

TIMELINE

Old - timers

Ancient trilobite fossils report from the Grand Canyon on life and times long, long ago . . .

The fossils in a specific rock layer are the remains of organisms that lived during a geologic time period in Earth's history. Index fossils help geologists date rock layers. A good example is the trilobite, an arthropod (like insects, spiders, and lobsters) that lived in the oceans from 570 to 245 million years ago. Here's how a trilobite becomes a fossil.



550 MILLION YEARS AGO

LIVING IT UP!

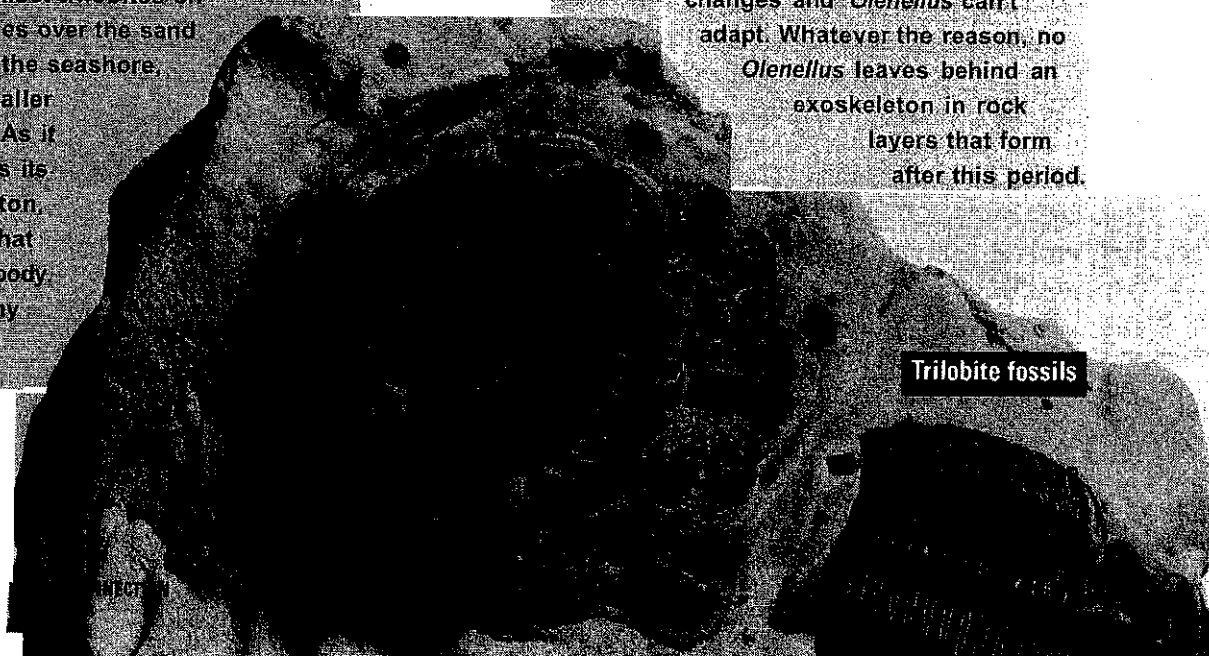
Olenellus (OH len ELL us) lives in the sea in what is now the desert in Arizona.

One of the earliest trilobites on Earth, it scurries over the sand and mud near the seashore, feeding on smaller invertebrates. As it grows, it sheds its hard exoskeleton, the structure that surrounds its body. Over time, many trilobites live, shed, and die.

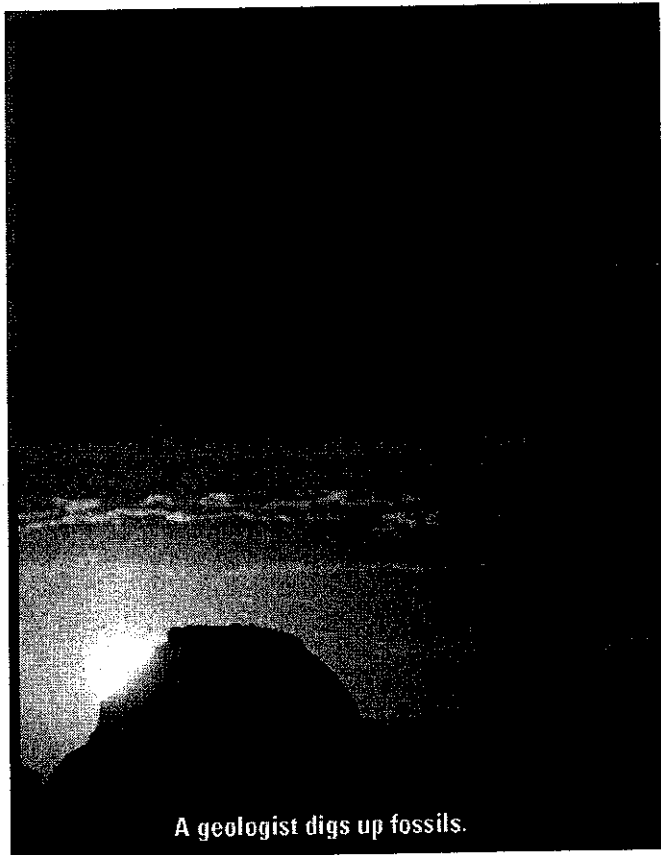
505 MILLION YEARS AGO

DYING OUT

Olenellus becomes extinct. It may evolve into a new genus, or the environment changes and *Olenellus* can't adapt. Whatever the reason, no *Olenellus* leaves behind an exoskeleton in rock layers that form after this period.



