172 The Fossil Record

Key Idea: Fossils provide a record of the appearance and extinction of organisms. The fossil record can be used to establish the relative order of past events.

The importance of the fossil record

- **Fossils** are the remains of long-dead plants and animals that have become preserved in the Earth's crust.
- Fossils provide a record of the appearance and extinction of organisms, from species to whole taxonomic groups.
- The fossil record can be calibrated against a time scale (using dating techniques), to build up a picture of the evolutionary changes that have taken place.

Fossilized fern frond

Gaps in the fossil record

The fossil record contains gaps and without a complete record, it can sometimes be difficult to determine an evolutionary sequence. Scientists use other information (e.g. associated fossils and changes in morphology) to produce a order of events that best fits all the evidence.

Gaps in the fossil can occur because:

- Fossils are destroyed.
- Some organisms do not fossilize well.
- Fossils have not yet been found.

Profile with sedimentary rocks containing fossils

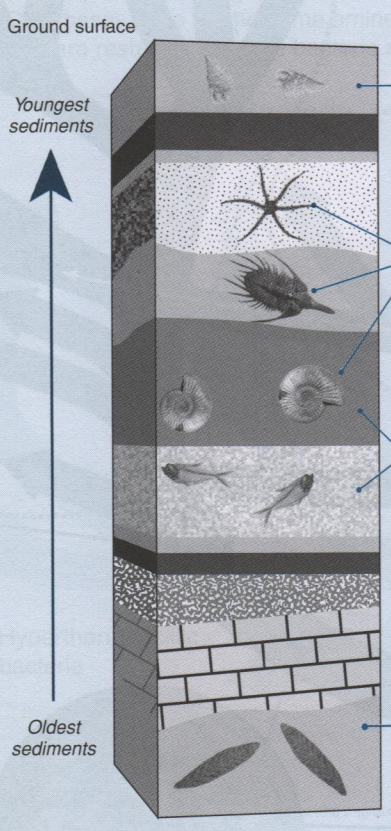
Rock strata are layered through time

Rock strata are arranged in the order that they were deposited (unless they have been disturbed by geological events). The most recent layers are near the surface and the oldest are at the bottom. Fossils can be used to establish the sequential (relative) order of past events in a rock profile.

New fossil types mark changes in environment

In the strata at the end of one geological period, it is common to find many new fossils that become dominant in the next.

Each geological period had a different environment from the others. Their boundaries coincided with drastic environmental changes and the appearance of new niches. These produced new selection pressures, resulting in new adaptive features in the surviving species as they responded to the changes.



Recent fossils are found in more recent sediments
The more recent the layer of rock, the more resemblance there is between the fossils found in it and living organisms.

Extinct species
The number of extinct species is far greater than the number of species living today.

Fossil types differ in each stratum
Fossils found in a given layer of sedimentary rock are generally significantly different to fossils in other layers.

More primitive fossils are found in older sediments
Fossils in older layers tend to have quite generalized forms. In contrast, organisms alive today have specialized forms.

1. Discuss the importance of fossils as a record of evolutionary change over time: _____

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2. Why can gaps in the fossil record make it difficult to determine an evolutionary sequence? _____

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