



TOPIC: Divisions of Geologic Time

Earth has gone through a series of major geological and biological changes throughout its existence. Many renowned scientists in the past were puzzled with the question about life on Earth. Through countless scientific investigations and discoveries, scientist struggled to learn the age of its formation. By means of rock correlation and fossil evidence, they were able to arrange the sequence in the Earth's history. These events are presented in the geologic time scale which presents Erath's history in series of time intervals.

**Geologic Time Scales**

- It is the record that depicts Earth's history.
- It is the order of life from 2500 million years ago (mya) to the present.

**The Scope of Geologic Time**

EON	ERA	PERIOD	EPOCH	Major Geologic & Biologic Events	MYA	
Phanerozoic	Cenozoic	Quaternary	Recent/Holocene	Sumerian civilization (0.006 MY), recorded history Ice Age ends, agricultural development	0	
			Pleistocene	Equus (horse), Cro-Magnon (0.035 - 0.01 MY) Ice Age begins, Neandertal (0.2 - 0.03 MY) extinction	0.01	
		Tertiary	Neogene	Pliocene	Pliohippus, <i>H. habilis</i> (2.5 MY), <i>H. erectus</i> (1.8 MY) Hominids (earliest humans 4.4 MY - <i>Australopithecus</i> )	1.6
				Miocene	Major climatic changes Pigs, camels, cattle, deer, giraffes, merychippus	5.3
			Paleogene	Oligocene	Hominoids (apes), whales Mesohippus, basic orders of mammals present	23.7
				Eocene	Hydracotherium, echinoids abundant Whale-like mammal, hyena-like mammal	36.6
				Paleocene	First rodents, rabbits, primates, & carnivores Mammals - small, became larger by late Paleocene	57.8
						65
		Mesozoic	Cretaceous		Placental & marsupial mammals, mass extinction (end of the dinosaurs) Angiosperm radiation, Pterosaurs, Ornithischian and Saurischian dinosaurs	144
			Jurassic		Plesiosaurs, Ichthyosaurs, Archaeopteryx (bird & reptile characteristics) Cycads (seed bearing tree-fem/fem-like leaves)	208
	Triassic		Gymnosperms diversify, first mammals, Pangaea breakup, mass extinction Conifer-type seed plants, first angiosperms (flowering plants), archosaurs	245		
	Permian		Ferns, Pangaea a single continent, largest mass extinction Therapsids (mammal-like reptiles) - possibly warm-blooded	286		
	Carboniferous		Pennsylvanian	Seed ferns, Lycopytes, early formation of Pangaea (single land-mass) Reptiles diversified & began displacing many amphibians Abundant coal-forming swamps (mostly spore-producing woody trees)	320	
			Mississippian	Carboniferous coal swamps - most plants as seedless vascular plants Pelycosaurs (finback reptiles - extinct by the Permian) First reptiles, protorothyrids (first amniotic egg-laying stem reptiles)	360	
	Devonian		First amphibians, ray-finned fish, Lungfish, progymnosperms Crossopterygians (fish with paired fins, moved on land, "pre-amphibian")	408		
	Silurian		Cartilaginous fish, bony fish, first fish with jaws, armored jawed fish Acanthodians, Placoderms, Lobe-finned fish, first vascular plants	438		
	Ordovician		Bryozoans, Blastoids First land plants	505		
	Cambrian		Brachiopods, Mollusks, Echinoderms, Trilobites First fish, jawless fish, hard-bodied organisms, Ostracoderms	545		
	Precambrian	Proterozoic	Earliest shelled animals, widespread glaciation, breakup up Rodinia begins, worm-like fossils, Ediacaran fossils Soft-bodied organisms, single continent Rodinia, igneous activity, mid-continent rifting, Grenville orogeny Free oxygen, first red beds, banded iron formations, multicelled algae, prokaryotes, stromatolites, eukaryotes			2500
		Archean	Late Archean deformation, Canadian Shield, Plutonism (cooling of magma under earth's surface) Formation of greenstone belts & granite-gneiss complexes (igneous & metamorphic rock) Earliest fossil record of life: Algae, cell-like bodies, oldest rocks (Canada)			4000
Hadean		Crustal Evolution Detrital zircons (Australia) show crust existed (water present) Earth's origin			4600	

Million  
Years  
Ago

## Eons

- It is the highest level of unit.
- It is divided into four Eons.
  - a. Hadean Eon (4.5-4 billion years ago)
    - the oldest eon and was officially recognized only in 2012
    - the name was derived from Hades the God of the underworld
    - the name depicts its hellish condition and violent cosmic condition
  - b. Archaean Eon (4000-2500- mya)
    - It began after the formation of the earth's atmosphere, crust and seas.
    - It led the chemical and molecular evolution in the formation of organic molecules and their polymerization
    - It is the period where the protocells evolved into anaerobic cells and into prokaryotic archaea and bacteria
  - c. Proterozoic Eon (2500- 541 mya)
    - It is characterized by the accumulation of oxygen in the atmosphere due to the presence of cyanobacteria, allowing other organism to live.
  - d. Phanerozoic Eon (442 mya-present)
    - It spans within the past 541 million years up to present.
    - It is linked with the Cambrian explosion, which is a rapid evolutionary event when complex organism believed to have first evolved.

## Eras

- It is the longest period covering 88 percent of the earth's history.
- It is also known as Precambrian, where earliest organisms emerge similar to present day bacteria, most of which are invertebrates.
- It is divided into three long periods:
  - a. Paleozoic Era (442-251 mya)
    - It is the first 10 billion years of this period, change was initially low.
    - It where most of the modern phyla with definite skeleton appeared.
  - b. Mesozoic Era (251-66 mya)
    - It is the age of the dinosaur.
    - It where the appearance angiosperms or flowering plant.
  - c. Cenozoic Era (66 mya- present)
    - It means ceno or "latest".
    - It is the age of mammals because they are most common and dominant species of this era.





ACTIVITY 1  
KEY CHAIN FROM THE PAST

**Materials**

Flour, water, mixing container, bones of any animals, shellfish, heavy veined leaf,

**Procedure:**

1. Mix the flour and water in the container. The amount of flour will depend on size of the fossil. The consistency must be similar to that of a hotcake mix batter.
2. If you are using a leaf, place the leaf upside down in the bottom of the box. Carefully pour the mixture of the flour and wait for the mixture to solidify.
3. When it has hardened. Remove the plastic from the cardboard box mould and then carefully the specimen.
4. Clean the imprint. This is an example of a fossil imprint.

**Guide Question**

1. What parts of the specimen were imprinted on the flour?

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2. What do you think are the characteristics of specimen that has the possibility of leaving fossil imprints in the environment?

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3. Name the factors in the environment that can affect the process of producing fossil remains and fossil imprints.

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4. Name other sources of evidence that evolutionary biologist use the sequence existence of organism in the environment.

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**Conclusions**

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