

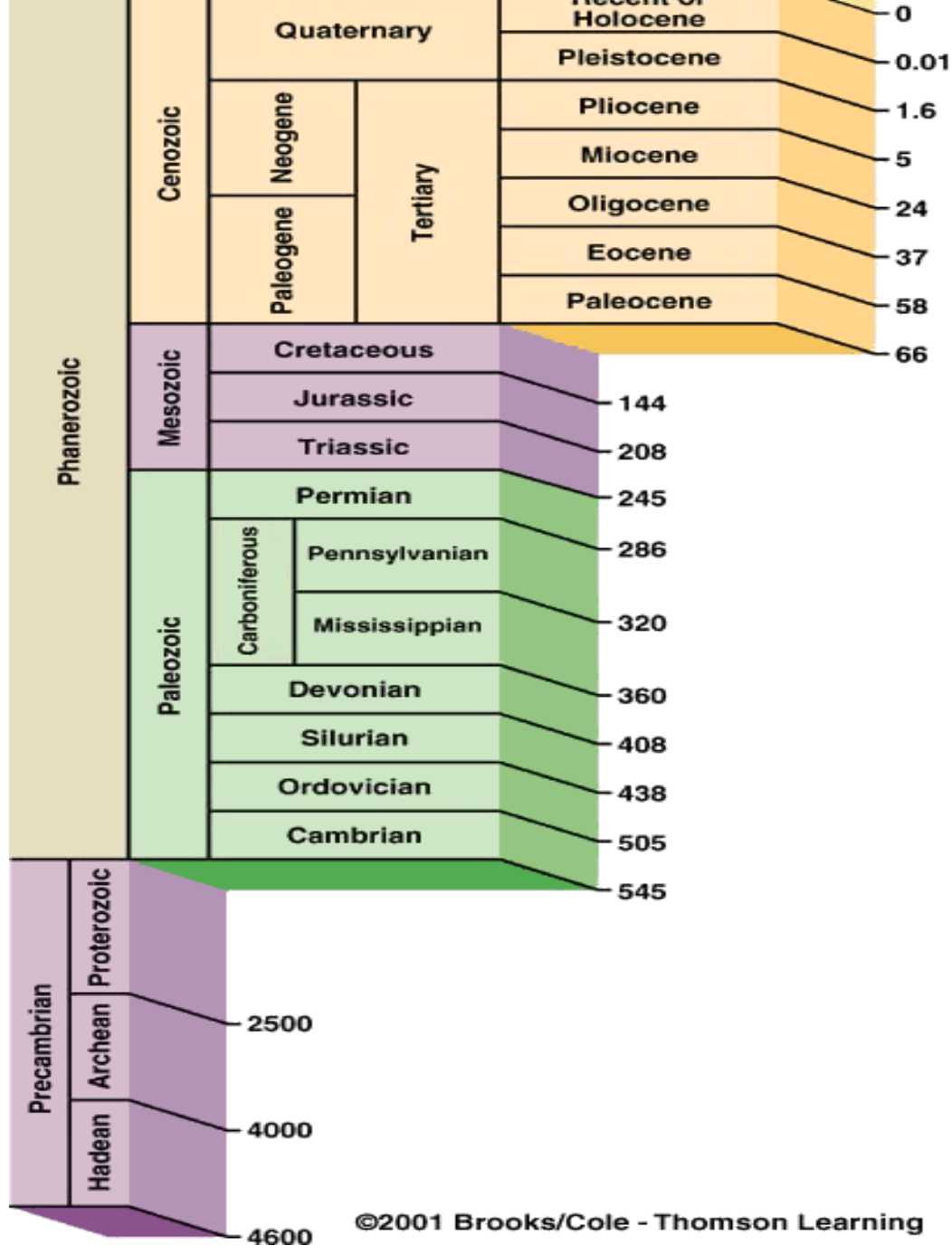
Geologic Time Scale

**A record of the life forms and geologic events in
Earth's history.**

Scientists placed Earth's rocks in order by relative age
to create the geologic column.

We developed the scale by studying these rock layers
and index fossils.

Radioactive dating helped us determine the absolute
date of the divisions in the scale.



Divisions of Geologic Time

As they studied the fossil record, they found major changes in life forms at certain times.

They used these changes to mark where one unit of geologic time ends and the next begins.

Divisions of the geologic time scale depend on events in the history of life on Earth.

Divisions of Time

- **EON** – largest division of geologic time
- **ERA** – 2nd largest, includes two or more periods
- **PERIOD** – 3rd largest, unit into which eras are divided
- **EPOCH** – 4th largest, the subdivision of a period

EON > ERA > PERIOD > EPOCH

Why is a time scale used to represent Earth's history instead of a calendar?

Earth's history is so long

When did Geologic time begin?

4.6 billion years ago

When does Geologic time end?

It doesn't. We are now in the Quaternary Period of the Cenozoic Era.

How long is a geologic period?

A period doesn't have an exact length.

