

General Biology 2: Lecture 1

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- Fossil Record

- Other fossils also exist, e.g. amber, ice, etc.
- Relative Dating
 - * Law of Superposition: older layers are deeper
 - * Fossils found below other fossils are the older fossils
- Index Fossils
 - * Fossils that are:
 1. Widely distributed
 2. Easy to recognize
 3. Existed for a long period of time
 - * They can be used to relatively date other fossils (as a uniform age exists for them)
 - * E.g.
 - “Ammonites”, a type of mollusk from the Mesozoic era
 - “Trilobites”, a type of arthropod from the Paleozoic era
 - and many others
- Factors that Affect the Fossil Record
 - * Anatomy: hard parts fossilize more easily (e.g. bones, teeth, shells, etc.) and are more likely to be preserved
 - * Size: fossil remains of larger organisms are more likely to be found
 - * Number: species that exist in greater numbers over wider areas are more likely to be found
 - * Environment: inland species are less likely to be found than marine species due to ease of sedimentation on the ocean floor (species that lived on the edge of the ocean are more likely to be found than inland as well)
 - * Time: species that lived more recently or for a longer period of time are easier to find
 - * Geological Processes: certain organisms are more likely to be destroyed by geological processes (e.g. erosion, volcanoes, etc.)
 - * Paleontology: certain types of fossils may be more interesting to paleontologists, and thus more likely to be found (e.g. dinosaurs)
- Absolute Dating
 - * Radiometric Dating (Half-Life)
 - Half-life: the time it takes for half of the atoms in a sample to decay to a daughter isotope ($C_{14} \rightarrow N_{14}$ in 5,730 years)
 - Unaffected by temperature, light, pressure, etc.

- All radioactive isotopes have a dependable half-life (from seconds to billions of years)
- Geologic Time Scale
 - “The history of life over time”
 - * Biologic history based off of fossil evidence
 - * Changes observed in organisms
 - * Results of genetic changes, environmental changes, etc.
 - * Patterns consistent with:
 - Climate/temp, atmospheric composition, landmasses (continental drift - 10 cm/year), floods/glaciation, volcanic eruptions, meteorite impacts, etc.
 - * Eras
 - Paleozoic, Mesozoic, Cenozoic (key focused eras in Biology)
 - * Cambrian Period
 - Sudden increase of diversity of many animal phyla (“Cambrian Explosion”)
 - * Permian-Triassic Extinction
 - “The Great Dying”
 - 81% of marine species went extinct (commonly quoted as 90 + %, perhaps incorrectly)
 - * Cretaceous-Paleogene Extinction
 - “K-T Extinction” or “K-Pg Extinction”
 - 75% of plant and animal species went extinct (e.g. the non-avian dinosaurs)
 - * Holocene Extinction
 - Current mass extinction event
 - Human induced