



Earth Systems

Lesson 5

Sequence of Major Events in Earth History

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✧ <http://www.enchantedlearning.com/subjects/Geologictime.html>

✧ 4.6 billion years ago the earth and the remainder of the solar system have formed. Earths atmosphere lithosphere and oceans now exist.

Geologic Time Scale

What do the divisions of the geologic time scale signify?



Divisions of Geologic Time

Eon, Era, Period, Epoch

↑
**Largest
span of
time**

↑
**Smallest
span of
time**

Geologic Time Scale

Time Units of the Geologic Time Scale					Development of Plants and Animals	
Eon	Era	Period	Epoch			
PHANEROZOIC	CENOZOIC	Quaternary	Holocene	0.01	Humans develop	
			Pleistocene	1.6		
		Tertiary	Pliocene	5.3	"Age of Mammals"	
			Miocene	23.7		
			Oligocene	36.6		
			Eocene	57.8		
			Paleocene	66.4		
	MESOZOIC	Cretaceous	144	"Age of Reptiles"	Extinction of dinosaurs and many other species	
		Jurassic	208		First flowering plants	
		Triassic	251		First birds	
		PALAEOZOIC	Permian	286	"Age of Amphibians"	Dinosaurs dominant
			Pennsylvanian	320		Extinction of trilobites and many other marine animals
				Mississippian		360
			Devonian	408	"Age of Fishes"	Large coal swamps
			Silurian	438		Amphibians abundant
		PROTEROZOIC	Ordovician	505	"Age of Invertebrates"	First insect fossils
	Cambrian		543	Fishes dominant		
PROTEROZOIC	Collectively called Precambrian, comprises about 87% of the geologic time scale			First land plants		
	Archean	2500			First multicelled organisms	
		Hadean	3800			First one-celled organisms
			4600			Age of oldest rocks
					Origin of the Earth	

Adapted from: illustration by Dennis Tasa, 1993, Macmillan Publishing Company.

Archean

✧ Approx. 3.2 billion years ago. The first known life now exists on earth. This includes Bacteria and Algae

Proterozoic

- ✧ No life is on land, it is in the oceans.
- ✧ Includes: simple marine plants, algae, fungi, etc.
- ✧ In North America there is a great deal of Volcanic Activity. Lava flows and metamorphism occurs.
- ✧ Also, formation of large copper, iron and nickel deposits.

Paleozoic

✧ Age of invertebrates

Cambrian

- ✧ 570-505 Ma
- ✧ Marine invertebrates are very common.
- ✧ Includes: trilobites, brachiopods, snails, sponges, etc.
- ✧ Late cambrian we see the evolution of the first vertebrate organisms... the early fish



Ordovician

- ✧ 505 - 438 Ma
- ✧ Marine invertebrates continue to thrive.
- ✧ North America sees the start of the formation of the Appalachian Mountain Chain.
- ✧ Half of present North America is submerged.

Silurian

- ✧ 438 - 408 Ma
- ✧ The first land animals now exist.
- ✧ Includes: Spiders, scorpions, etc
- ✧ Fish continue to develop.

Devonian

- ✧ 408 - 360 Ma
- ✧ First amphibians appear in the fossil record.
- ✧ First land plants, forests, etc now exist.
- ✧ In North America the Mountain Building Process continues.

Mississippian

- ✧ 300 - 320 Ma
- ✧ Amphibians flourish
- ✧ Ferns and conifers are abundant

Pennsylvanian

- ✧ 320 - 280 Ma
- ✧ First reptiles appear in fossil record.
- ✧ Many species of giant insects exist now.
- ✧ Spore bearing plants and amphibians flourish.
- ✧ In North America large coal swamps form.

Permian

- ✧ 286 - 245 Ma.
- ✧ A mass extinction of most species occurs at the end of the Permian.
- ✧ Trilobites, seed ferns, scale trees, etc all die.
- ✧ Corals become abundant.

Mesozoic Era

✧ Age of the
Reptiles



Triassic

- ✧ 245 - 208 Ma
- ✧ Reptiles start to evolve.
- ✧ Forests of cycads and conifers now exist.
- ✧ In North America: volcanism, faulting and earthquakes occur along the west coast.

Jurassic

- ✧ 208 - 144 Ma
- ✧ Giant Dinosaurs have now evolved.
- ✧ First birds and mammals appear in the fossil record.
- ✧ Conifers and cycads are now abundant.
- ✧ West Central North America is under a huge sea. The Gulf of Mexico and the Atlantic Ocean start to form.

