

The background image shows a vast, rugged landscape of mountains with distinct horizontal sedimentary rock layers. A winding road in the lower-left foreground cuts through the terrain, leading the eye towards the center of the frame.

GEOLOGICAL TIMELINE OF EVENTS

By Kayden, Michael, and Arjun

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Notes

- YA = years ago, MYA = million years ago, BYA = billion years ago.
- Each section is organized by era.
- Each slide is organized by epoch.
- Timeline measurements are for the start of the period, approximate dates, and are the average of dates found on different sources.
- If epochs are not available, periods are used. If periods are not available, eras are used. If eras are not available, eons are used.

Creation of Earth

4.6 BYA

Earth forms in a disk-shaped cloud of dust left over from the creation of the Solar System. The Earth is uninhabitable due to the surface being molten. There is no solid crust at this time. At this point earth also develops a magnetic field and a heat source with the sun.

Scale: 0.5 Slides = 0.1 BYA

Pre-Cambrian Supereon

Includes Hadean, Archean, and Proterozoic Eons

Time: 4.6 BYA-541 MYA

Scale:

Hadean Eon

4.6 BYA

- Scale: 0.5 Slides = 0.1 BYA

Creation of the Moon

4.5 BYA

A Mars sized planet called Theia collided with Earth, leaving some of its mass behind. A small chunk of Theia formed the moon. The Pre-Cambrian Era officially starts from this point.

Scale: 0.5 Slides = 0.1 BYA

Archean Eon

- Time: 4 BYA-2.5 BYA
- Scale: 0.5 Slides = 0.1 BYA

Formation of the Oceans/Start of Life

3.8 BYA

After the Earth cooled down below 212 degrees Fahrenheit water could remain in a liquid form instead of water vapor. Rain starts filling into basins forming the first oceans and makes the planet habitable.

Scale: 0.5 Slides = 0.1 BYA

3.7 BYA

The earliest life forms were microbes that left signs of their presence. They fed on Carbon compounds that were accumulating in the ocean. The remains that led to their discovery were made from a type of carbon produced by the microbes.

Proterozoic Eon

- Time: 2.5 BYA-539 MYA
- Scale: 0.5 Slides = 0.1 BYA

Oxygen in the Atmosphere

2.4 BYA

During The Great Oxygen Event most of the oxygen trapped in the ocean was beginning to escape into the atmosphere, eventually becoming a core component of it. the high rise in oxygen levels in the air would later help life on land develop.

Scale: 0.5 Slides = 0.1 BYA

A photograph of a volcano erupting at night. The volcano's peak is shrouded in dark smoke and ash, while the base is engulfed in intense orange and red lava flows. Lava is also visible cascading down the flanks of the mountain. In the background, snow-capped mountains are visible under a dark sky.

Scale: 0.5 Slides = 0.1 BYA

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Scale: 0.5 Slides = 0.1 BYA

The Boring Billions

1.8 BYA

Scale: 0.5 Slides = 0.1 BYA

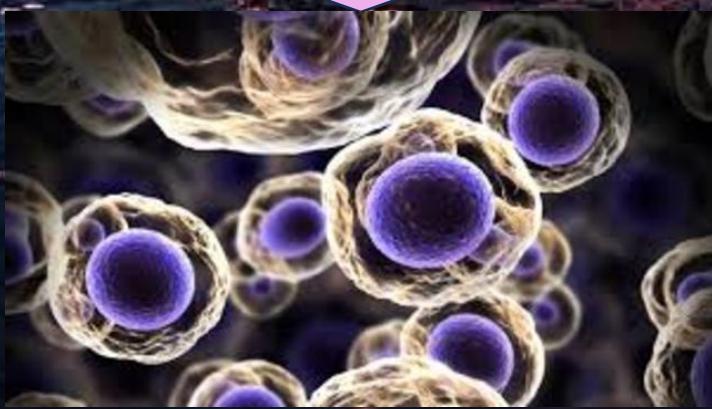
The boring billions is a time spanning between 1.8 BYA and 800 MYA which is named after the fact that at this point evolution, tectonic activity, geologic motion, and climate were generally stable and not very active.

