, and therefore any time period can be recognized by its fossil content.”*

Fossils

What information can be gathered from fossils?

1. *Fossils indicate the age of sedimentary rocks.*

➤ Within each of the ages there are many subdivisions based on certain species of fossils.

➤ For example the divisions of the geologic time scale is subdivided according to the presence and absence of fossils.

➤ This same succession of organisms preserved as fossils is seen on every major landmass.

2. Fossils indicate the environments in which rocks formed.

- Knowing the nature of life-forms that existed at a particular time may indicate the environment in which the sedimentary rock formed.
- Past environments can be indicated by studying the nature and characteristics of sedimentary rocks and the fossils in them.
 - Ex; clam shells are found in limestone. You could assume that the region was covered by a shallow sea, because that is where clams are found today. (Uniformitarianism).
- Fossil characteristics reveal what type of environment the organism lived in the past.

3. Fossils are used to match up (correlate) rocks from different places that are the same age.

- Fossils can be used as time indicators,
 - useful means of correlating rocks of similar age in different regions.
- Scientists use index fossils, which are widespread geographically and are limited to a short span of geologic time.
- These fossils are important when matching rocks of the same age.
- If index fossils are not present, then groups of fossils in the same rocks are used to correlate rocks of the same age.

4. *Fossils are used to interpret the geologic past.*

- Characteristics of certain fossils and the type of fossil present in sedimentary rocks, allow you to interpret aspects of the geologic past
- Ex: temperature, climate, type of environment, etc

5. *Fossils can also indicate evolutionary pathways.*

- the principle of fossil succession + the law of superposition,
- fossils in the rocks show progressive changes demonstrating the evolution of life through time.
- Ex: Age of Invertebrates - trilobites are recognized early in the fossil record.
- Then, in succession, you can see Age of Fishes, an Age of Amphibians, an Age of Reptiles, and an Age of Mammals.
- So, it is thought that Invertebrates evolved into Fish, which evolved into Amphibians, which evolved into Reptiles, and finally Mammals.

Sample Problem

Which best describes the progression of life forms from Precambrian to Cenozoic?

- (A) bacteria – dinosaurs – trilobites – mammoths
- (B) bacteria – trilobites – dinosaurs – mammoths
- (C) dinosaurs – bacteria – mammoths – trilobites
- (D) dinosaurs – mammoths – bacteria – trilobites