

Fossils

A fossil is the remains of an animal or plant that lived thousands of years ago.

- fossils can be bones, tracks, tunnels, or other signs of life
- the study of fossils is paleontology and the scientist that studies fossils is a paleontologist



Fossils provide clues about life thousands of years ago.

- we can study fossils to see how organisms began, flourished, and then died out
- fossils can tell us where and when an organism lived, but they can also tell us how the organism lived

Example: Did the organism live in herds? Did the organism migrate?

- fossils also give us big clues to how the climate was in certain areas at certain times

There are many different types of fossils: it depends on the material that the organism falls into when it dies.

- petrified fossils occur when a material is turned into stone
 - when the remains are covered with wet mud, the water removes some materials from the bone and replaces them with others turning it into stone
 - many of these bones are used to make the skeletons we see in museums
- amber fossils usually preserve insects and spiders



- amber is the sticky resin found inside a pine tree which traps insects
- these small drops of resin then harden preserving the insect inside
- over thousands of years the resin turned into amber

- ice fossils occur when the bodies of animals are caught in the ice covering land

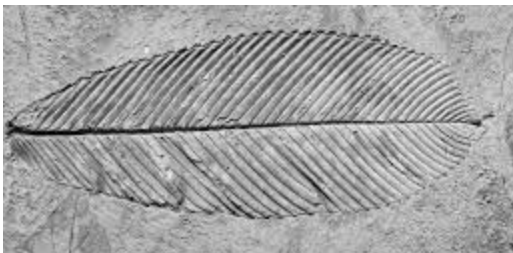
- full mammoths have been found in Siberia perfectly preserved
- they have all their hair and even bugs in the hair



- tar fossils occur when the bodies have fallen into tar pits



Most of the time it is the bones that remain, but sometimes the carbon in the organisms leaves an imprint of the organism that was there. This is how we will get impressions of plants. Sedimentary rocks are the ones that hold the most fossils, they have even found tracks of dinosaurs which walked along an ancient riverbed.



Sometimes fossils are created using the mold and cast formation

- an organism falls into sediment and then is covered by more sediment
- parts of the organism can dissolve leaving a mold
- then other sediment will fill the opening and create a cast of the original organism

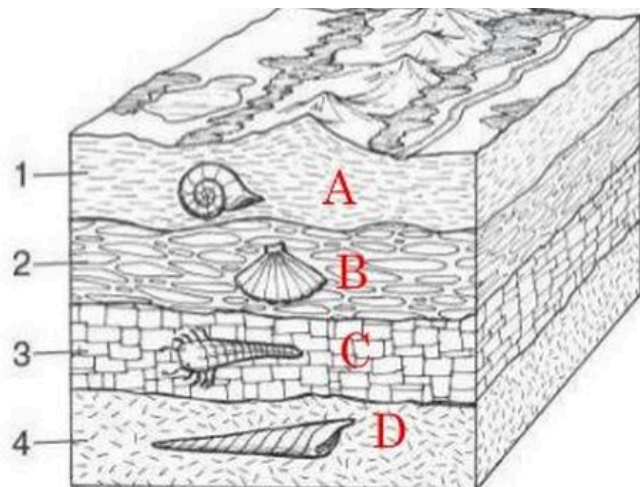
Geological Time

Scientists have the ability to estimate the age of a fossil by where it is in the layers as you go down from the surface. This is known as **the principle of superposition**:

- the basis of this principle is that **in undisturbed layers of rock the oldest layers are always on the bottom and the youngest layers are on top**
- as these layers pile up they make strata of rock
- each strata is laid down in its own time frame
- once scientists have uncovered a strata in the soil structure they can then begin to do **relative dating** of the things that they find in the strata
 - they can do this by finding soil strata they know specific dates of

