

Prentice Hall **EARTH SCIENCE**



Tarbuck ♦ Lutgens

Chapter

13

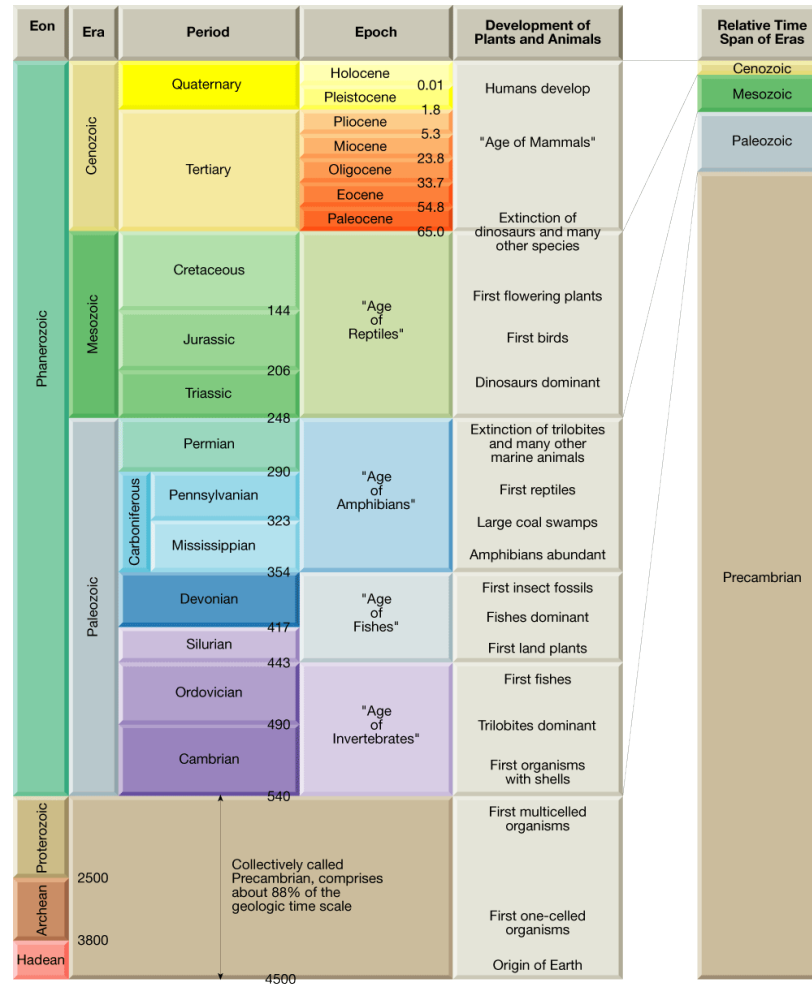
Earth's History

13.1 Precambrian Time: Vast and Puzzling

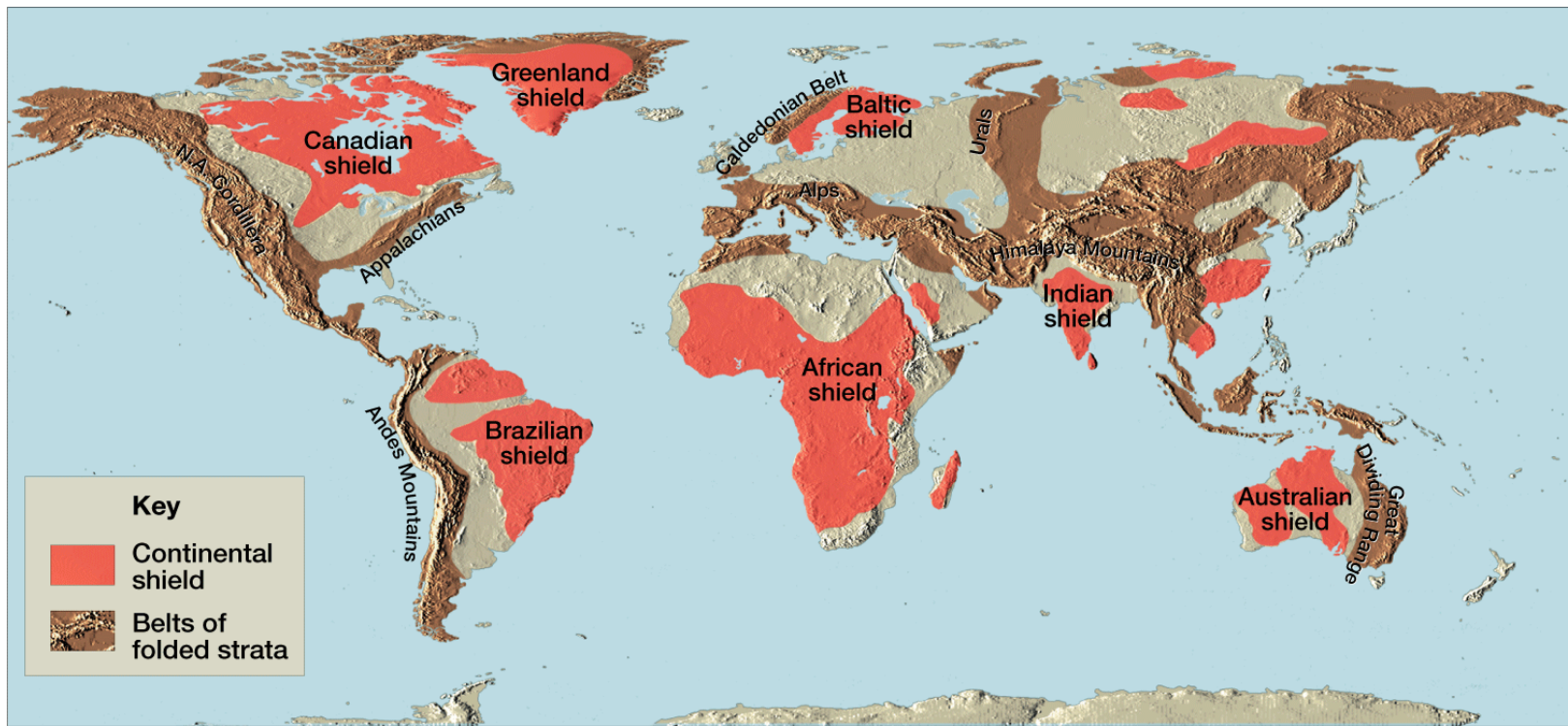
Precambrian History

- ◆ The Precambrian encompasses immense geological time, from Earth's distant beginnings 4.56 billion years ago until the start of the Cambrian period, over 4 billion years later.
- ◆ Precambrian Rocks
 - **Shields** are large, relatively flat expanses of ancient metamorphic rock within the stable continental interior.
 - Much of what we know about Precambrian rocks comes from ores mined from shields.

Geologic Time Scale



Remnants of Precambrian Rocks



13.1 Precambrian Time: Vast and Puzzling

Precambrian History

◆ Earth's Atmosphere Evolves

- Earth's original atmosphere was made up of gases similar to those released in volcanic eruptions today—water vapor, carbon dioxide, nitrogen, and several trace gases, but no oxygen.
- Later, primary plants evolved that used photosynthesis and released oxygen.
- Oxygen began to accumulate in the atmosphere about 2.5 billion years ago.

13.1 Precambrian Time: Vast and Puzzling

Precambrian History

◆ Precambrian Fossils

- The most common Precambrian fossils are stromatolites.
- **Stromatolites** are distinctively layered mounds or columns of calcium carbonate. They are not the remains of actual organisms but are the material deposited by algae.
- Many of these ancient fossils are preserved in chert—a hard dense chemical sedimentary rock.

13.2 Paleozoic Era: Life Explodes

Early Paleozoic

- ◆ Following the long Precambrian, the most recent 540 million years of Earth's history are divided into three eras: Paleozoic, Mesozoic, and Cenozoic.

13.2 Paleozoic Era: Life Explodes

Early Paleozoic

◆ Early Paleozoic History

- During the Cambrian, Ordovician, and Silurian periods, the vast southern continent of **Gondwana** encompassed five continents (South America, Africa, Australia, Antarctica, and part of Asia).

Gondwana and the Continental Landmasses



13.2 Paleozoic Era: Life Explodes

Early Paleozoic

◆ Early Paleozoic Life

- Life in early Paleozoic time was restricted to the seas.

Life in the Ordovician Period



13.2 Paleozoic Era: Life Explodes

Late Paleozoic

◆ Late Paleozoic History

- **Laurasia** is the continental mass that formed the northern portion of Pangaea, consisting of present-day North America and Eurasia.
- By the end of the Paleozoic, all the continents had fused into the supercontinent of Pangaea.