Trilobite fossils



A geologist digs up fossils.

What Makes a Good Index Fossil?

Here are the qualities a fossil needs to make the grade.

Widespread. The original plant or animal must have lived in a large region so that geologists can use it to show a relationship between rocks from different parts of the world.

Short period of time. If a species survived through more than one geologic era, it won't help pinpoint a rock layer's age.

Abundant and easy to find. Millions of trilobites left behind a huge number of exoskeletons.

Easy to identify. Every trilobite species indicates a geologic time period.

Well preserved. Trilobites became fossils because they had hard shells that did not decay or disintegrate.

505-10 MILLION YEARS AGO

BURIED

Olenellus remains become fossils. More sand and mud layers build up, burying the trilobite exoskeletons deeper and deeper. Other sediments are deposited on top, and the sand and mud particles squeeze together to form a natural cement. To become a fossil, an animal must be completely buried by a very fine sediment. Eventually minerals replace the calcium in the bone or shell. The sediment hardens into sandstone or shale with the trilobite fossils locked in.

10 MILLION YEARS AGO-PRESENT

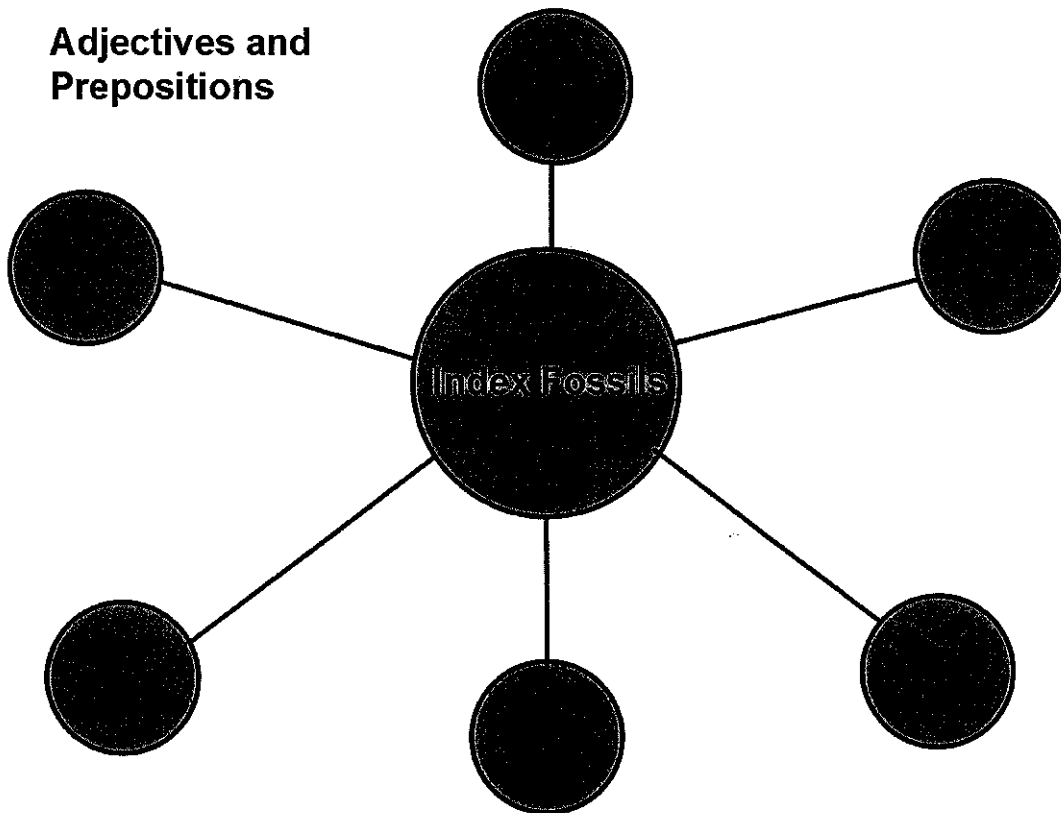
EXPOSED

The sea is long gone. The region is now just a low, flat area with a river running through it that cuts through the rocks. Over time the river makes a canyon, which gets deeper and wider every day. The trilobite skeletons that have been buried for more than 500 million years are exposed on the deep canyon walls. As early as the 1850s, geologists can see which fossils correspond to time periods in Earth's history. They come to the Grand Canyon and find *Olenellus* fossils, which tell them that the rock formed about 550 million years ago.

Activity

FOSSIL FINESSE Trilobites are useful index fossils. Research the anatomy, lifestyle, environment, and evolution of these fossils. Discuss why they are useful to geologists. What time period(s) can trilobites be used to date? What conclusions can you draw from learning about different trilobites?

**Adjectives and
Prepositions**



Discussion Questions:

- 1. What makes a good index fossil?**
- 2. Why do scientists study index fossils?**