Multicellular Organisms

1.7 BYA

At this time, the first multicellular organisms began evolving from single celled eukaryotes. This is the beginning of complex lifeforms and increased biodiversity on the earth.

Scale: 0.5 Slides = 0.1 BYA



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Scale: 0.5 Slides = 0.1 BYA

Supercontinent Rodinia

1.3 BYA

At this point in time the second super continent after Columbia known as Rodinia began to form. This supercontinent made up for most if not all of the land masses on planet earth at the time.

Scale: 0.5 Slides = 0.1 BYA



Neoproterozoic Era

Time: 1 BYA-635 MYA

Scale:

Tonian Period

1 BYA

In the Tonian Period was the beginning of when the supercontinent Rodinia which made up most of the land mass of the earth at the time broke up. This period marked the beginning in more activity of the earth's geology and atmosphere.

Scale: 1 Pentagon ≈ 100 MYA



Cryogenian/ Ediacaran periods

720 MYA

The Cryogenian period marked the beginning of rapid climate changes, and the glaciation of earth. There was a long-term glaciation occasionally disrupted by warm climate but soon returning back to global glaciation. These cold stages are also referred to as snowball earth.

635 MYA

The Ediacaran period was the mark of more complex multicellular life. These could be *Solza Margarita*, *Nemiana*, and *Marywadea ovata*.

Scale: 1 Pentagon \approx 100 MYA

Phanerozoic Eon

Paleozoic – Present Day

Time: 539 MYA-Present

Scale:

Paleozoic Era

Time: 541 MYA ~ 252 MYA

Scale:

The First Multi-Celled Animals

539 MYA

Cambrian Explosion brings large amounts of biodiversity to Earth. The land was lifeless at this time, and arthropods dominated the Cambrian seas.

488 MYA

The Ordovician continued to build up life on Earth. Our very first ancestors, primitive fish, started to evolve here. Large shelled mollusks also started to evolve. Some of these are the massive 4-meter long Orthoceras.

Scale: 0.5 Slides \approx 50 MYA

First Plant-Life

445 MYA

Ordovician-Silurian Mass Extinction was caused by rapid glaciation of Earth, wiping out multiple species of creatures. Despite this, life continued virtually the same as during the Cambrian.

444 MYA

The Silurian Period introduced the first primitive plants such as Cooksonia. Other than this, life was only in the ocean. Arthropods still rule the seas, and massive sea scorpions are the apex predators. Our ancestors, fish, continued to evolve and thrive.

1 MYA Gap

Devonian/Carboniferous Period

410 MYA

The Devonian Period brought dozens of new creatures to Earth. Even larger arthropods, including arachnids evolve, such as the 3.1 ft scorpion Brontoscorpio. Fish like Cephalaspis start to evolve the first brains.



359 MYA

As the Earth transitions into the Carboniferous, massive swamp-like conifer rainforests cover the continents. At this time, there was a surplus of oxygen, and not enough animals to use it up. This caused massive animals to appear. Insects dominate the new world. The eagle sized dragonfly Meganeura and the millipede Arthropleura rule the world. Although, from humble beginnings, the first reptiles evolve.

Scale: 0.5 Slides ≈ 50 MYA

The Permian Period

299 MYA

The Permian Period is the last period in the Paleozoic. The glory days of the arthropods are over, and reptiles will rule the world for the next hundreds of millions of years. The continents start to fuse into the supercontinent Pangaea. Large tetrapod carnivores such as Dimetrodon are the forerunners of the Dinosaurs.

252 MYA

Permian-Triassic Extinction was the largest extinction event in Earth's history, wiping out over 57% of biological families, 83% of genera, 81% of marine species, and 70% of terrestrial vertebrates. This is mostly caused by large volcanic explosions baking the Earth and making the oceans acidic. This marked the end of the Paleozoic and the start of the Mesozoic Era.