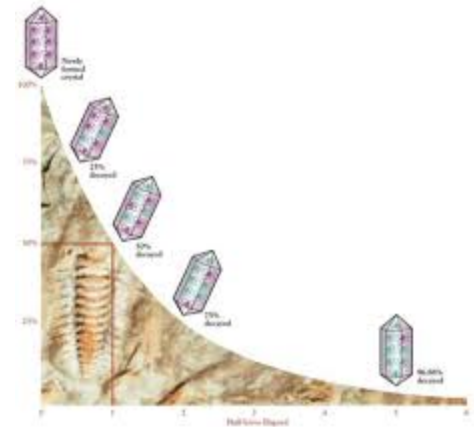
Example: **when a volcano erupts it spreads ash out for a long distance, if the scientists find a layer of this ash then they know how old something is if it is below or above the layer of ash**

A fossil can also be used to give the relative age. This can happen if the scientists know that a certain creature was on the Earth for only a **short period of time**. This then dates the strata that it is found in.



Scientists also use **radiometric dating** to get a more specific date on a fossil.

- this is done by knowing that all organisms contain a **specific amount of the radiocarbon** when they are alive
- when they die the carbon-14 begins to decay over its **half life**
- by doing some calculations of the **amount of carbon-14** in a sample we can estimate the age of the fossil

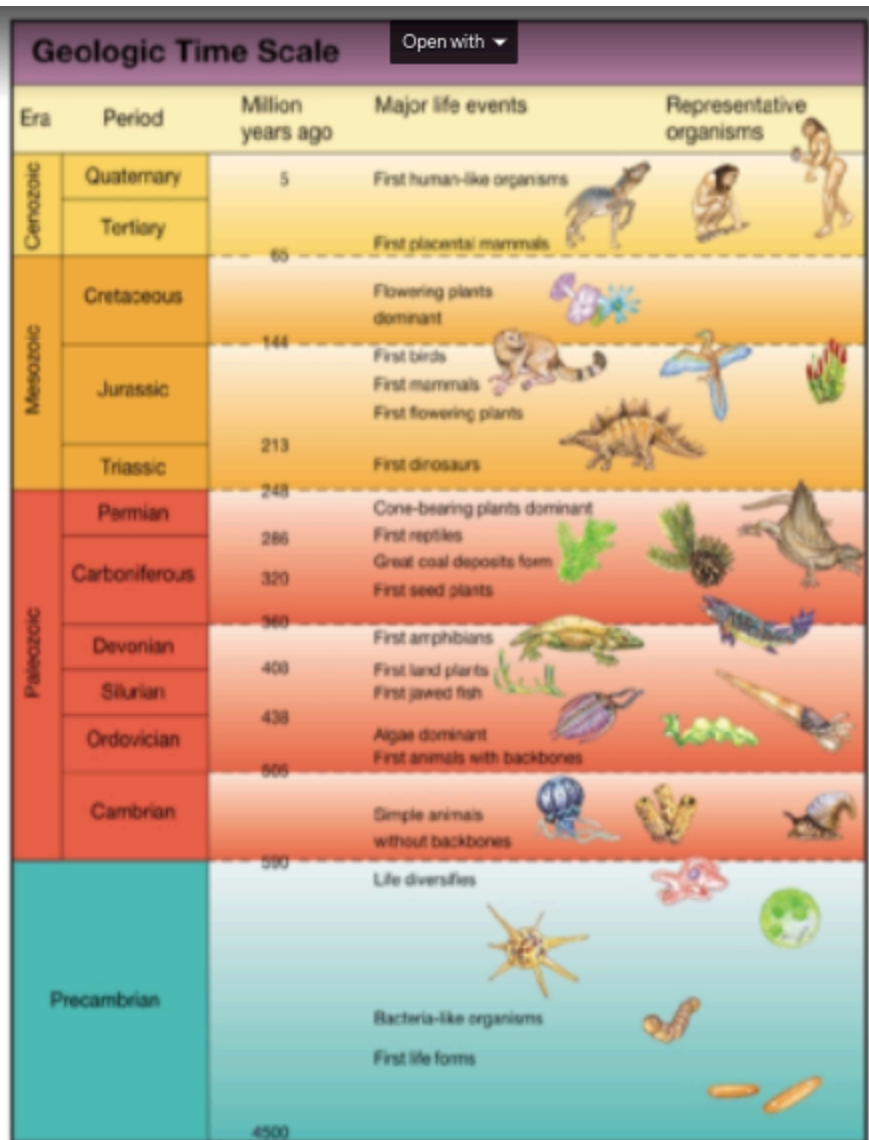


The geological time scale is a division of the Earth's history into smaller units based upon the appearance of different life forms

