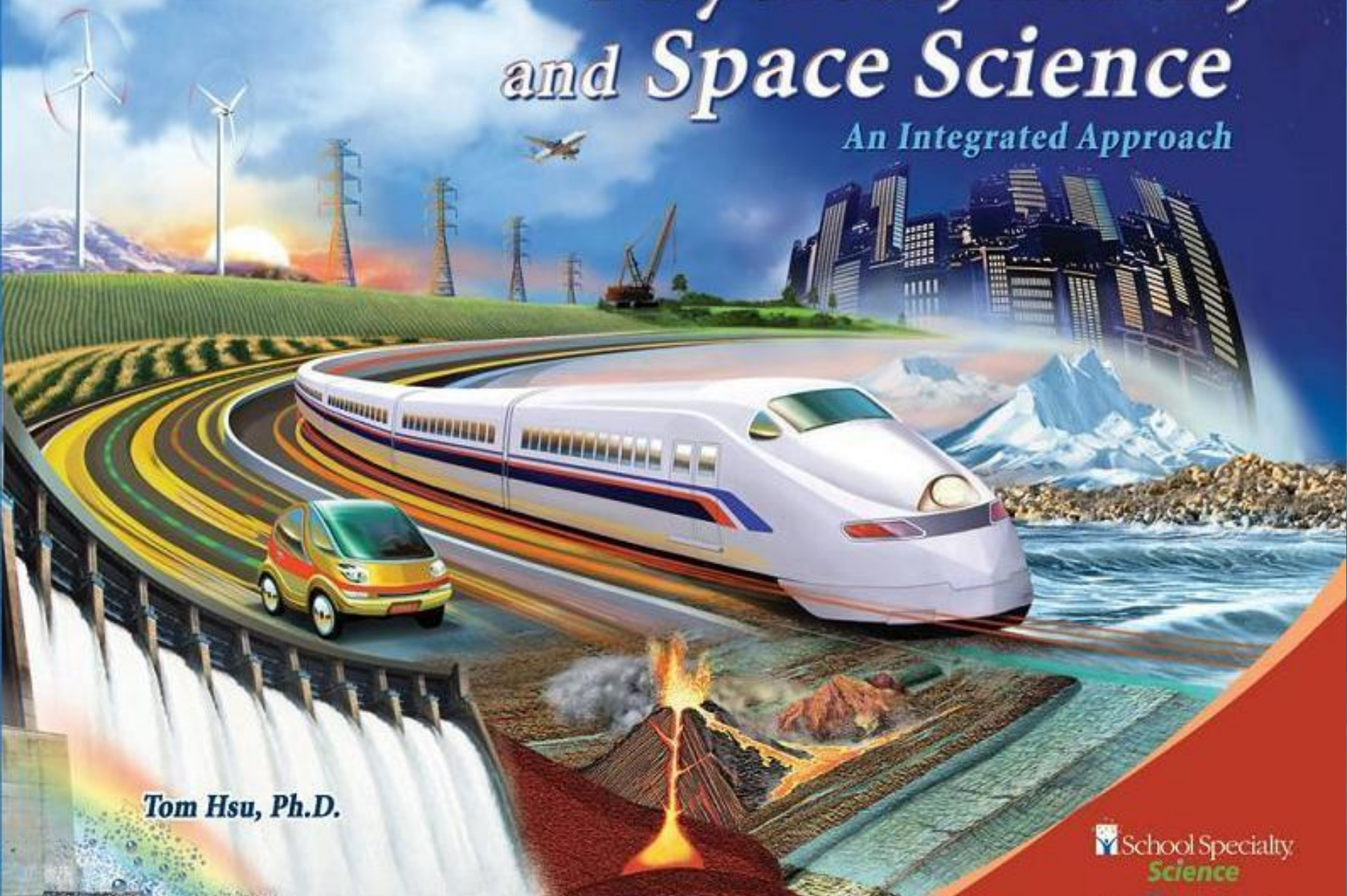


cpo science

Physical, Earth, and Space Science

An Integrated Approach



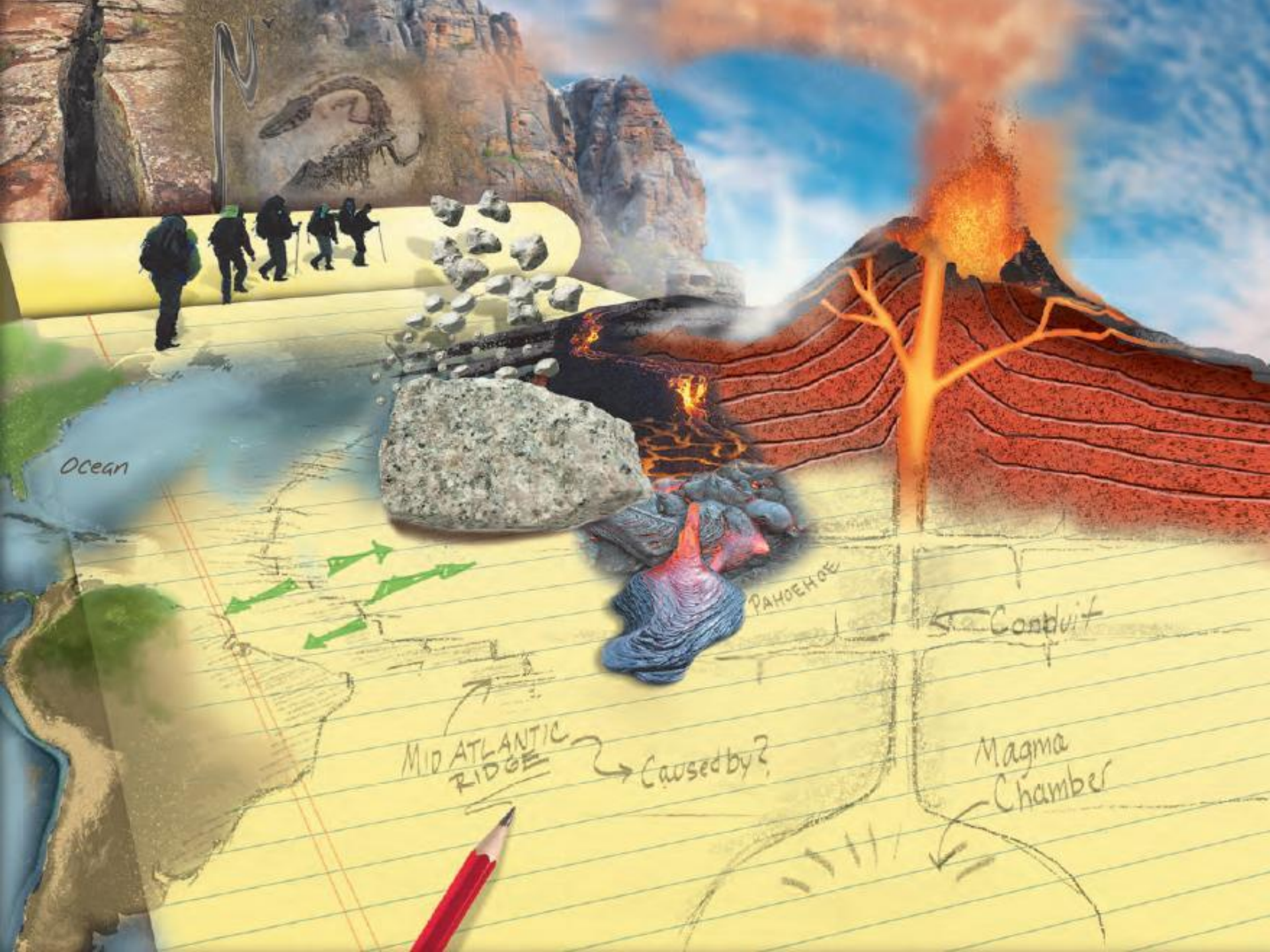
Tom Hsu, Ph.D.

 School Specialty
Science



UNIT SIX: Earth's Structure

- **Chapter 18 Earth's History and Rocks**
- **Chapter 19 Changing Earth**
- **Chapter 20 Earthquakes and Volcanoes**



Ocean

MID ATLANTIC RIDGE

Caused by?

PANGLOSS

Conduit

Magma Chamber



Chapter Eighteen: Earth's History and Rocks