Scale: 0.5 Slides ≈ 50 MYA



Mesozoic Era

Time: 252 MYA – 66 MYA

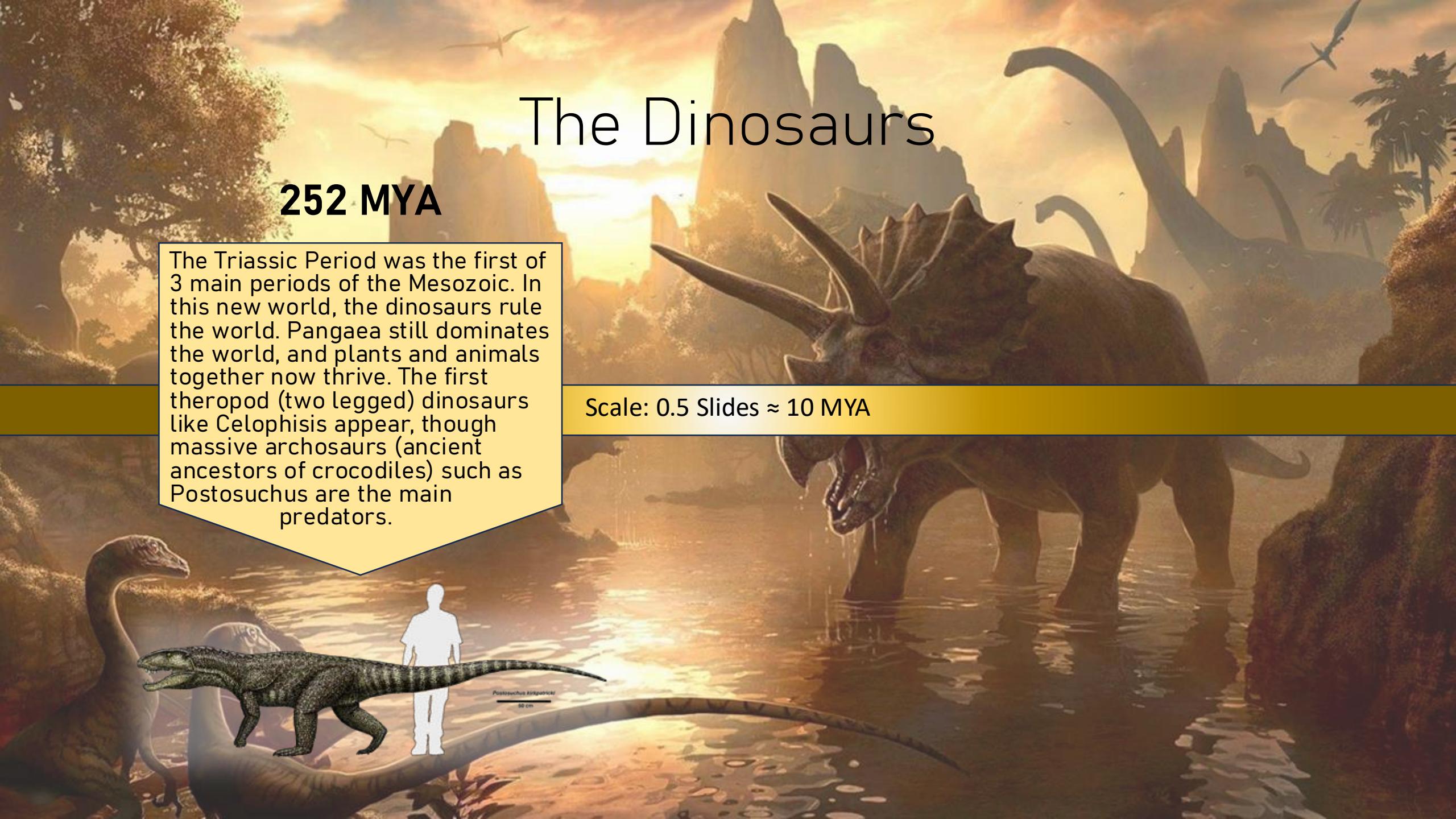
Scale: 0.5 Slides = 10 MYA

The Dinosaurs

252 MYA

The Triassic Period was the first of 3 main periods of the Mesozoic. In this new world, the dinosaurs rule the world. Pangaea still dominates the world, and plants and animals together now thrive. The first theropod (two legged) dinosaurs like *Celophysis* appear, though massive archosaurs (ancient ancestors of crocodiles) such as *Postosuchus* are the main predators.

