What Is the Geologic Column?

Chapter 10 Lesson 1
Part 3

ByDesign Science, 6th Grade

Time Inferences

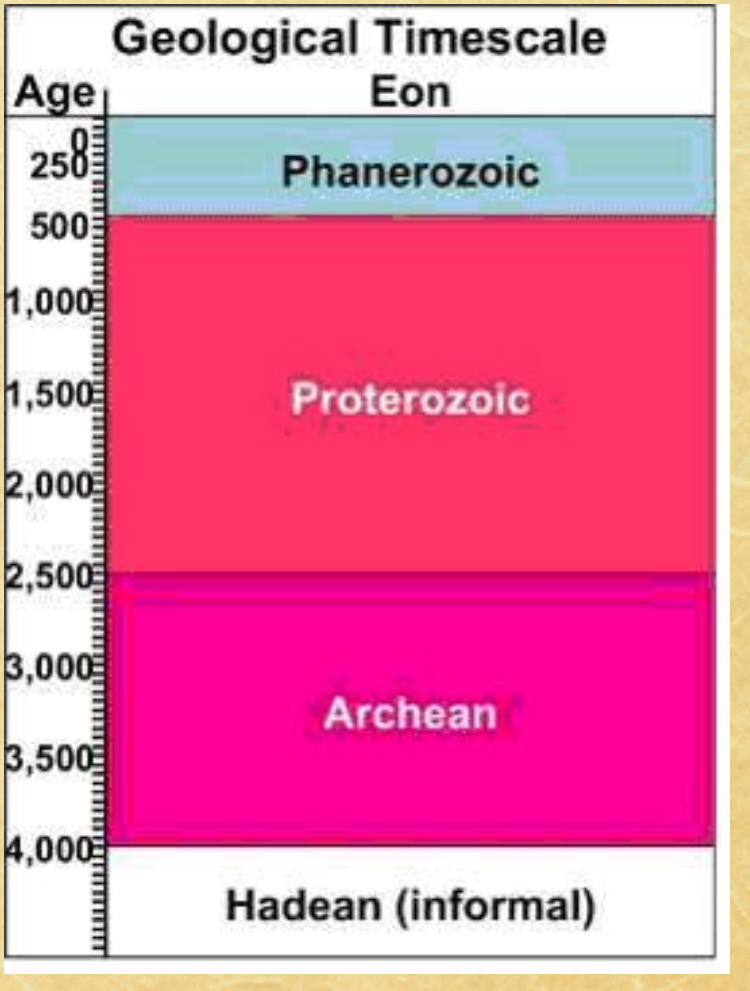
Geological Time Scale

ERA	PERIOD	EPOCH / AGE	Million Years Ago	EVENTS
CENOZOIC *Age of Mammals* 65.5 mya – present day	*Quaternary*	*Holocene*	*Today*	Ice Age ends Humans are dominant
		Pleistocene	*0.01*	Earliest Humans appear Ice Age begins
	Tertiary	*Pliocene*	*1.6*	Hominids (human ancestors) appear
		Miocene	*5.3*	Grass becomes widespread
		Oligocene	*23.7*	Mammals are dominant
		Eocene	*36.6*	Eocene – Oligocene extinction event
		Paleocene	*57.8*	First large mammals appear
MESOZOIC *Age of Reptiles* 245 mya – 65.5 mya	*Cretaceous*	*Extinction of Dinosaurs*	*65.5*	K-T extinction event Earth looks closer to present-day Flowering plants appear
	Jurassic		*144*	First Birds appear Pangaea splits into Laurasia, Gondwanna Dinosaurs are dominant
	Triassic	*First Dinosaurs*	*208*	Pangaea cracks First mammals appear Reptiles are dominant
PALEOZOIC 570 mya – 245 mya	*Permian*	*Age of Amphibians*	*245*	Permian – Triassic extinction event Pangaea forms
	Carboniferous		*286*	First reptiles appear First large cartilaginous fishes appear
	Devonian	*Age of Fishes*	*360*	Late Devonian extinction event First land animals appear First amphibians appear
	Silurian		*408*	First land plants appear First jawed fishes appear First insects appear
	Ordovician	*Age of Invertebrates*	*438*	Ordovician – Silurian extinction event First vertebrates appear
	Cambrian		*505*	End Botomian extinction event First fungi appear Trilobites are dominant
PRECAMBRIAN 4600 mya – 570 mya	*Proterozoic Eon*		*570*	First soft-bodied animals appear First multicellular life appear
	Achean Eon		*2500*	Photosynthesizing cyanobacteria appear First unicellular life appear
	Hadean Eon	*Priscoan Period*	*3800*	Atmosphere and oceans form Oldest rocks form as Earth cools
Formation of Earth			*4600*	

