

GEOLOGICAL TIME SCALE & GEOLOGICAL ERA

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Geologic time scale

- Chronology of Earth's history
- 4.7 billion history of the earth from its origin to the present
- Transitions in the fossil record, found in characteristic layers of sedimentary rock
- Formulated by assessing the age of rocks and rock sediments.
- Correlates with evolutionary events

Kaibab Limestone

Tiwoyap Formation

Cocconino Sandstone

Hermit Shale

Esplanade Sandstone

Wescogame Formation

Marathon Formation

Wahonig Formation

Redwall Limestone

Temple Butte Formation

Muav Limestone

Bright Angel Shale

Tapeats Sandstone*

Sixtymile Formation*

Chuar Group*

Nankowap Formation*

Unkar Group*

Vishnu Basement Rocks*

Geologic time scale

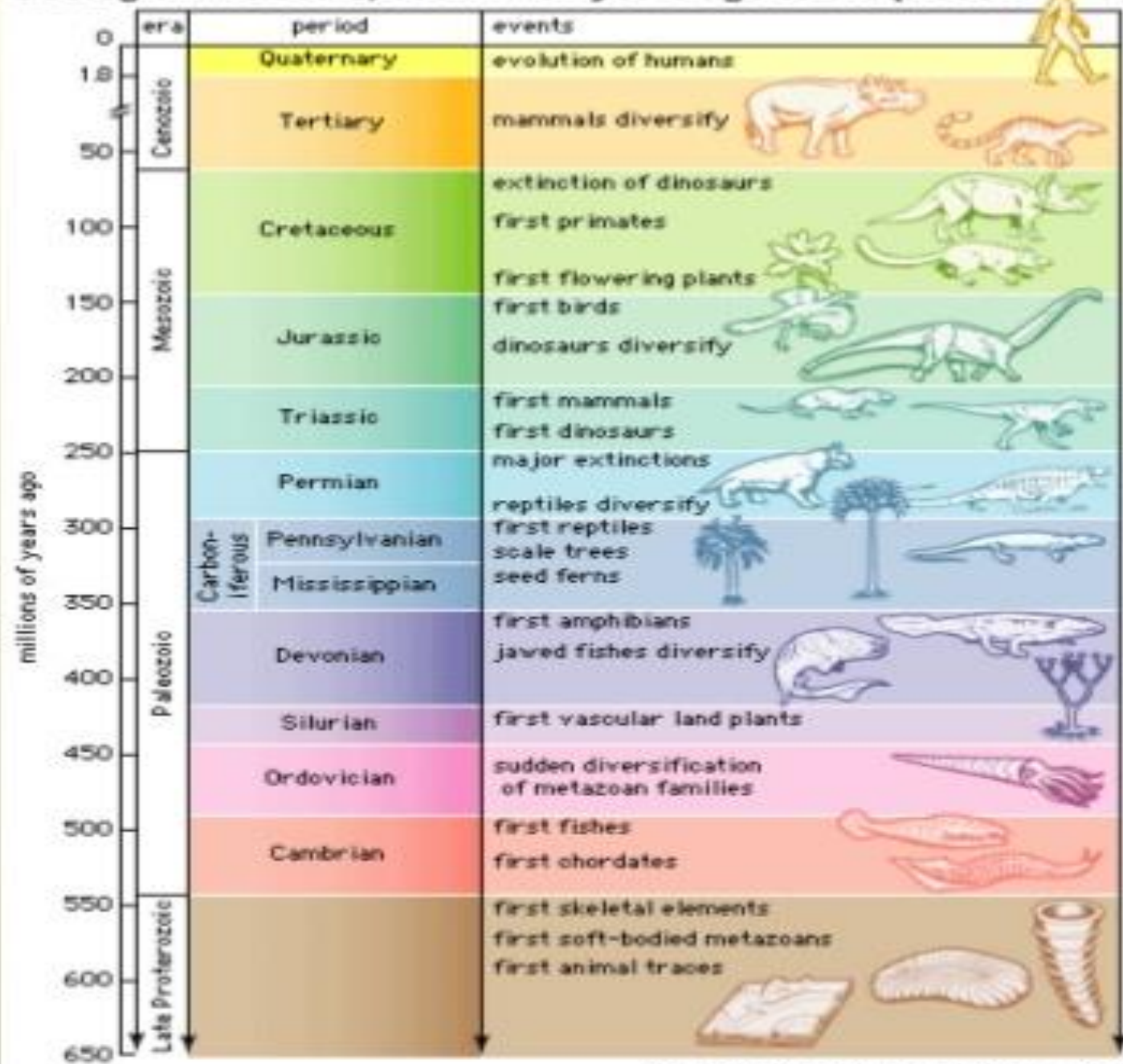


- Based on geologic events
- the ancient period from earth's history is formulated into eons-eras-periods-epochs.
- Each division in the geological calendar is clearly identified and described.
- Incidents pertaining to earth surface, plant and animal life are neatly recorded.
- The influence of geological and climatic changes on the life and the evolution of the living organism had been well analyzed.
- Earth is 4.7 billion (4,700 million) years old.

Geologic Time Scale

A BRIEF HISTORY OF EARTH SINCE 4.6 BILLION YEARS.

Geologic time scale, 650 million years ago to the present



The geologic time scale

Eon	Era	Period	Epoch	Development of Plants and Animals	Relative Time Span of Eras			
Phanerozoic	Cenozoic	Quaternary	Holocene	0.01	Humans develop	Cenozoic		
			Pleistocene	1.8		Mesozoic		
		Tertiary	Pliocene	5.3		"Age of Mammals"	Paleozoic	
			Miocene	23.8				
			Oligocene	33.7				
			Eocene	54.8				
			Paleocene	65.0	Extinction of dinosaurs and many other species			
	Mesozoic	Cretaceous	"Age of Reptiles"	First flowering plants	Precambrian			
		Jurassic		144		First birds		
		Triassic		206		Dinosaurs dominant		
	Paleozoic	Permian	"Age of Amphibians"	Extinction of trilobites and many other marine animals		Precambrian		
		Carboniferous		Pennsylvanian			290	First reptiles
				Mississippian			323	Large coal swamps
		Devonian	354	Amphibians abundant				
		"Age of Fishes"	First insect fossils					
			Silurian	417			Fishes dominant	
			Ordovician	443			First land plants	
		"Age of Invertebrates"	First fishes					
Cambrian	490		Trilobites dominant					
Proterozoic	Archean	Hadean	Collectively called Precambrian, comprises about 88% of the geologic time scale	First multicelled organisms				
				First one-celled organisms				
				Origin of Earth				

Measuring Time

- The **Geological time scale** is a record of the life forms and geological events in Earth's history.
- Scientists developed the time scale by studying **rock layers** and **fossils** world wide.
- **Radioactive dating** helped determine the absolute divisions in the time scale.