- **18.1 Geologic Time**
- **18.2 Relative Dating**
- **18.3 The Rock Cycle**



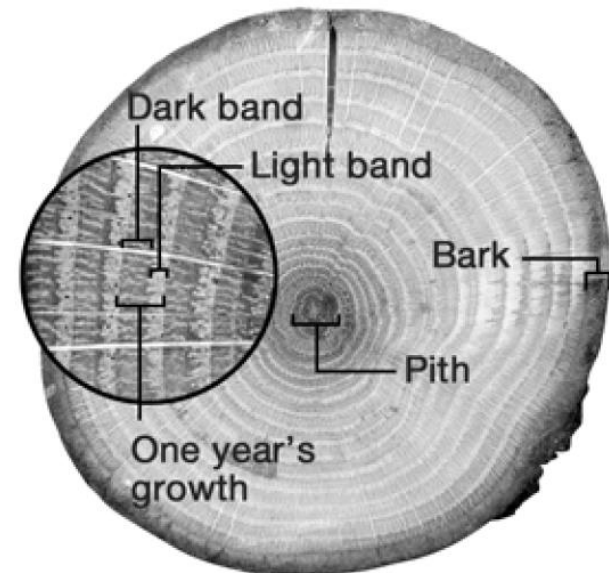
18.1 Learning Goals

- **Discuss the events associated with periods of Earth's history.**
- **Apply knowledge of isotopes to explain how radiometric dating is used to find out Earth's age.**
- **Analyze cross-sections and cores of trees to learn about their histories and ages.**

Investigation 18A

Time and Tree Rings

- **Key Question:**
Do tree rings tell a story?





