Continental Drift and Major Extinctions: Tectonic Plates

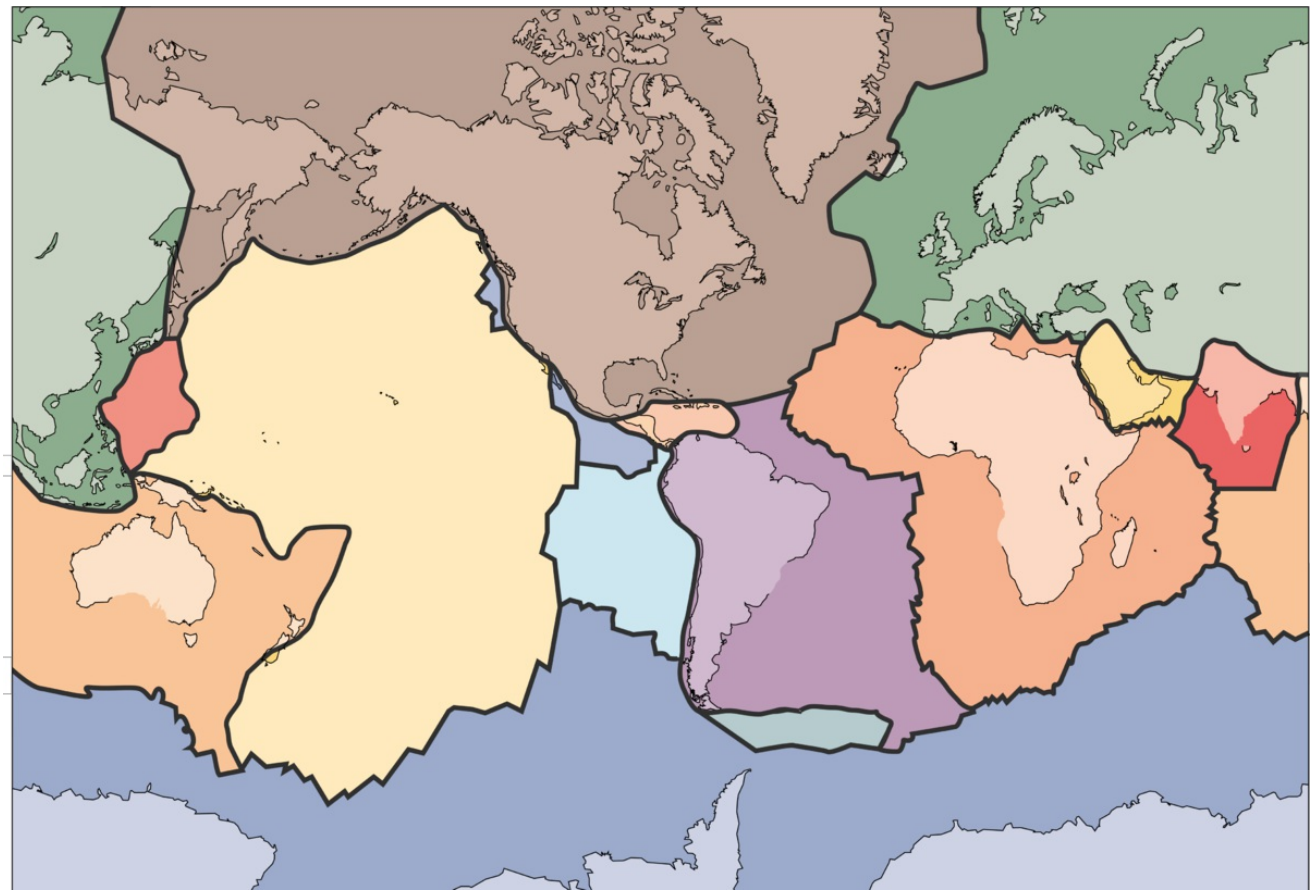
by Sophia

WHAT'S COVERED

In this lesson, we are going to cover the theory of continental drift. We will discuss plate tectonics and explore the five major known mass extinctions on Earth. Specifically, this lesson will cover the following:

1. Plate Tectonics

Continents are actually only the surfaces of larger plates called tectonic plates, most of which are underwater. Tectonic plates cover the entire Earth's surface. These tectonic plates float on Earth's molten inner layer called the mantle.



The plates are in constant motion. They are colliding, sinking, crawling over each other, and pulling apart from one another entirely.

- When two plates pull away, the gap can fill with molten lava from the mantle, which forms either a volcano or a trench.
- When two plates that have similar densities collide, they push upon each other and form mountains.
- When two plates with different densities collide, one will slide underneath the other. and that section will melt back into molten lava, shrinking the plate's overall size.
- When two plates rub against each other as they pass, it creates what we know as an earthquake.

