

8, 9 - Fossils and the Fossil Record

Fossil

- Remains of past life
- Some fossils involve the original organic matter dissolving away and new minerals filling their place
- Other fossils can be made of the original organic material instead, like a sea shell
- Fossils form in different ways
- Latin: fossilis (something that has been dug up)

Preservation

Factors

Environmental

- Grain size
 - smaller = better
- Rate of deposition
 - quicker = better
- Drying out, being frozen, trapped in amber, tar pits, etc
 - more = better
 - reduce amount of decay

Biological Factors

- Tissues
 - harder = better

Types

Unaltered

- Still some original tissues
- Very well preserved
- Types
 - Frozen
 - Like freezing meat
 - Amber
 - Amber drips down

- Tar
 - Tar Pits
 - Natural tar that rises up in springs along with water
 - Shale heated up and rose up
 - La Brea Tar Pits
- Caves
 - Less things to disturb the organisms
 - Objects can be coated by calcite (from dripping water)
- Mummification (drying out)
 - Things dry out and stop decaying
 - nothing to do with bandages or mummies
 - uncommon circumstances

Altered

- Original tissues get replaced by minerals or sediment (except for permineralization)
- Types
 - Permineralization / Petrification
 - Dissolved minerals, carried by groundwater, begin to grow crystals
 - The original, organic fossil material still remains
 - Common minerals include quartz and calcite
 - Replacement
 - The original mineral of a fossil get replaced by a new mineral
 - Mainly seashells, clam shells, etc (tissues that are already made of minerals to begin with)
 - Recrystallization
 - Little tiny organic crystals fuse together into much larger crystals due to heat and pressure during metamorphism
 - Or the minerals dissolve then reform again into newer, larger crystals
 - This recrystallizes the original material of the shell and damages it, causing it to lose a lot of its detail
 - Carbonization
 - When a leaf of insect, for example, fossilize, they break down into simple organic compounds that diffuse away into the surrounding rock
 - The carbon from the fossil cannot move through the rock easily, so it just stays behind. This leaves a shadow-like effect

Fossil Record

- All the fossils we have found so far, put in order of their formation
- Found in stacks of sedimentary rocks across the world

- We've only scratched the surface
- Most organisms don't fossilize
- Of those that do, its mainly hard tissues like bones and shells and teeth
- Most of these fossils will remain deeply buried in the ground, and we will never find them
- We only find fossils when they present themselves to us
- We randomly come across fossils, then explore further to find more of them
- Not typically an entire skeleton, just a few bone fragments or teeth
- The layers of the Earth can be read like pages of a book
- The distribution of fossils is not random