18.1 Geologic Time

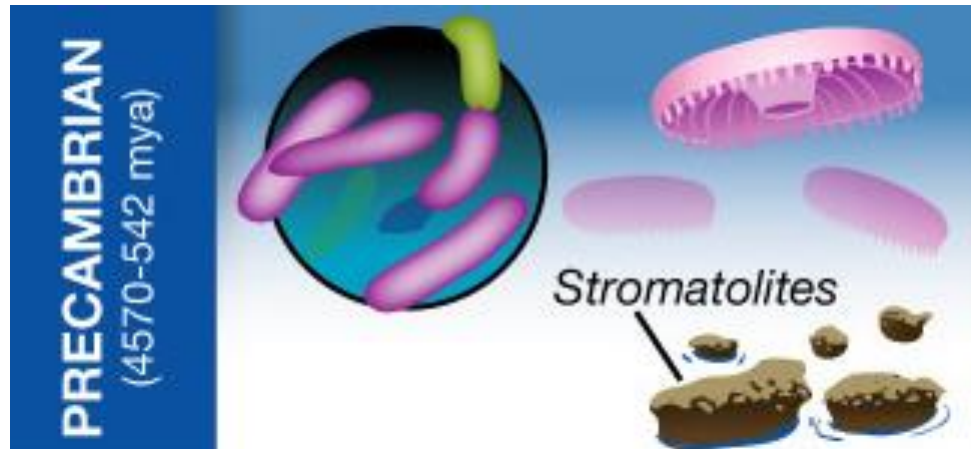
- * Scientists have developed a model of the history of life on Earth called the *geologic time scale*.
- * Paleontologists divide the geologic time scale into blocks of time called *eras* and *periods*.

TIME	
Units for One Day	Units for Geologic Time
<p>One day is divided into...</p> <p>↓</p> <p>hours which are divided into...</p> <p>↓</p> <p>minutes.</p>	<p>One eon is divided into...</p> <p>↓</p> <p>eras which are divided into...</p> <p>↓</p> <p>periods.</p>



18.1 Precambrian era

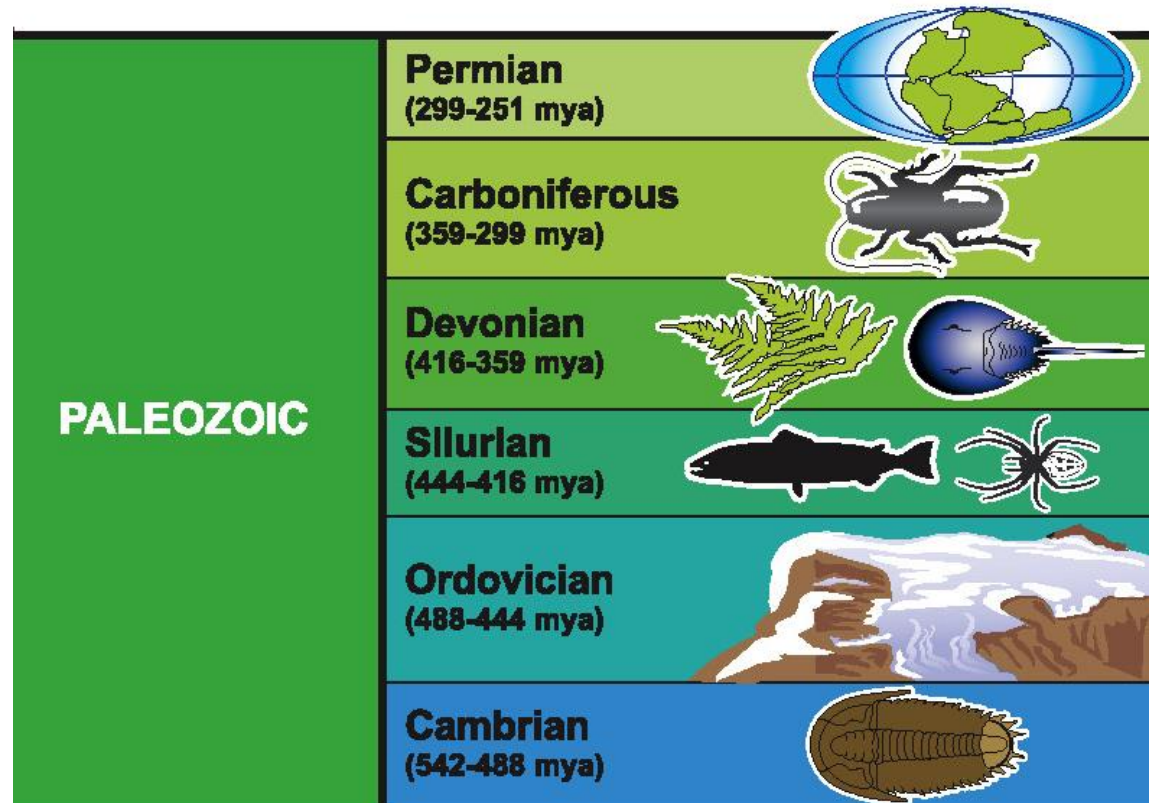
- * The Precambrian era lasted from Earth's formation 4750 until 542 million years ago (mya).
- * The first cells appeared in the Precambrian era.





18.1 Paleozoic era

- * The Paleozoic era lasted from 542 to 251 mya.
- * *Paleozoic* is a Greek word meaning “ancient life.”