- it begins **4.5 billion years ago** when Earth was formed

- from there the time is divided into **eons**

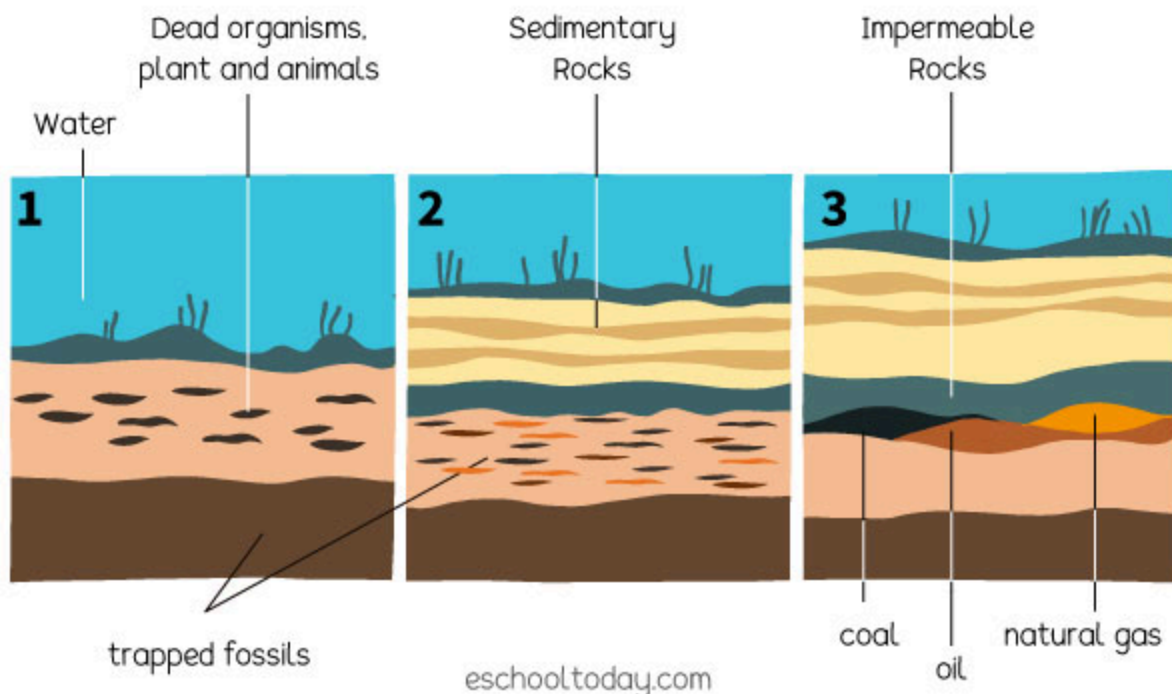
- each eon is divided into **eras**, and each era is divided into **periods**



Fossil Fuels

If an organism **decays** rather than becoming a fossil it could possibly become fossil fuels.

- **petroleum** is a naturally occurring mixture of hydrocarbons. It is usually found in sedimentary rock basins that used to be **ancient seas**
- the plant and animal matter under the sediment was subjected to millions of years of **heat and pressure**
 - this caused them to be transformed into fossil fuels
 - these deposits of fossil fuels get **trapped between strata**



- scientists have developed interesting ways to **discover where oil and gas deposits may be found**
 - they will look for certain types of **surface rocks**
 - they will take **core samples** from deep within the ground
 - they will do **seismic tests** to locate the deposits

In the oil sands, like northern Alberta, the product that is produced is **bitumen**

- this is a **heavy, almost solid form** of petroleum
- there is **sand** mixed in with the heavy oil
- the first thing that must be done is to **separate the oil from the sand**