Scale: 0.5 Slides \approx 10 MYA



The Dinosaurs

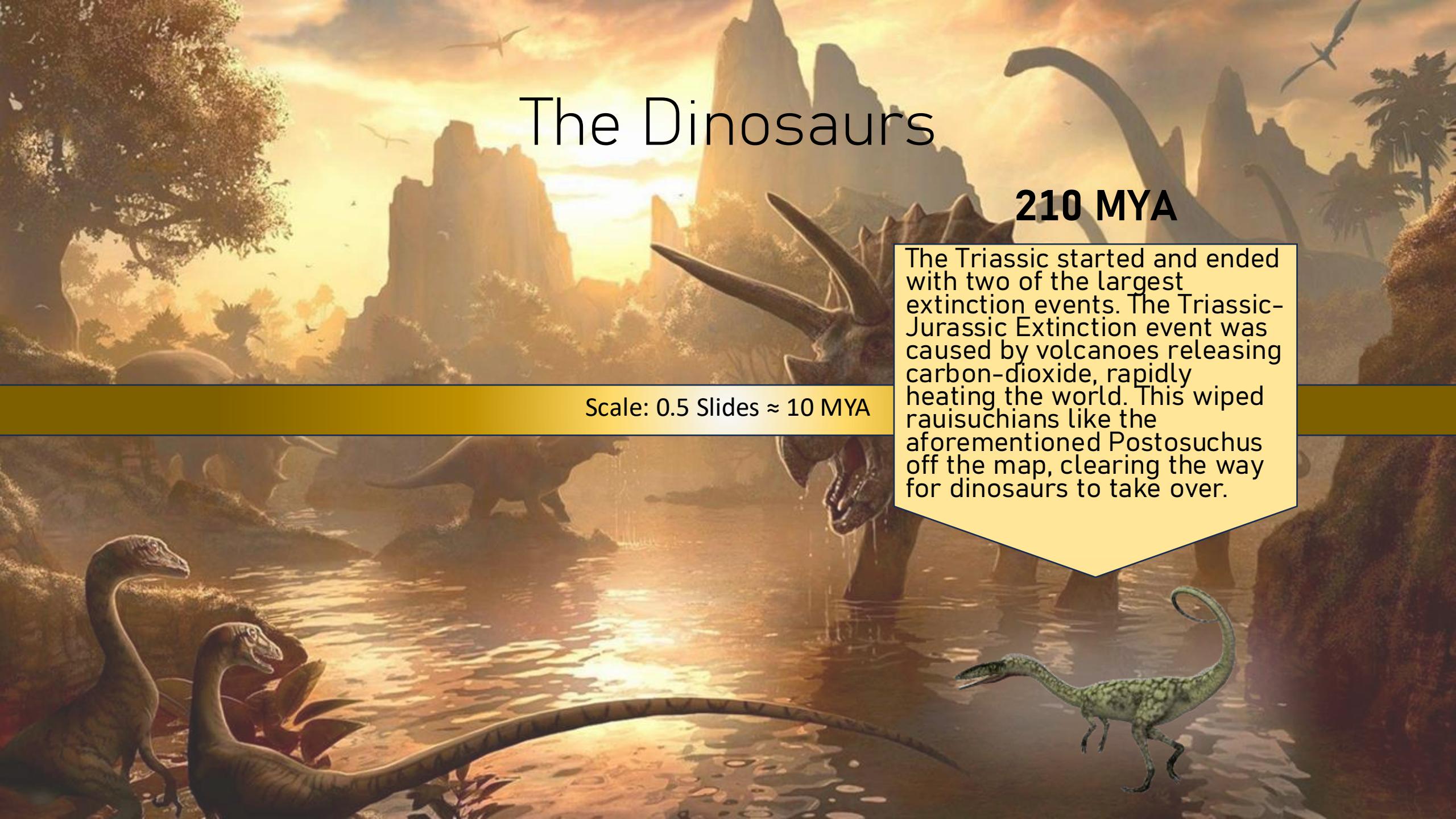
Scale: 0.5 Slides \approx 10 MYA

The Dinosaurs

210 MYA

The Triassic started and ended with two of the largest extinction events. The Triassic-Jurassic Extinction event was caused by volcanoes releasing carbon-dioxide, rapidly heating the world. This wiped rauisuchians like the aforementioned Postosuchus off the map, clearing the way for dinosaurs to take over.