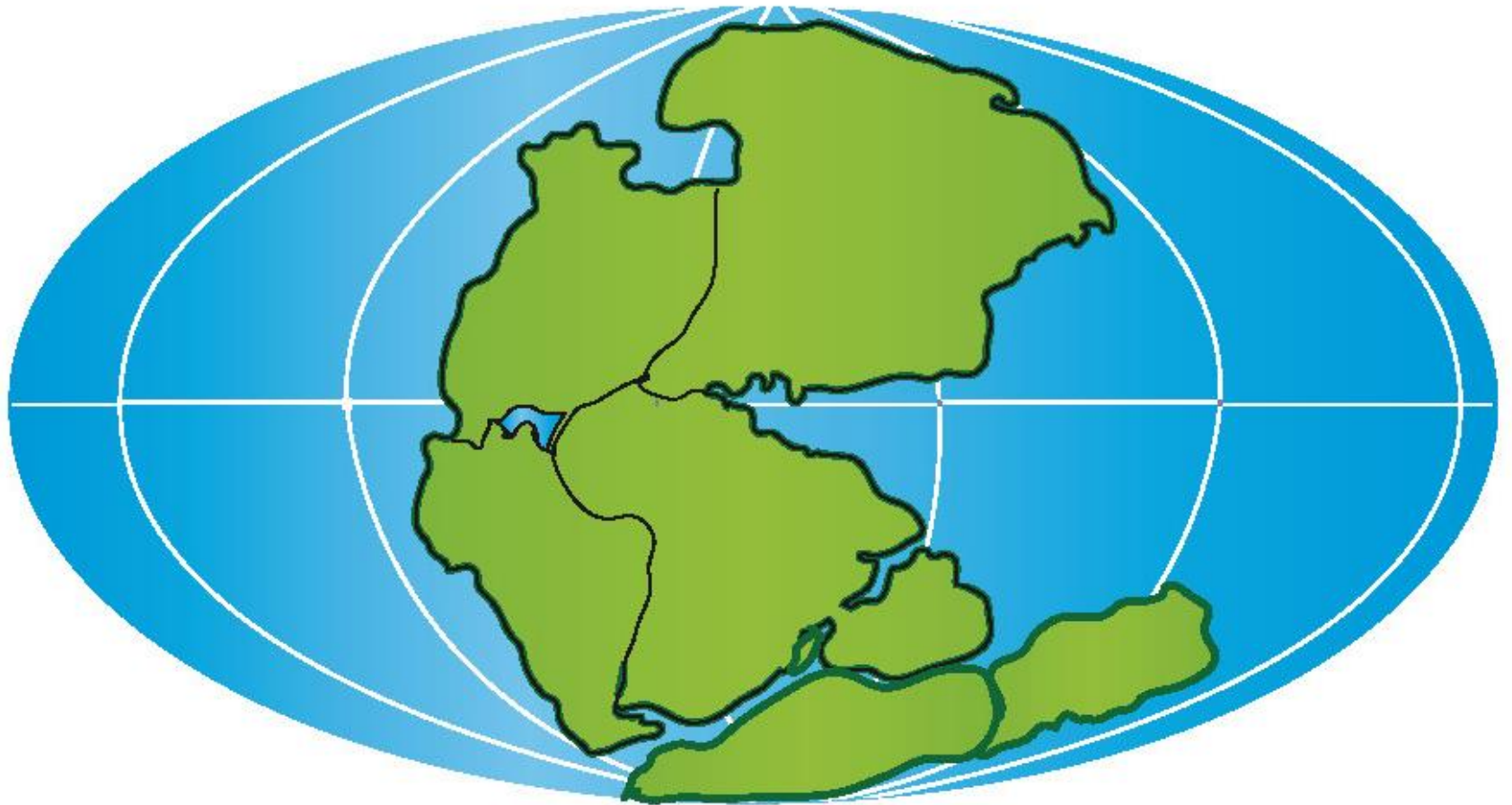


18.1 Paleozoic era

- *** Rocks from the Paleozoic Era contain fossils of snails, clams, corals, and *trilobites*.**