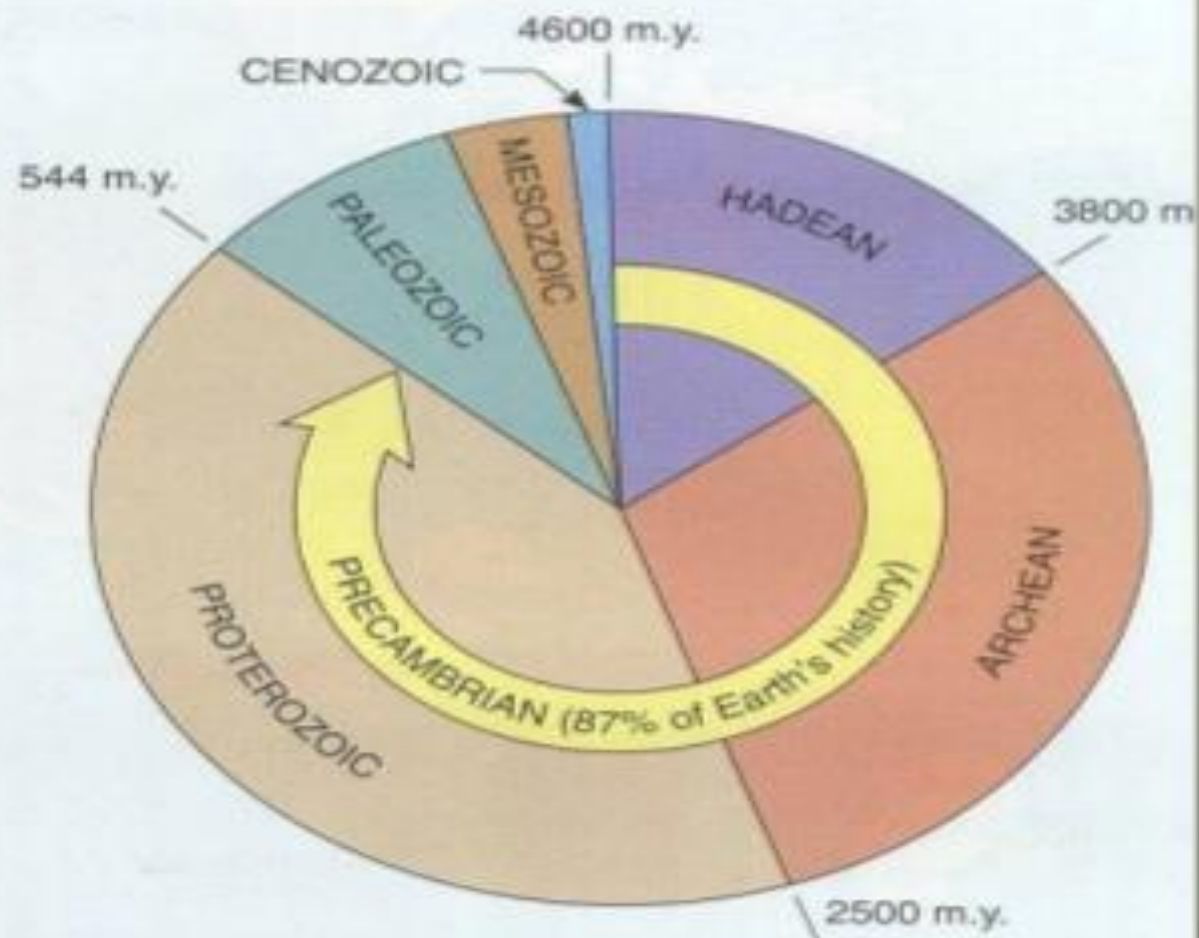