Scale: 0.5 Slides ≈ 10 MYA



Jurassic Period

201 MYA

The Jurassic was when dinosaurs really started to flourish. Carnivorous theropods like Allosaurus are the apex predators, while towering sauropods like Brachiosaurus and Diplodocus stand untouched. Pterosaurs are the rulers of the skies, while massive beasts like Liopleurodon lurk beneath the waves. At this time, Pangaea starts to break up, forming continents.

Scale: 0.5 Slides \approx 10 MYA



Scale: 0.5 Slides ≈ 10 MYA



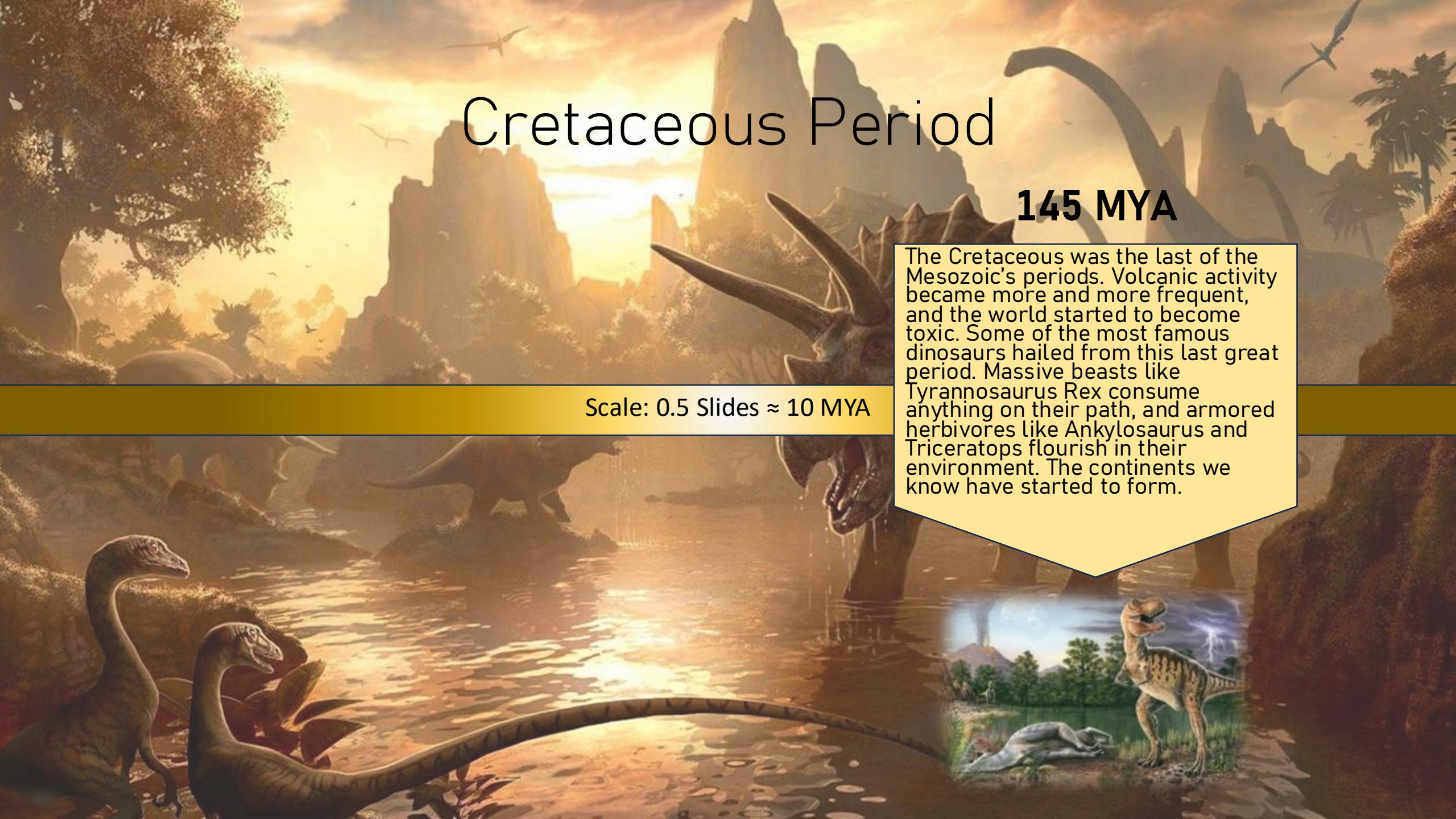
Scale: 0.5 Slides ≈ 10 MYA