245 mya

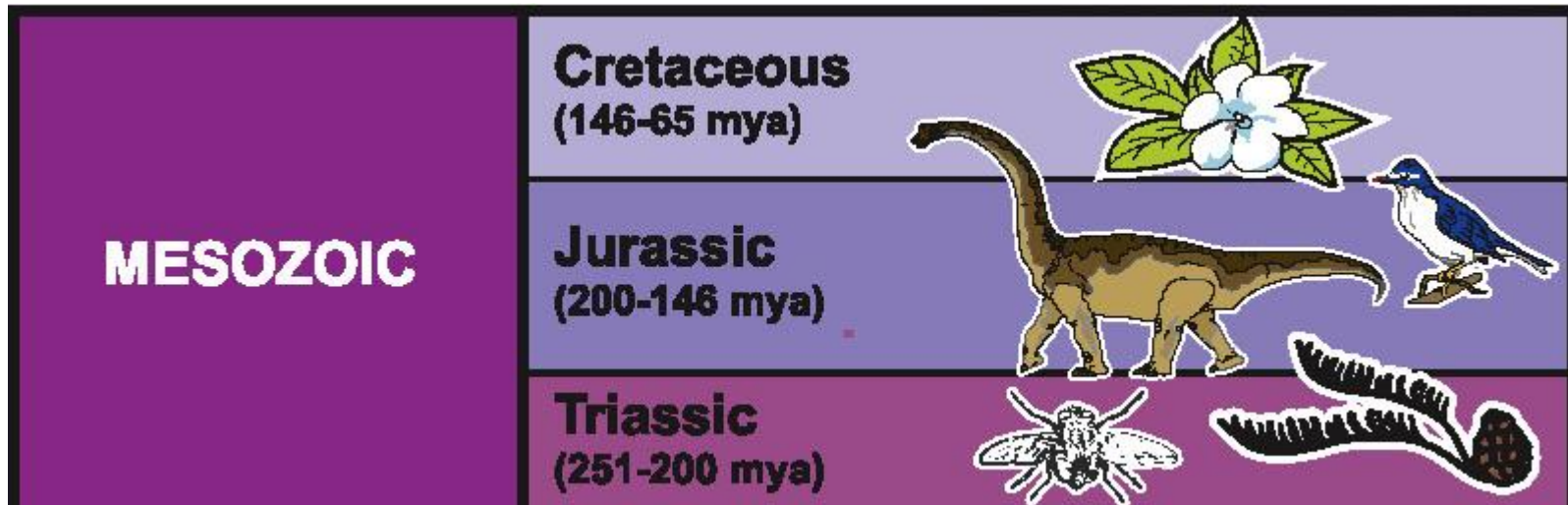


Pangaea.



18.1 Mesozoic era

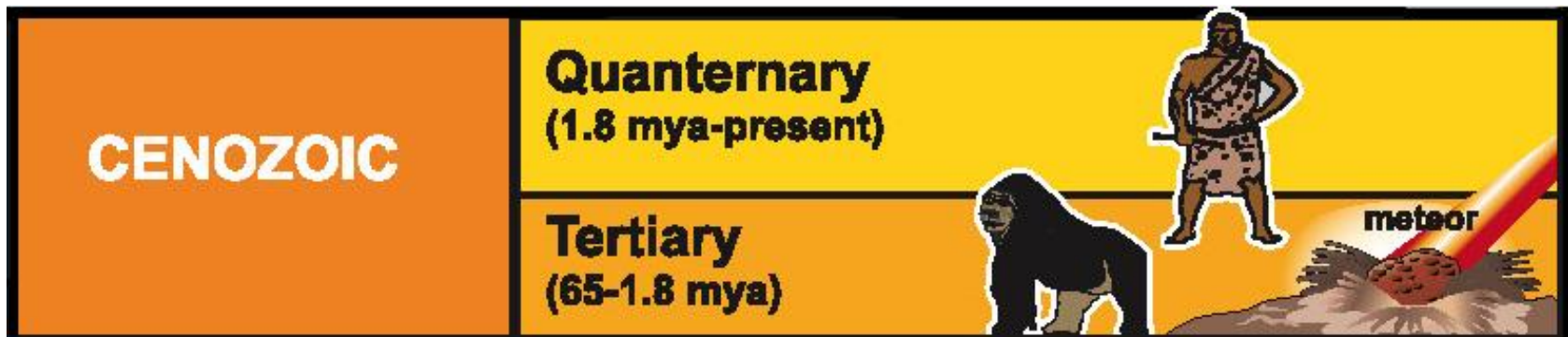
- * The Mesozoic era lasted from 251 to 65 mya.
- * This era is often called the Age of Reptiles.





18.1 Cenozoic era

- ***The Cenozoic era began 65 mya and is still going on.**
- *** The common name for the Cenozoic Era is the Age of Mammals.**





