



Chapter 8:
Fossils and Their Place in Time and Nature





1. Fossils: Memories of the Biological Past
Fossils allow us to document **phylogeny**
What are fossils?

- **Taphonomy** what happens to an organism's remains after death.
- circumstances are necessary for fossilization to occur.
- Fossilization requires an anoxic environment, where decomposition is limited.



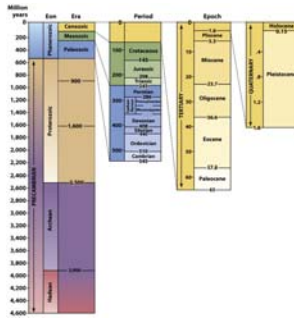
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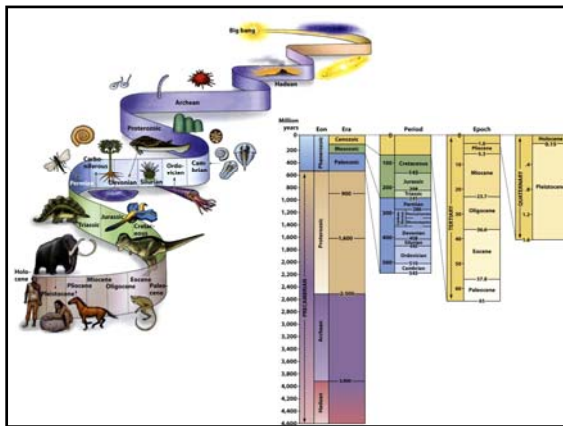


South African Cave **Taphonomy**

2. Just How Old is the Past?

- **Time in perspective**
 - Geological time ("deep time") stretches back 4.6 billion years
 - It is hard for many people to conceive.
- **Geologic time: Earth History**
 - Geology has established three **eras** of time in Earth's history, each divided into periods and **epochs**
 - 1) **Paleozoic**
 - 2) **Mesozoic**
 - 3) **Cenozoic**





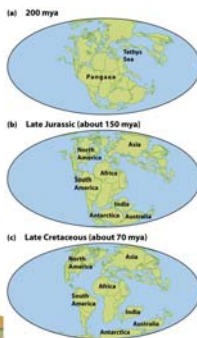
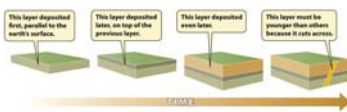
Geologic time: Earth History

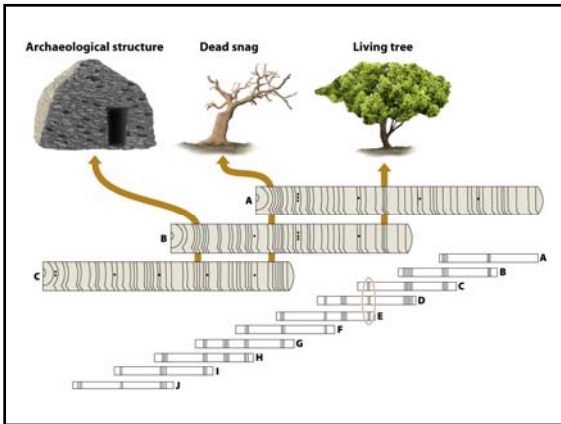
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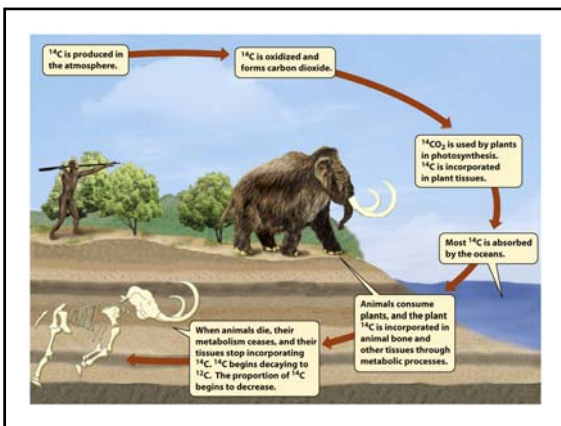
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Changes to **Pangaea** and oceans occurred plate **tectonics**

- **Relative and Numerical Age**
Steno's law of superposition







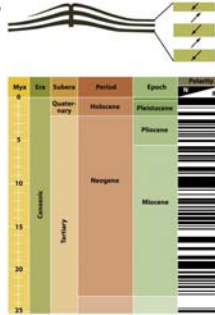
Non-radiometric Absolute Dating

- Amino acid dating** to 200 kya and, in some settings, 1 mya.
- Fission track dating** uranium-238- volcanic ash and glass millions of years old.

The diagram shows the interconversion of L and D forms of amino acids. Below this, a graph plots the D/L ratio against Time, showing an exponential increase. To the right, a photograph shows a piece of glass with numerous fission tracks visible under a microscope.

Non-radiometric Absolute Dating

- **Paleomagnetic dating** Sedimentary rock. (South Africa)
- **Electron spin resonance** radioisotope buildup in fossils over time.
- **Luminescence dating** sun's energy in sediment, stone, or ceramic.



Genetic Dating: The Molecular Clock

- changes in DNA over time
- timing of the splits in primate and human evolution.

