

SEGMENT THREE; LECTURE THREE: BIO-GEOLOGICAL HISTORIES

In the history of life on earth, recorded in fossils, five major events have occurred, that allowed the evolution of many new forms of life.

1. First single-celled organisms

About 35 years ago, the presence of microscopic fossils (microfossils) in ancient sediments was discovered by micropaleontologists such as J. William Schopf. The oldest microfossils are about 3.5 billion years old and are found in fossilized **stromatolites** or fossilized layers in boulder-like formations that formed from marine bacterial mats. Stromatolites still form in only a very few localities on earth, such as Shark's Bay in Australia, where salinity excludes animals that would otherwise feed on the bacteria. These microfossils resemble modern photosynthetic bacteria.

2. Oxygen accumulates in the atmosphere

A byproduct of photosynthesis is oxygen, which gradually accumulated from 2.7-2.2 billion years ago. Seasonal production of oxygen increased the precipitation of iron compounds in sea water, producing banded iron formations(see Fig. 25.8).

3. First complex multicellular organisms (eukaryotes)

Fossil forms are as old as 2.1 billion years and arose by serial **endosymbiosis**, a process in which one cell lives inside another and eventually becomes an organelle (Fig. 25.9).

4. The Cambrian explosion

Many groups (phyla) of animals, both living and extinct, arose during the Cambrian period, 535-525 million years ago (Fig. 25.10). During this 10 million year period, new fossil animals with shells and new fossil predators evolved. The ability to secrete protective shells was one adaptation that explains this evolutionary radiation.

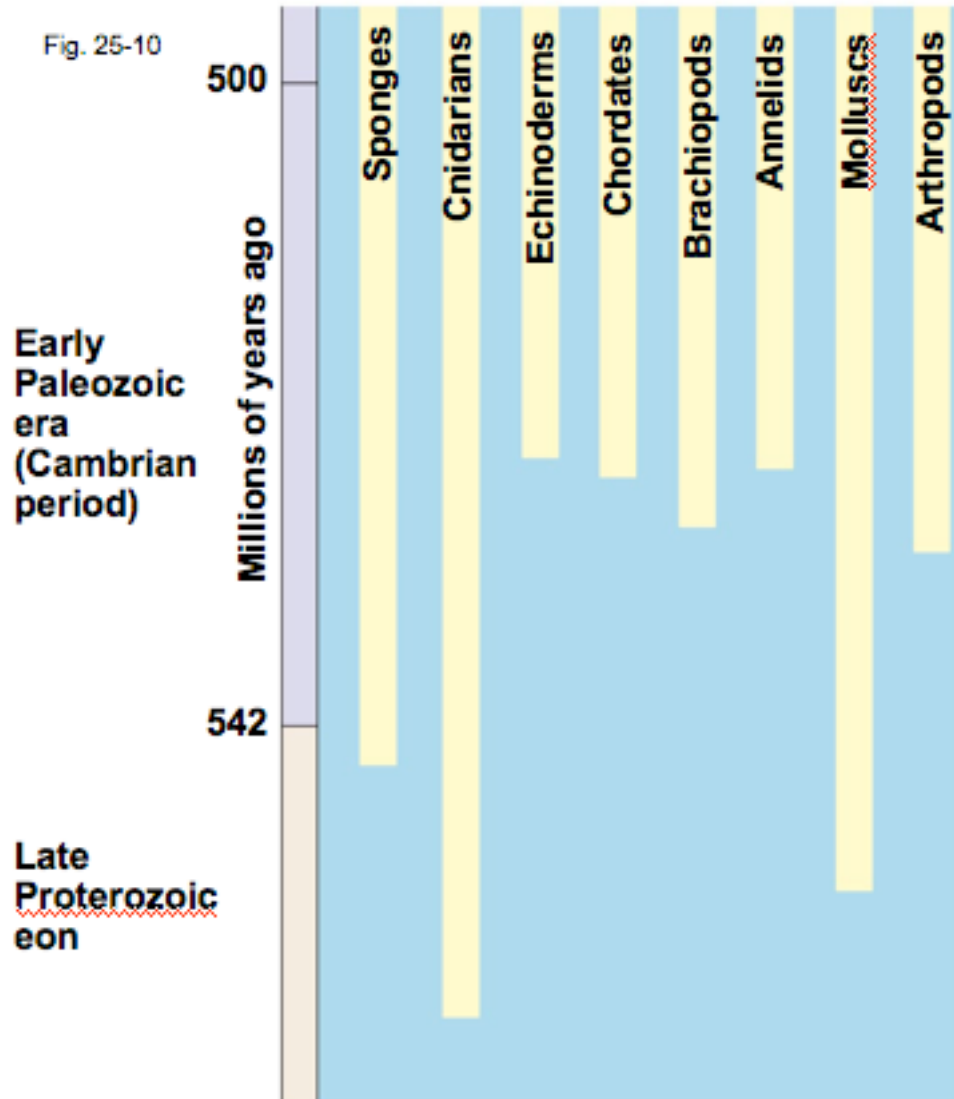
5. Colonization of land

Prokaryotes lived on land first, but complex multicellular terrestrial fossil species (fungi, plants and animals) first appeared about 500 million years ago.

These major events in the history of life were caused, in part, by continental movements, adaptive radiations, and periodic catastrophic extinctions.

adaptive radiation = period of evolutionary change in which many new species evolve.

Fig. 25-10





**J. William
Schopf
Microfossil
Expert**