18.1 Cenozoic era



Mammoth



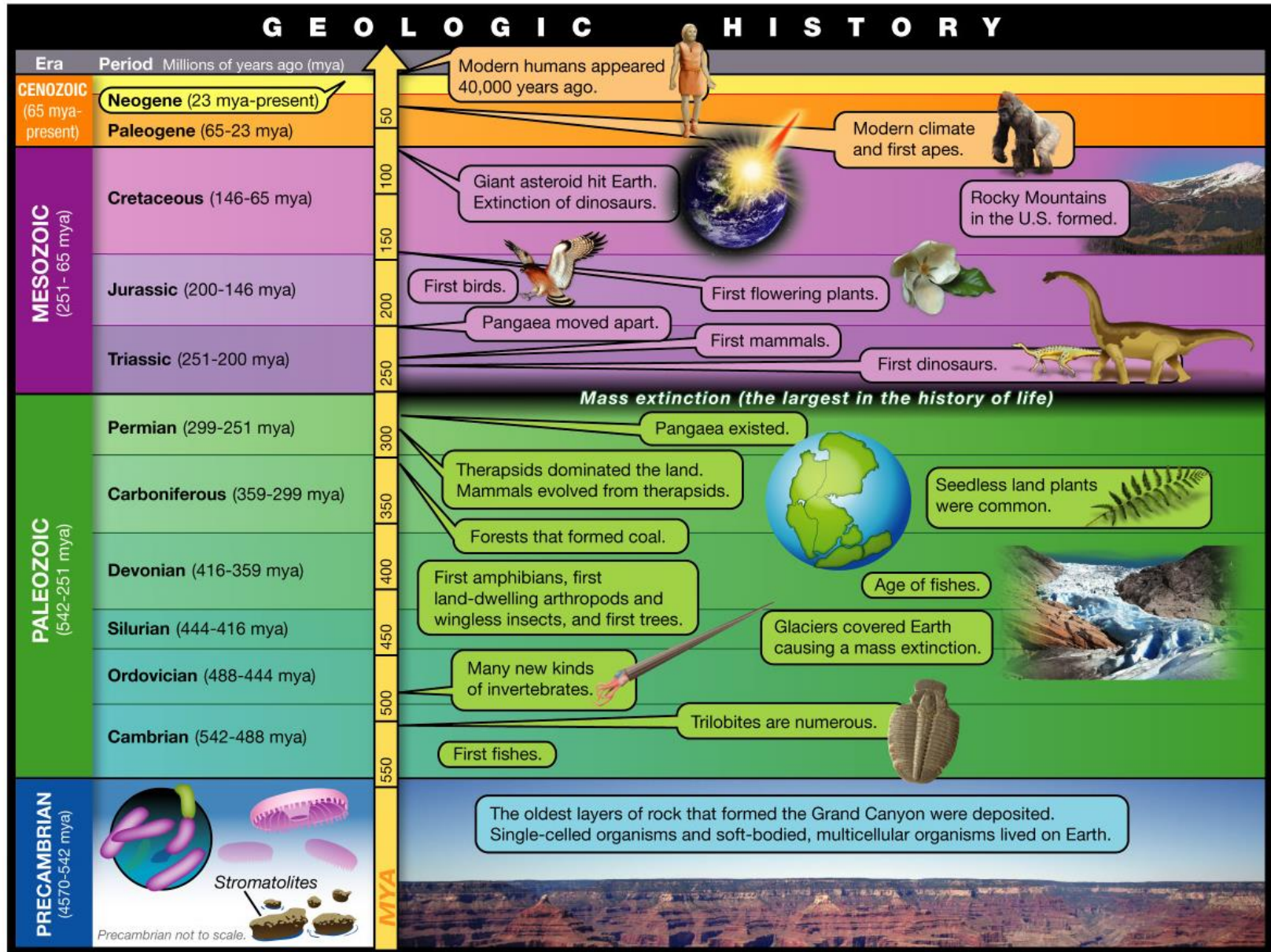
Smilodon



Eohippus

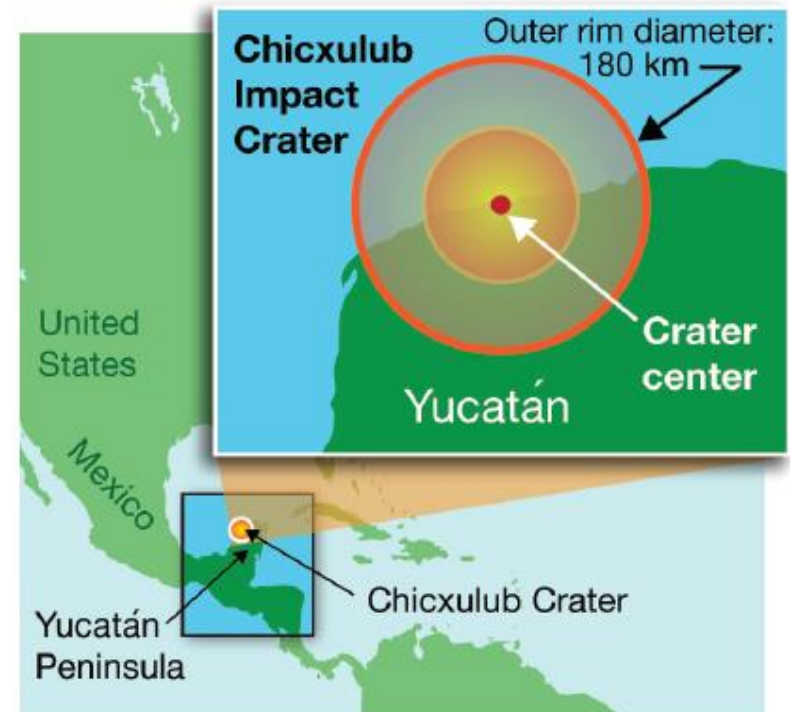
- * Mammals diversified into a variety of species including land mammals, sea mammals, and flying mammals.
- * Cenozoic means “recent life.”