Late Paleozoic Plate Movements



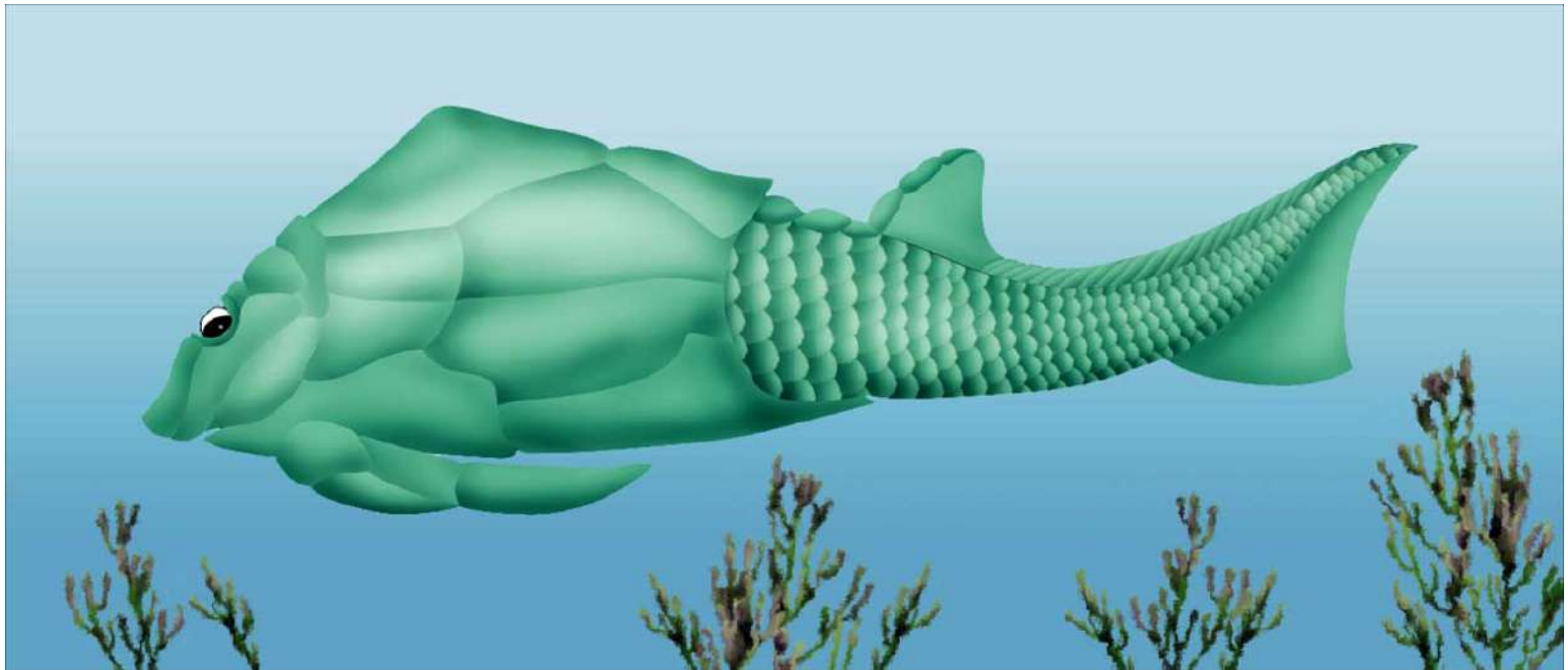
13.2 Paleozoic Era: Life Explodes

Late Paleozoic

◆ Late Paleozoic Life

- Some 400 million years ago, plants that had adapted to survive at the water's edge began to move inland, becoming land plants.
- The amphibians rapidly diversified because they had minimal competition from other land dwellers.

Armor-Plated Fish



Model of a Pennsylvanian Coal Swamp



13.2 Paleozoic Era: Life Explodes

The Great Paleozoic Extinction

- ◆ The world's climate became very seasonal, probably causing the dramatic extinction of many species.
- ◆ The late Paleozoic extinction was the greatest of at least five mass extinctions to occur over the past 500 million years.

13.3 Mesozoic Era: Age of Reptiles

Mesozoic Era

- ◆ **Dinosaurs** were land-dwelling reptiles that thrived during the Mesozoic era.
- ◆ **Mesozoic History**
 - A major event of the Mesozoic era was the breakup of Pangaea.

13.3 Mesozoic Era: Age of Reptiles

Mesozoic Era

◆ Mesozoic Life

- **Gymnosperms** are seed-bearing plants that do not depend on free-standing water for fertilization.
- The gymnosperms quickly became the dominant plants of the Mesozoic era.

Canadian Rockies Were Formed Throughout the Cretaceous Period



13.3 Mesozoic Era: Age of Reptiles

Mesozoic Era

◆ The Shelled Egg

- Unlike amphibians, reptiles have shell-covered eggs that can be laid on the land.
- The elimination of a water-dwelling stage (like the tadpole stage in frogs) was an important evolutionary step.

13.3 Mesozoic Era: Age of Reptiles

Mesozoic Era

◆ Reptiles Dominate

- With the perfection of the shelled egg, reptiles quickly became the dominant land animals.
- At the end of the Mesozoic era, many reptile groups became extinct.

The Flying Reptile Pteranodon



13.4 Cenozoic Era: Age of Mammals

Cenozoic North America

- ◆ The Cenozoic era is divided into two periods of very unequal duration, the Tertiary period and the Quaternary period.
- ◆ Plate interactions during the Cenozoic era caused many events of mountain building, volcanism, and earthquakes in the West.

13.4 Cenozoic Era: Age of Mammals

Cenozoic Life

- ◆ **Mammals**—animals that bear live young and maintain a steady body temperature—replaced reptiles as the dominant land animals in the Cenozoic era.
- ◆ **Angiosperms**—flowering plants with covered seeds—replaced gymnosperms as the dominant land plants.

13.4 Cenozoic Era: Age of Mammals

Cenozoic Life

◆ Mammals Replace Reptiles

- Adaptations like being warm blooded, developing insulating body hair, and having more efficient heart and lungs allow mammals to lead more active lives than reptiles.

13.4 Cenozoic Era: Age of Mammals

Cenozoic Life

◆ Large Mammals and Extinction

- In North America, the mastodon and mammoth, both huge relatives of the elephant, became extinct. In addition, saber-toothed cats, giant beavers, large ground sloths, horses, camels, giant bison, and others died out on the North American continent.
- The reason for this recent wave of extinctions puzzles scientists.