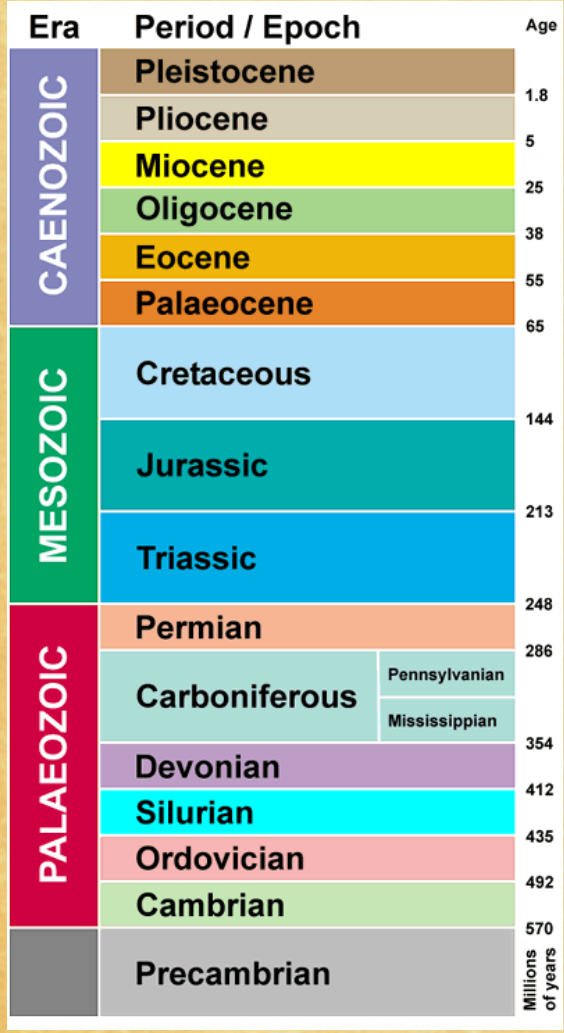
- The reason for the fossil sequence and the time span associated with it came to be associated with the newest scientific theory – evolution.
- As individual layers were grouped into larger categories, they were given names with time connotations.
- Now the geologic column is referred to as the geological time scale and uses divisions called eons, eras, and periods.

Time Inferences

- An **eon** is the largest division of geologic time.
- There are four eons:
  - Phanerozoic
  - Proterozoic
  - Archean
  - Hadean



Time Inferences



- Eons are divided into **eras**, which are still long periods of time, but shorter than eons.
- For example, the Phanerozoic eon is divided into three eras – Cenozoic, Mesozoic, Paleozoic.
- Each of these three eras contain at least three periods.
- A **period** is the basic unit on the geologic time scale.

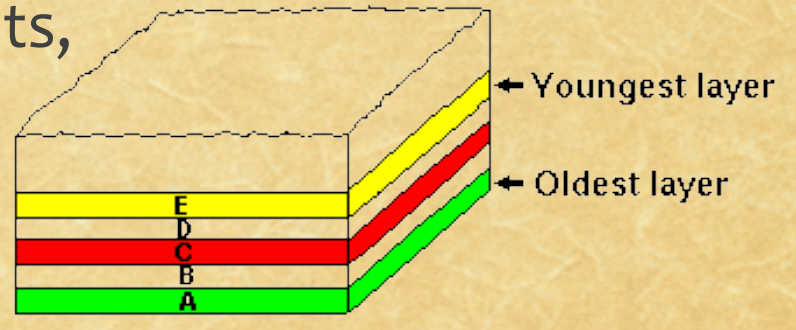
Time Inferences

	Prefix	Suffix	Meaning
Cenozoic	Ceno = recent	Zoic = animal life	Recent Animal Life
Mesozoic	Meso = middle	Zoic = animal life	Middle Animal Life
Paleozoic	Paleo = old	Zoic = animal life	Old Animal Life

- Notice how the meaning of the words Cenozoic, Mesozoic, and Paleozoic include the idea of time.
- Lower layers are considered *older* than higher layers because they were laid down earlier.