Earth's Geologic History



18.1 Mass extinction

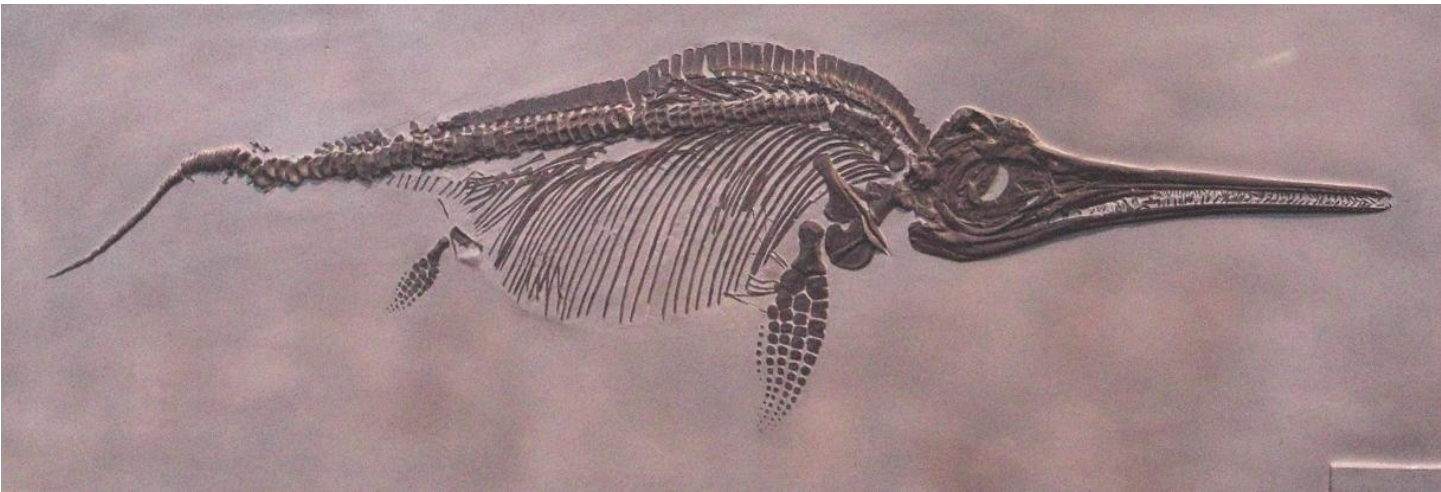
- * Scientists have evidence that a large asteroid crashed near Mexico's Yucatan peninsula about 65 mya.
- * The resulting climate change may have caused the extinction of Mesozoic Era reptiles, including most dinosaurs.





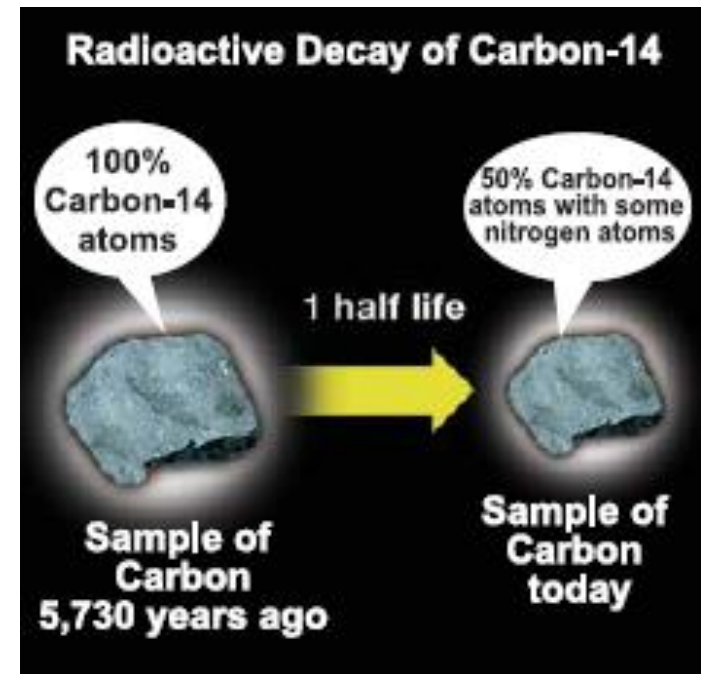
18.1 Absolute Dating

- * ***Absolute dating*** is a method of measuring the age of an object such as a rock or fossil in ***years***.
- * **Scientists use both absolute and relative dating to develop the geologic time scale.**



18.1 Absolute Dating

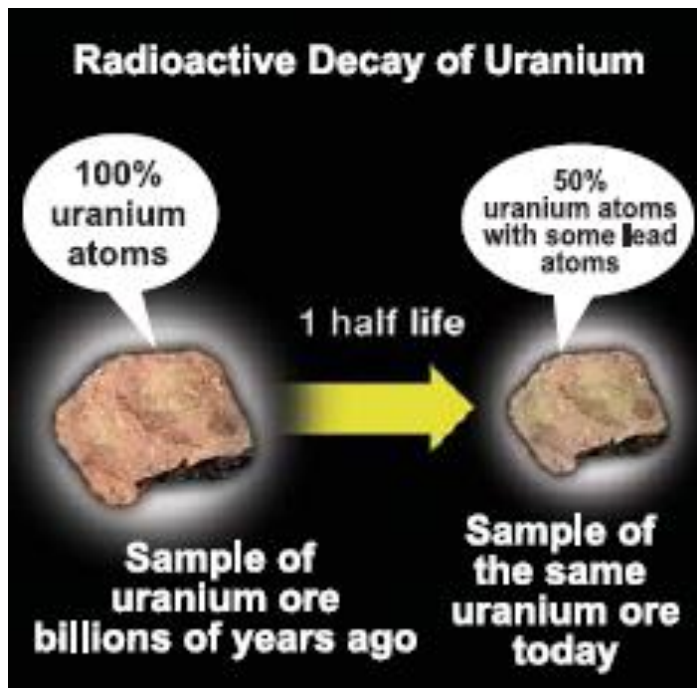
- * **Radioactive decay** refers to how unstable atoms lose energy and matter over time.
- * As a result of radioactive decay, an element turns into another element over a period of time.