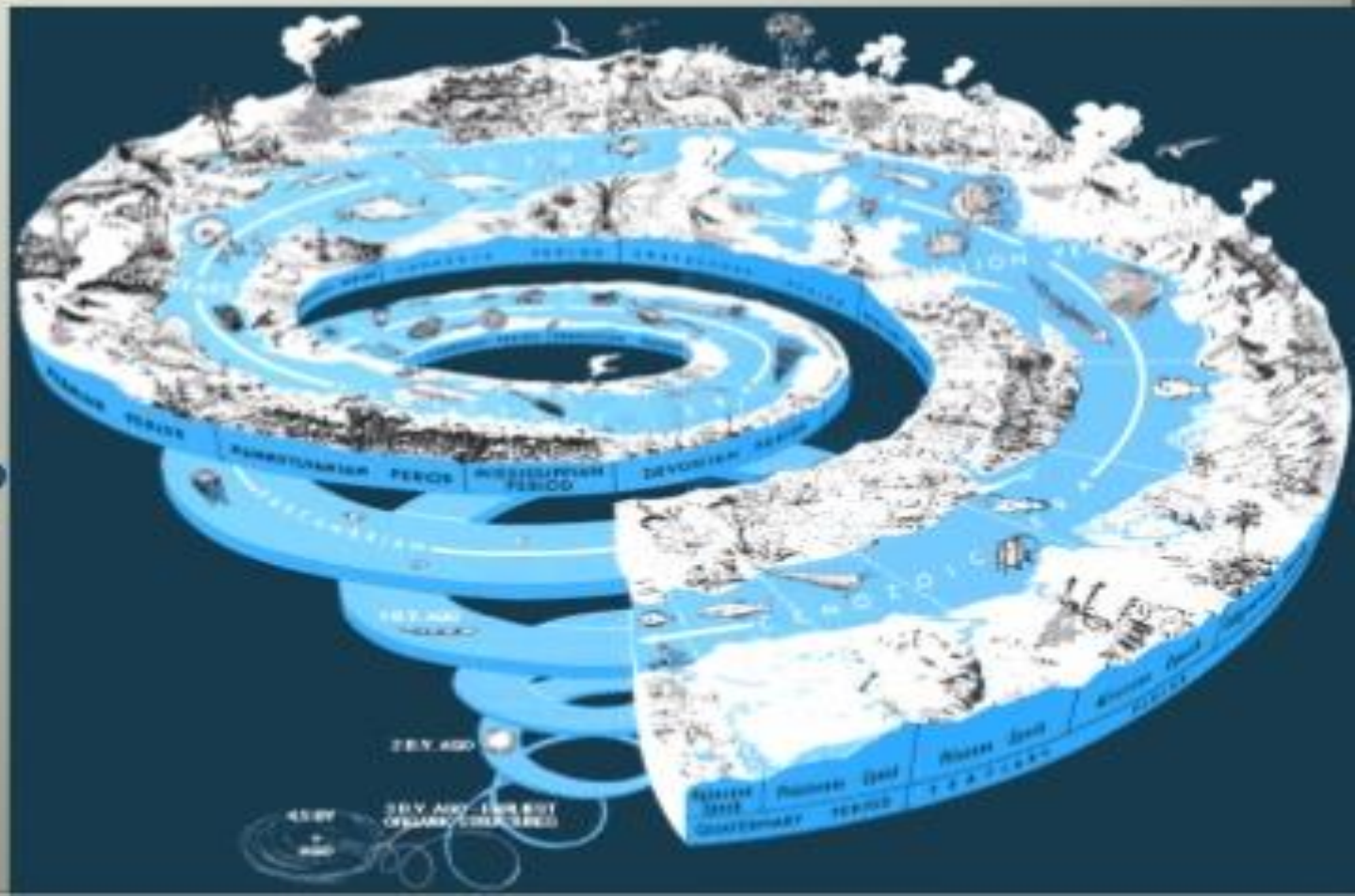