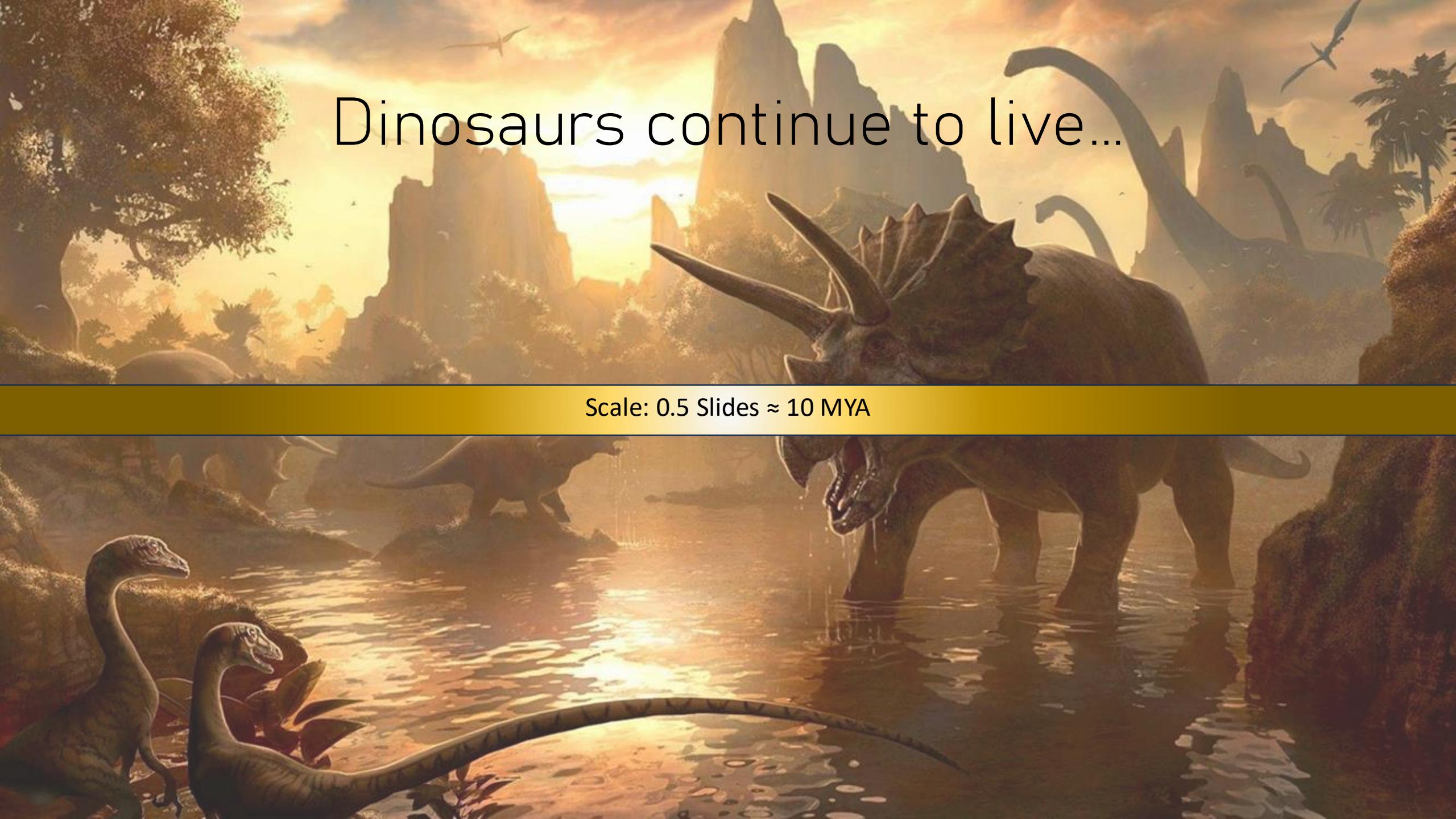
Cretaceous Period

145 MYA

The Cretaceous was the last of the Mesozoic's periods. Volcanic activity became more and more frequent, and the world started to become toxic. Some of the most famous dinosaurs hailed from this last great period. Massive beasts like Tyrannosaurus Rex consume anything on their path, and armored herbivores like Ankylosaurus and Triceratops flourish in their environment. The continents we know have started to form.

Scale: 0.5 Slides ≈ 10 MYA





Dinosaurs continue to live...