* Carbon turns in to nitrogen over time.



18.1 The half life of uranium



- * Scientists know that it takes 4.5 billion years for one half of the uranium atoms in a specimen to turn into lead.
- * We say that 4.5 billion years is the *half-life* for the radioactive decay of uranium.



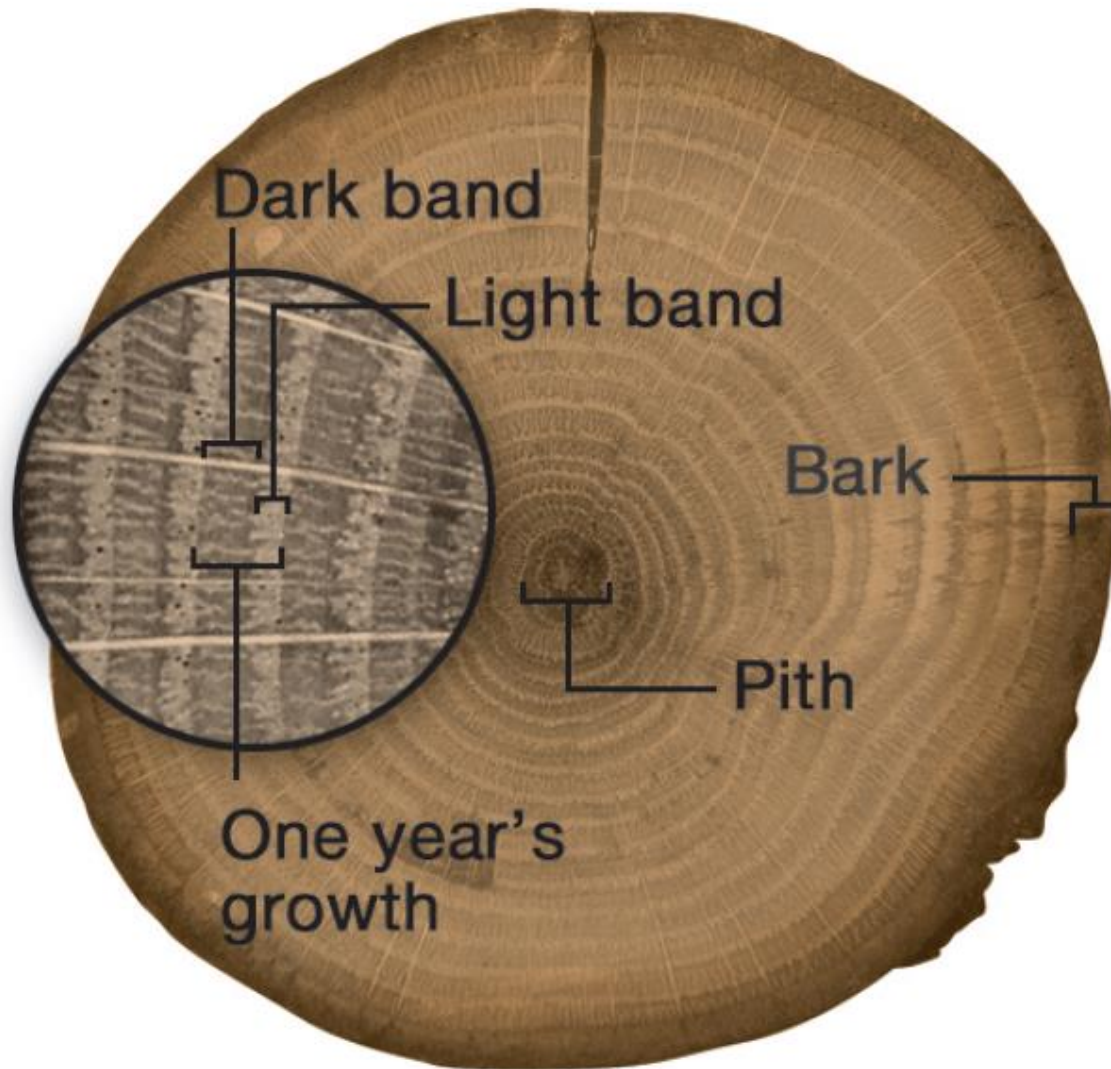
18.1 Trees and absolute dating

- A tree grows one *tree ring* for every year that it is alive.
- Andrew Douglass (1867–1962) was an astronomer who discovered the significance of tree rings.
- In the early 1900s, Douglass hypothesized that trees might record what Earth's climate was like in the past.



One growth ring

A Cross-Section of a Tree





18.1 Trees and absolute dating



- Each tree ring is a record of what the environment was like that year.
- Wide tree rings indicated a very wet year and narrow rings indicated a dry year.
- Douglass named this new field of science *dendrochronology*.



18.1 Trees and absolute dating



- The oldest tree on record is a bristlecone pine called “Methuselah.”
- It is 4,765 years old.
- These trees grow in the mountains of California.

Bristlecone pine trees grow very slowly.