FIGURE 6-14 Proportions of geologic time encompassed by the Precambrian and its divisions, the Hadean, Archean, and Proterozoic eons.

Giving Time a Name

- The largest sections are called “eons”.
- “Eons” are divided into “eras” (the 2nd largest section).
- “Eras” are divided “periods”.
- ‘Periods’ are divided into ‘epochs’



Eons

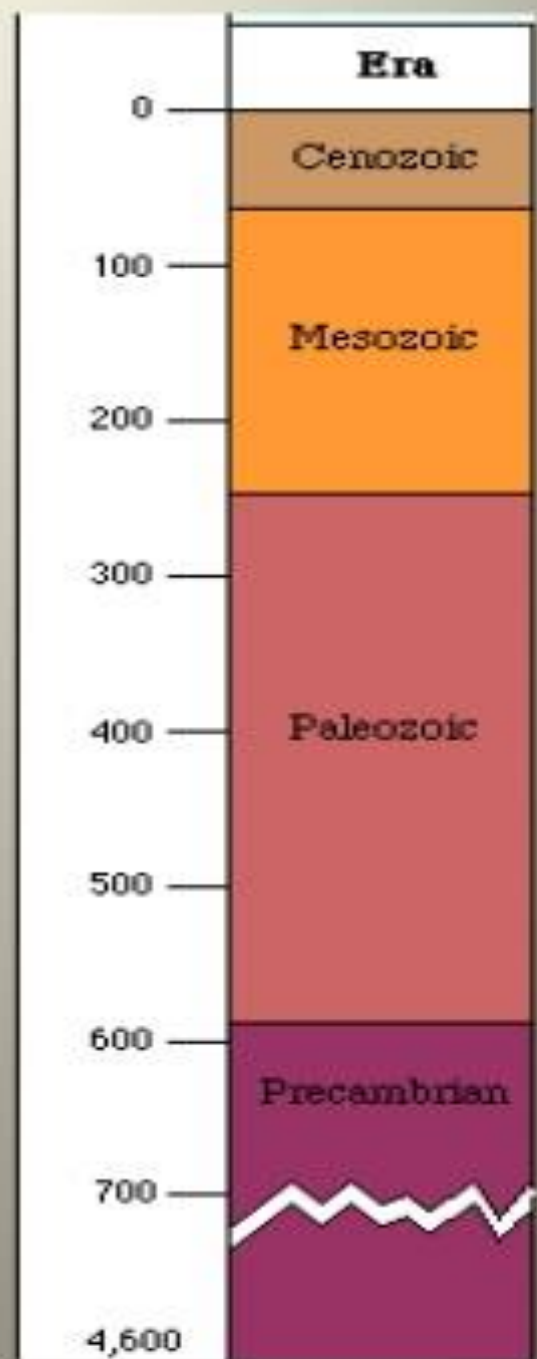
- Largest, most general division of time.
- 2 Eons
- The eons are: Cryptozoic (Precambrian) eon and Phanerozoic eon.
- Precambrian and Phanerozoic eon both consists of three eras as shown in the figure.