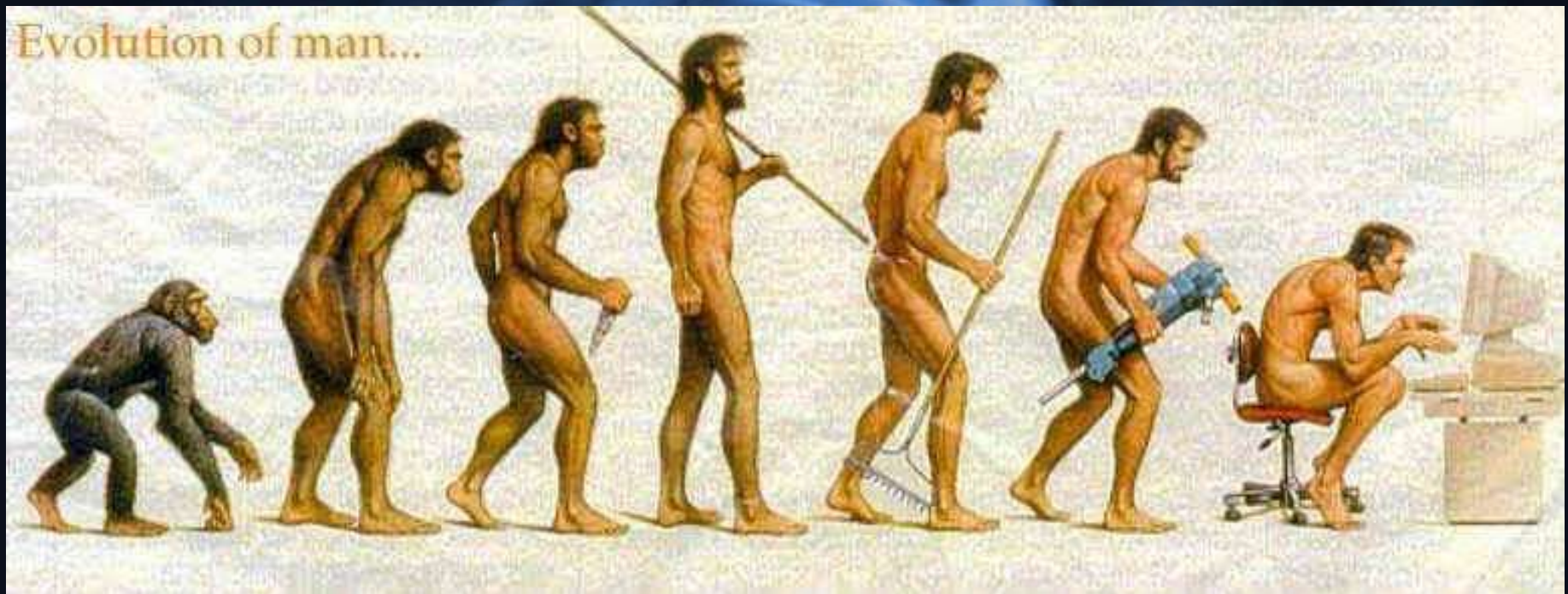


Cretaceous

- ✧ 144 - 66.4 Ma.
- ✧ Dinosaurs and amniotes die out as part of a mass extinction that kill most species
- ✧ Mammals and birds start to evolve.
- ✧ Flowering plants and hardwood trees evolve.
- ✧ North America: Rockies start to form.
- ✧ Coal swamps form.

Cenezoic Era

✧ Age of the Mammals



Paleocene

- ✧ 66.4 - 57.8 Ma
- ✧ Evolution of mammals starts after extinction of dinosaurs.
- ✧ Uplift of Mountains in Western North America continues.

Eocene

- ✧ 57.8 - 36.8 Ma.
- ✧ Pygmy ancestors of the horse and other mammals now exist.
- ✧ First whales now appear in the fossil record.
- ✧ Diatoms and flowering plants thrive.
- ✧ Coal forms in Western North America



Oligocene

- ✧ 36.6 - 23.7 Ma
- ✧ Mammals continue to evolve.
- ✧ Elephants exist in Africa
- ✧ Monkeys die out in North America
- ✧ The Alps and Himalayas start to form

Miocene

- ✧ 23.7 - 5.3 Ma
- ✧ The horse migrates to Asia.
- ✧ Elephants migrate to North America
- ✧ Grasses and grazing animals thrive.
- ✧ North America was still joined to Asia.
- ✧ Volcanic Activity and Mountain building still continue in Western North America.

The background of the slide is a dark blue gradient with a central point of light blue. From this center, several concentric, slightly blurred ripples or waves emanate outwards, creating a sense of depth and movement. The overall effect is reminiscent of a stone dropped into water or a galaxy's core.

Quaternary Period

Pleistocene

- ✧ 1.6 - 0.01 Ma
- ✧ Hominids continue to evolve.
- ✧ Elephants flourish in North America and then die out.
- ✧ There are a series of ice ages.
- ✧ Mountains and Plateaus form in Western North America.

Holocene

- ✧ 0.01 Ma - Present
- ✧ Humans are now the dominant species on the planet.
- ✧ Domestic animal species are developed
- ✧ The last of the Pleistocene Ice ages ends.
- ✧ West Coast of North America continue to uplift and the Great Lakes form
- ✧ And so on...

Sample Problem

1. Which geological time span is referred to as the “Age of Reptiles”?

(A) Cenozoic

(B) Mesozoic

(C) Paleozoic

(D) Proterozoic

2. Which time span would least likely contain fossil evidence?

(A) Cenozoic

(B) Mesozoic

(C) Paleozoic

(D) Precambrian

3. Rocks from which era would contain fossils of trilobites?

(A) Cenozoic

(B) Mesozoic

(C) Paleozoic

(D) Phanerozoic

NOTE: This concept usually tested as multiple choice