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2. Continental Drift

Throughout history, these plates and the continents have been moving and shifting all over Earth. Between 225 and 275 million years ago, all of the continents were combined into what is called Pangaea, a supercontinent, shown below. See how South America actually kind of fits into Africa like a puzzle?

As continental drift continued, this supercontinent was separated. The species were separated from each other, eventually evolving into their own groups over time, resulting in greater planetary biodiversity. The more separated the continents are, the more shoreline area there is, and the more overall biodiversity we have. Today, the continents are more widely spread.

This model of tectonic plates and continental drift wasn't actually scientifically accepted until oceanic scientists in the 1960s discovered that the seafloor does, in fact, spread. Other pieces of evidence that support the theory of continental drift and plate tectonics are identical fossils on separate continents, areas where continents were believed to have been connected previously, and identical plant and animal groups in locations where continents are believed to have been connected.

Continental drift and plate tectonics are a scientific theory. While widely accepted, they are not a proven fact. Future science may discover better explanations for the way the continents were formed or how they move.

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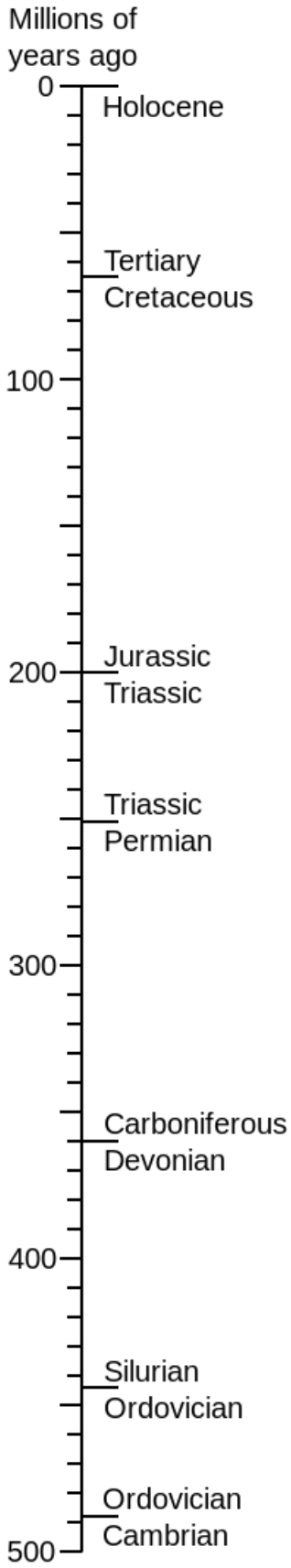
3. Major Mass Extinctions

Earth's history has not had a steady linear increase in biodiversity. There have been fluctuations, biodiversity expansions, and mass extinctions. There are five major known mass extinction periods on Earth, with many smaller ones as well (see diagram below). We're going to discuss the five major ones. We have been able to identify these periods of extinction by studying fossil records.



Extinctions	Date	Description
Ordovician–Silurian extinction	439 million years ago	It was caused by glacial melting and killed approximately 60% of life forms, all of which were marine because the vast majority of life at that point was aquatic.

Late Devonian extinction	364 million years ago	It killed approximately 57% of life on Earth and was likely the result of an asteroid impacting the planet.
Permian–Triassic extinction	251 million years ago	Approximately 96% of marine life and 70% of terrestrial life was wiped out by what is thought to have been a volcanic eruption, an asteroid impact, or a supernova. Some scientists speculate that it was caused by Pangaea and the subsequent loss of biodiversity because it occurred over a few million years and biodiversity levels did not return to full strength until 6 million years after the extinction ended.
End-Triassic extinction	199 to 214 million years ago	It is thought to have been caused by massive flooding or lava eruption from the Central Atlantic Ocean.
Cretaceous–Tertiary extinction	65 million years ago	It is thought to have happened by some sudden cataclysmic event. The leading theory suggests that an asteroid struck somewhere in the Gulf of Mexico region, which set off a group of volcanic eruptions, fires, tidal waves, and severe storms. The combined result was an elimination of sunlight, which both plants and animals require for survival. It ended the 165-million-year era of the dinosaurs, and humans evolved just after this, about 64 million years ago.
Holocene extinction	The last 12,000 years to the present	Many scientists are considering the current era of human population growth to be the sixth major extinction. In this time, it is estimated that somewhere between 500,000 to one million species of birds, mammals, reptiles, amphibians, plants, and insects have gone extinct from overharvesting, habitat degradation, and pollution from human population growth and activities.

SUMMARY

In this lesson, we talked about **plate tectonics**, the theory of **continental drift**, and the five **major mass extinctions.**

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