Phanerozoic	Cenozoic
	Mesozoic
	Paleozoic
Precambrian	Proterozoic
	Archaean
	Hadean

Eras

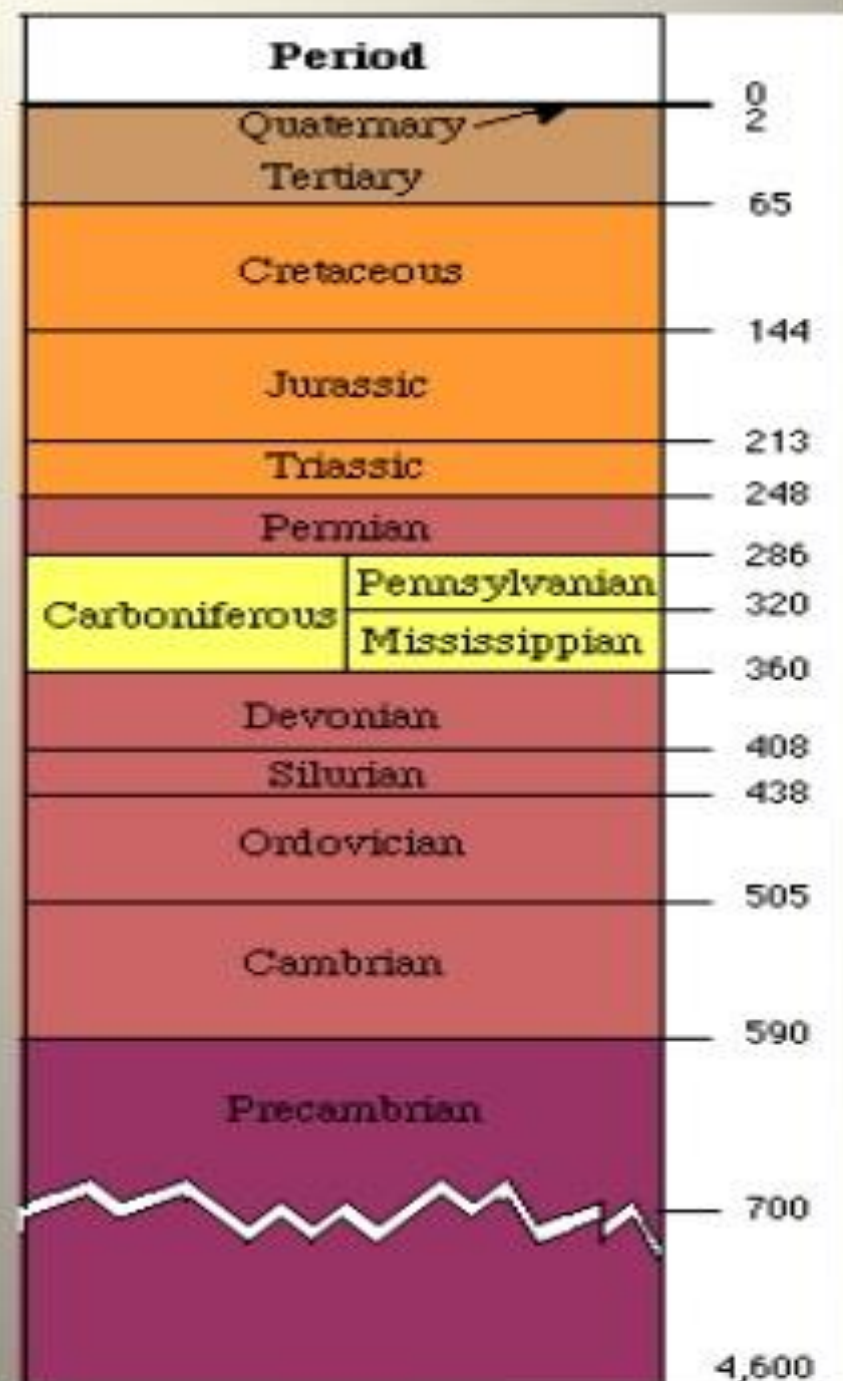
- Each Eon is broken up into Eras.
- Major eras in Earth's history:
 - Archean (4600 mya - 2500 mya)
 - Proterozoic (2500 mya - 540 mya)
 - Paleozoic (540mya - 250mya)
 - Mesozoic (250 mya - 65.5 mya)
 - Cenozoic (65.5 mya – present)