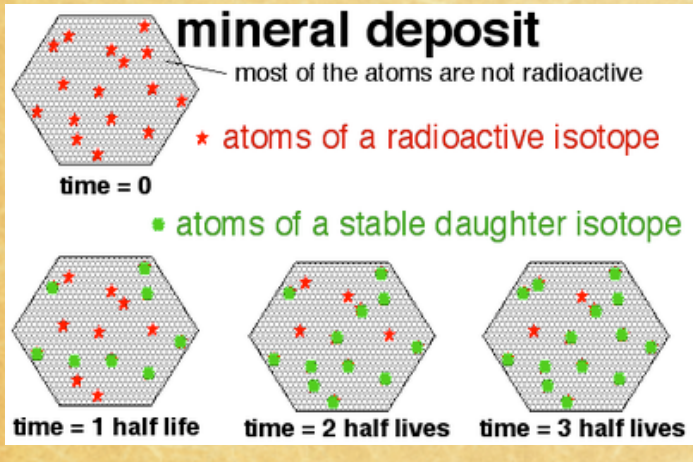
Time Inferences

- Scientists often refer to the age of one layer in relation to another.
- **Relative age** is the age of a rock or formation in relation relative to other rocks or formations, usually defined as a zone fossil name.
- **Relative dating** is the science of determining the relative order of past events, without necessarily determining their absolute age.



Time Inferences

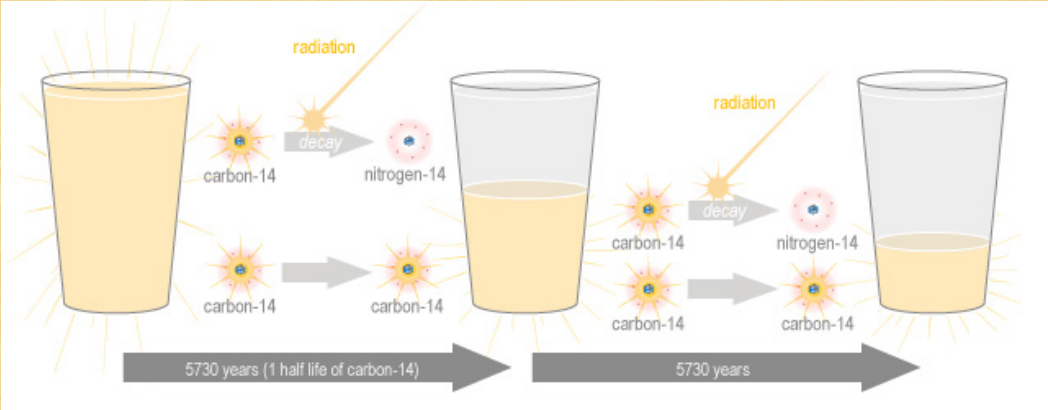
- Scientists have attempted to assign actual dates to the rock layers using a process called **radiometric dating**.
- Also, called absolute dating, it is a method of dating that compares the relative proportions of radioactive isotopes present in a sample.



- Certain elements that occur in nature decay predictably over time, changing from what we call a parent isotope to what we call a daughter isotope.

Time Inferences

- The more time that passes, the less parent isotope is left and the more daughter isotope there is.
- Scientists know that half-lives of various elements.
- They can compare the ratio of parent isotopes to daughter isotopes to figure out the age of the rock layers.



Time Inferences

- While the ratios of parent isotopes to daughter isotopes are actual data, the interpretation of those ratios as millions of years conflicts with both the biblical history of earth and scientific evidence that is difficult to explain if the layers were really laid down over millions of years.

- Short age geology predicts that there are more discoveries to be made about radiometric dating and that these discoveries will shed light on why these ratios indicate time spans that conflict with the chronological information found in the Bible.

Time Inferences

- The geologic column, which includes both the rock strata and the fossil record, is observable data.
- The time inferences associated with the geologic column are interpretations of that data, which are influenced by the worldview of the scientists who make them.