

## Evolution and the History of Life

## Structured Notes Part 3

### Chapter 9: The History of Life on Earth

#### I. Chapter 9.1: Evidence of the Past

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#### Fossils

Fossils are traces or imprints of living things.

Fossils are found most often found in \_\_\_\_\_. So what is a rock?

The rock cycle describes how rocks are formed. The three kinds of rocks are sedimentary, igneous, and metamorphic. But sometimes there are complications when reading rocks.

The three types of rocks are classified according to how they were formed.

The Rock Cycle is a sequence of events involving the formation, alteration, destruction, and reformation of rocks as a result of natural processes ... *Glossary of Geology, Bates & Jackson, AGI*

The Rock Cycle is a process in which rocks change form from one type to another type. Any of the three classes of rock can be changed into any other class.

Igneous Rock- Formed from \_\_\_\_\_

Sedimentary Rock- Formed from \_\_\_\_\_ compacted and cemented together

Metamorphic Rock- formed by changes in \_\_\_\_\_.

#### The Age of Fossils

**Relative Dating:** \_\_\_\_\_. Older rocks are on the bottom and newer layers are on the top, unless there has been \_\_\_\_\_. This method of dating fossils or layers relative to each other is called relative dating. Exact ages cannot be determined with relative dating.

**Absolute Dating:** \_\_\_\_\_. Atoms are made of \_\_\_\_\_, protons, and \_\_\_\_\_. Isotopes are atoms of the same element but with different numbers of \_\_\_\_\_. Some isotopes are not stable - unstable isotopes - release energy by decaying radioactively. Each time an isotope decays it becomes another element that may or may not be stable. Eventually, a \_\_\_\_\_ will be formed.

Each isotope decays at a particular rate. The time it takes for one-half of the unstable isotopes to decay is its half-life. By measuring the ratio of \_\_\_\_\_ isotopes to \_\_\_\_\_ isotopes is how the age of rock and fossils in the rock can be determined.

This absolute dating is how exact ages can be determined.

**Example problem.** Thorium-232 has a half life of 14.1 billion years. How much of an 8 mg sample will be unchanged after one half-life? \_\_\_\_\_. How much after two half-lives? \_\_\_\_\_. How much after three half-lives? \_\_\_\_\_. How much after four half-lives? \_\_\_\_\_.

Carbon-14, an isotope of carbon, has a half-life of 5780 years. How much of the original sample will be left after 11560 years? After 17190 years?

## Geologic Time Scale

Because geologic time is sooooo long a different type of calendar is used to describe geologic time - the geologic time scale.

### Divisions in the Geologic Time Scale

\_\_\_\_\_ have divided the time scale into large blocks of time called \_\_\_\_\_ which are then subdivided into \_\_\_\_\_ that can be subdivided again. Our four eras are (Papa Pete Makes Cake) Precambrian, Paleozoic, Mesozoic, and Cenozoic. Eras are characterized by the type of animal that dominated the Earth at the time.

- \_\_\_\_\_ - all time up to 540 million years ago (\_\_\_\_\_) - prokaryotic (with nucleus) and eukaryotic single celled organisms.
- \_\_\_\_\_ began 540 mya to 248 mya - plants and fishes. Included the largest mass extinction when 90 percent of marine organisms and 75 percent of terrestrial organisms became extinct.
- \_\_\_\_\_ - 248 mya to 65 mya - dominated by dinosaurs and other reptiles, and birds until their mass extinction when the era ended.
- \_\_\_\_\_ - 65 mya to now - dominated by mammals - Age of Mammals.

### Mass Extinctions

When a species is extinct it does not \_\_\_\_\_. There have been five major extinctions in the Earth's history. These extinction events are called mass extinctions. There are many possible reasons for these \_\_\_\_\_, a possible explanation for the dinosaur extinction is a meteorite hit that caused a brief change in climate or atmospheric composition. It is thought that \_\_\_\_\_ may be the source of the rapid extinctions that are occurring today - the 6<sup>th</sup> major extinction.

## The Changing Earth

Marsupials - mammals that carry their young in \_\_\_\_\_ are found in Australia almost exclusively. The answer that geophysicists have developed is called plate tectonics which explains why Australia is so different. Australia separated from the main landmass of the earth's early beginning.

### Pangaea

Pangaea is the name given to the Earth's early landmass by \_\_\_\_\_. He published his theory called Continental Drift in his 1915 book, *On the Origin of Continents and Oceans*. In it he also proposed the existence of the \_\_\_\_\_ Pangaea, and named it (Pangaea means "all the land" in Greek). The evidence Wegener used included the shapes of \_\_\_\_\_, the fossils of plants and animals at \_\_\_\_\_, and that there has been drastic changes in the \_\_\_\_\_ of continents.

**Do the Continents Move?** Plate Tectonics - the outer crust is underlain by a semi-molten material that circulates and in doing so creates convection currents that move the overlying crustal plates.

### Adaptations in Slow Motion

Tectonic plates move slowly, slowly enough for adaptations to occur.