***mya refers to million years ago.**



Periods

- Each Era is divided into even more specific blocks of time called periods.
- Various geologic events are associated with each period.
- Each period is again classified into different epochs.



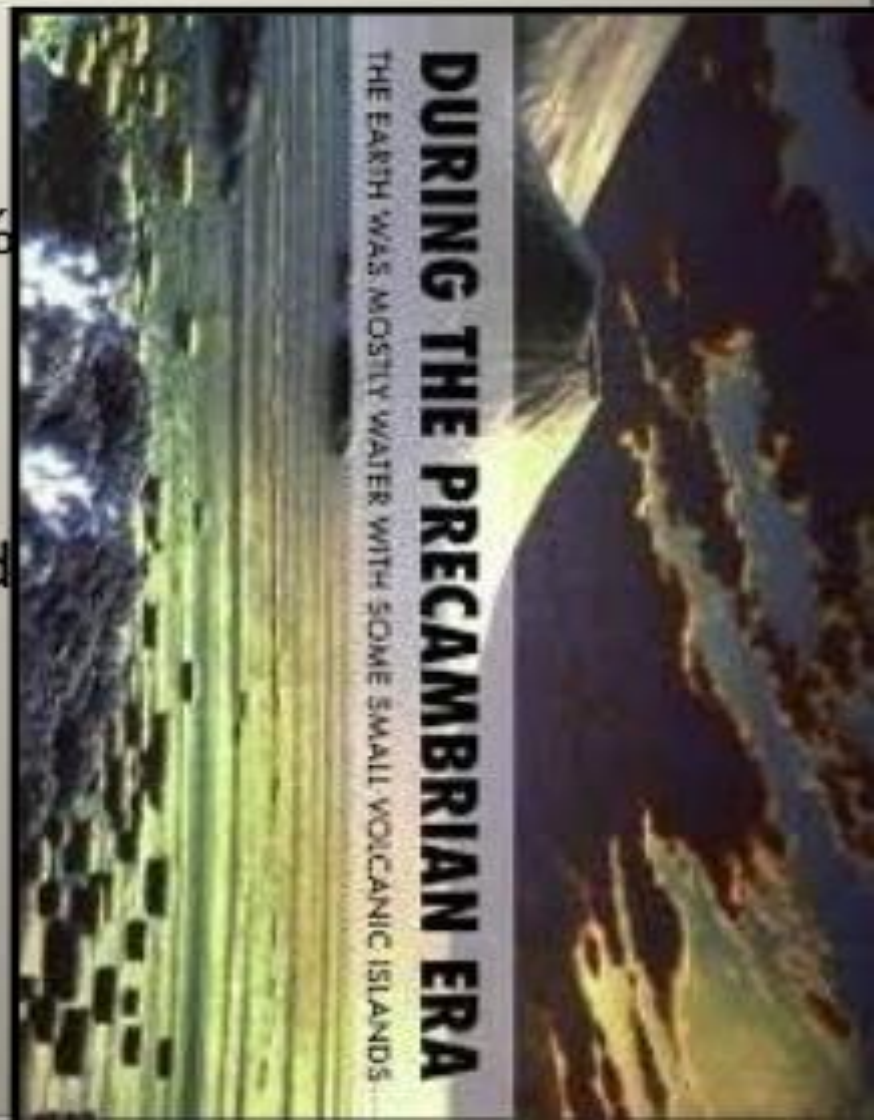
How is Time Divided?