Scale: 0.5 Slides ≈ 10 MYA



Scale: 0.5 Slides ≈ 10 MYA



Scale: 0.5 Slides ≈ 10 MYA



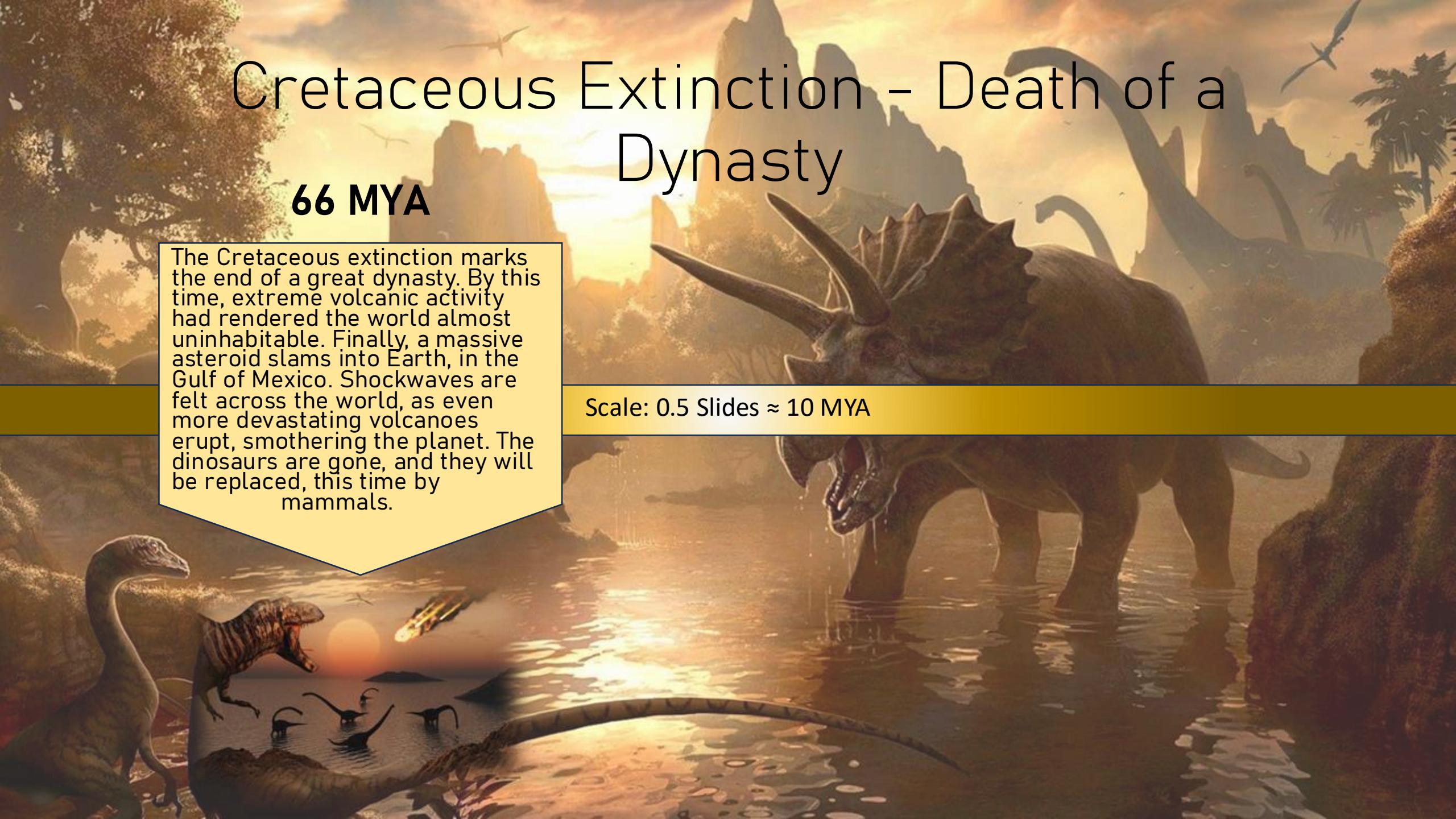
Scale: 0.5 Slides ≈ 10 MYA

Cretaceous Extinction – Death of a Dynasty

66 MYA

The Cretaceous extinction marks the end of a great dynasty. By this time, extreme volcanic activity had rendered the world almost uninhabitable. Finally, a massive asteroid slams into Earth, in the Gulf of Mexico. Shockwaves are felt across the world, as even more devastating volcanoes erupt, smothering the planet. The dinosaurs are gone, and they will be replaced, this time by mammals.

Scale: 0.5 Slides ≈ 10 MYA



Cenozoic Era

Time: 65mya ~ Present Day

Scale: 0.5 Slides = 10 MYA

Paleocene/Eocene Epoch

65 MYA

After the extinction of the dinosaurs, plants like cacti and palm trees started to form due to the warm climate. Mammals became more diverse and grew larger. Europe and North America were connected.

55 MYA

The largest epoch in the Cenozoic era. Ancestors of modern mammals appeared. There was a period of extreme global warming called the Paleocene-Eocene thermal maximum.

Scale: 0.5 Slides ≈ 10 MYA

Oligocene Epoch

36 MYA

Scale: 0.5 Slides ≈ 10 MYA

There was a sudden decrease in Earth's temperature. Antarctica moves to its current position and started to form its ice cap. Mammal diversity hit a low point partly due to the global cooling.

Miocene Epoch

23 MYA

The Earth stopped cooling, but the polar ice caps remained in place. India collided with Asia, creating the Tibetan Plateau and the Himalayas. North America was dominated by horses, rhinos, and a few other animals.

Scale: 0.5 Slides \approx 10 MYA