EONS

- **Hadean** – rocks from meteorites and moon
- **Archean** – earliest rocks on earth form
- **Proterozoic** – organisms with well developed cells
- **Phanerozoic** – means “visible life”
well represented in the fossil record

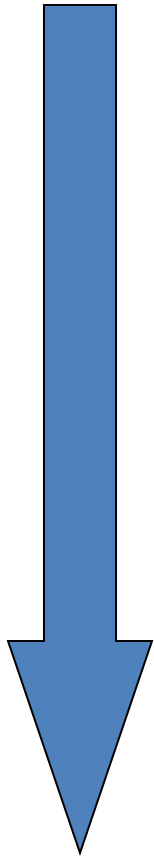
ERAS

- **Paleozoic** – “early life” 544 → 244 mya
- **Mesozoic** – “middle life” 245 → 66 mya
- **Cenozoic** – “recent life” 66mya → present

Which one do you live in today?

PERIODS

PAST



Cambrian – Explosion of life

Ordovician – 1st Vertebrates

Silurian – 1st Land Plants

Devonian – Age of Fish

Mississippian – Winged insects

Pennsylvanian – First reptiles

Permian – Age of Amphibians

Triassic – First Dinosaurs/Small mammals

Jurassic – First Birds/Flowering Plants

Cretaceous – Heyday of Dinosaurs

Tertiary – Mammals Thrive

Quaternary – Age of Man/Technology

PRESENT

Remember...Early Earth

- Earth formed 4.6 billion years ago.
- Scientists think that Earth began as a ball of dust, rock and ice.
- Gravity pulled this mass together.
- As Earth grew larger, gravity increased. Pulled in nearby dust, ice and rock.
- As objects hit Earth at high speeds, their energy changed into thermal energy.
- Energy from collisions caused Earth's temp to rise until planet was very hot.
- Scientist believe Earth may have become so hot it melted.
- Denser materials sank toward the center—formed Earth's dense iron core.
- At same time, Earth continuously lost heat to cold of space.
- Less dense molten material hardened to form Earth's outer layers. Oceans form.

Cambrian Period

- Cambrian Explosion-so many new life forms appeared within a short time.
- 1st time organisms had hard parts-shells and outer skeletons.
- All animals lived in the sea.
- Many were invertebrates-jellyfish, sponges, worms drifted through the water.
- Brachipods (clams) and trilobites were common in the Cambrian seas.

Ordovician Period

- Seas still cover the earth
- Ice cap covers what is now North Africa.
- Ancestors of squid and octopus appear.
- Jawless fish evolve—first vertebrates.

Silurian Period

- Coral reefs develop.
- Prior to this period, only one-celled organisms lived on land. Land plants appear.
- Fish with jaws appear.
- Insects and spiders appear.

Devonian Period

- Often called Age of Fishes.
- Every main group of fishes were present in the ocean.
- Most fish had jaws, skeletons and scales on their bodies.
- Sharks appeared late in the period.
- Animals begin to invade land.
- 1st vertebrates on land were lungfish. 1st amphibians evolved from the lungfish.

Carboniferous Period

- Broken into Mississippian and Pennsylvanian.
- Life expanded over continents.
Appalachian Mountains began to form.
- Small reptiles developed
- Winged insects evolved-huge dragonflies and cockroaches.
- Giant ferns & cone bearing plants and trees formed. “Coal forest”

Triassic Period

- *Fish, insects, reptiles and cone bearing trees survived Permian extinction.*
- 1st dinosaurs appear.
- 1st mammals appear-size of mouse.
- 1st turtles and crocs appear.
- Conifers, palm-like trees (cycads), ginko trees dominate forest.
- Pangaea holds together. Hot, dry conditions dominate center of Pangaea.

Jurassic Period

- Dinosaurs become dominant land animal.
- Some were plant eaters, some were meat eaters.
- Different types lived at different times.
- 1st birds appear. *Archaeopteryx means “ancient wing thing.”*
- 1st flying reptiles-pterosaurs appear.
- Pangaea breaks apart-N. America and S. America separate.

Cretaceous Period

- Continents moved toward present location.
- Widespread volcanic activity.
- Flying reptiles and birds competed.
- Birds hollow bones and feathers made them better adapted.
- 1st flowering plants. Flowering plants produce seeds that are inside fruit. Fruit helps seed survive.
- Dinosaurs dominate-T-rex.
- 1st snakes appear.

Tertiary Period

- Climate was warm and mild.
- Rockies and Himalayas form.
- Continental glacier covers Antarctica.
- 1st grasses appear-provide food source for grazing animals. (ancestors of cattle, deer, sheep.)
- Flowering plants thrive.
- Ancestors of humans evolve.

Quaternary Period

- Climate cooled-causing a series of ice ages.
- 20,000 years ago climate began to warm.
- Modern humans-Homo sapiens evolved as early as 100,000 years ago. 12,000-15,000 humans had migrated around the world.
- Mammals, flowering plants and insects dominate land.
- Giant mammals of N. America and Eurasia become extinct.