- Major changes in Earth's history mark the boundaries between the sections.
- Most sections have been divided because a major organism developed or went extinct in each section.



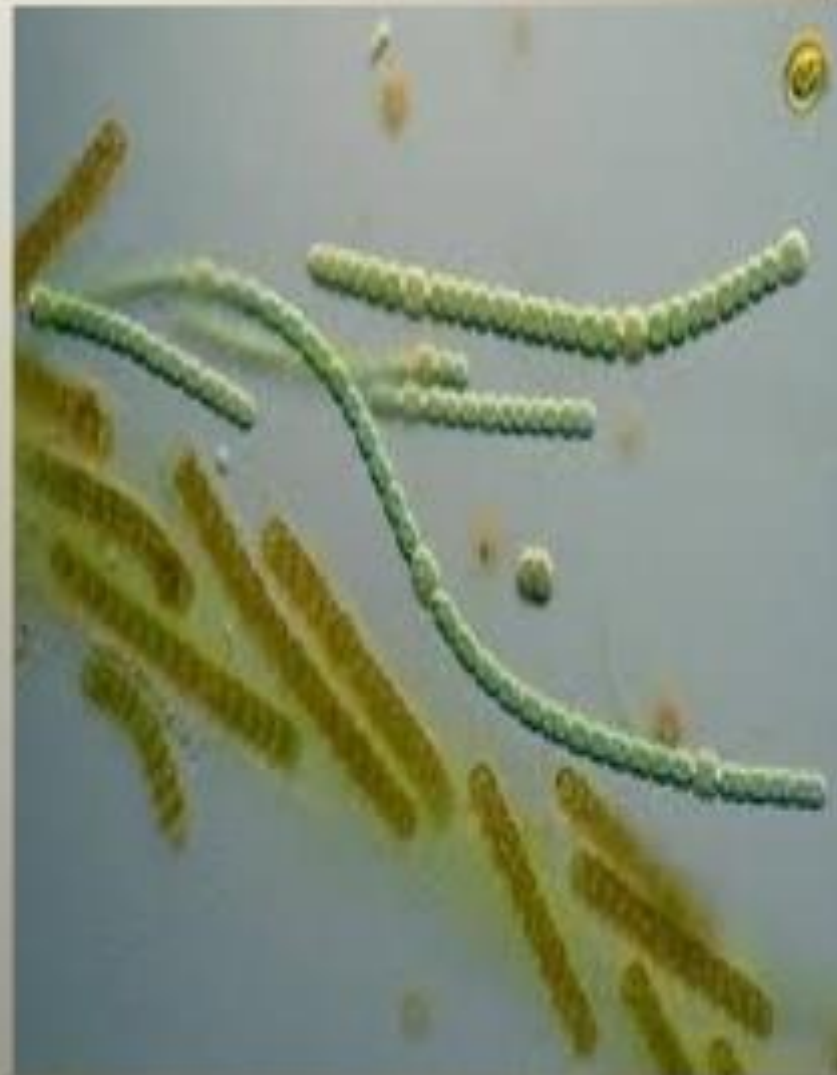
Cryptozoic eon (Precambrian time)

- Lasted from 540 million years ago to 4600 million years ago.
- Oldest and longest (covers almost 90% of earth's history).
- simple organisms- bacteria, algae, protozoa was born.
- Oldest rocks that we know were found in this eon which dates to about 3.5 billion years old.
- Divided into 2 eras: Proterozoic and Archean era.



Archean era

- Lasted from 2500 million years ago – 4600 million years ago.
- Earliest plants (marine algae) developed.
- The first life bacteria came into existence (3800 million years ago).
- The oldest rocks (3500 million years ago) were formed in this era.



Proterozoic era

- Lasted from 540 million years ago to 2500 million years ago.
- Marine invertebrates were probably common, few with shells.
- Glaciations took place in this era, probably worldwide.



THANK YOU