Pliocene Epoch – Start of the Last Ice Age

5 MYA

Scale: 0.5 Slides \approx 10 MYA

Arctic ice sheets start to form, starting the ice age. Armadillos and ground sloths travel from South to North America via a land bridge that emerges between them. Human ancestors first appear in Africa.

1m
3ft



Ice Age ends, Modern Humans Evolve (Pleistocene/Holocene epoch)

2.2 MYA **11 700 YA**

The Pleistocene was the last ice age when glaciers covered huge parts of the globe. Modern humans, called *homo sapiens*, meaning wise humans, evolved and spread across the earth in this small epoch.

Scale: 0.5 Slides \approx 10 MYA

The Holocene epoch is the epoch we are living in right now and is an unfinished chapter of the Cenozoic era. All of recorded human history occurred within the Holocene. Future geologists will discover the fossils of humans and learn that they were the dominant species.

Present Day - Conclusion

Today, we as humans are the dominant species of Earth. It is important that we look after our planet and make sure we take good care of the environment. Otherwise, there may not be the same number of plants and animals we have today, or there may be acid rain or bad air quality.

If we continue life the way we do now, there may not even be any future generations – the earth will become a barren, lifeless landscape, while we humans will start colonizing Mars. This is why it is important that we humans all do our best to keep the plants and animals alive, and keep the earth a healthy, liveable place for future generations.

I hope you learned something new in this presentation!

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