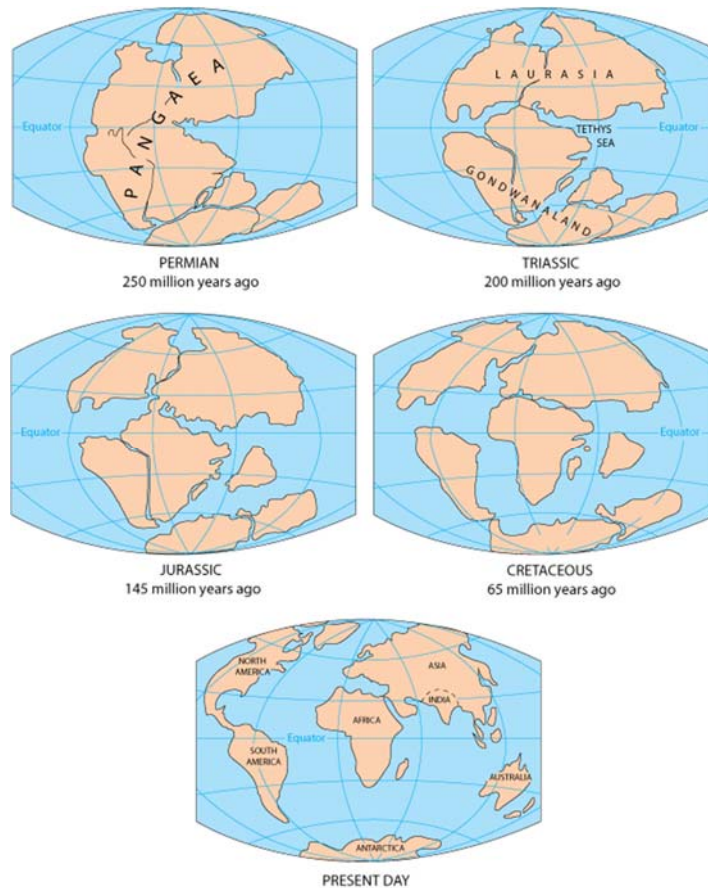


Slow and Steady

By ReadWorks



How did all the amazing things on our planet form? How did magnificent mountain ranges rise up in one place and beautiful beaches form elsewhere? Why do some places experience earthquakes and volcanic eruptions, while other places don't? How did our continents end up where they are now? All of these questions can be answered with an understanding of tectonic plates.

The outer shell of our planet is the earth's crust. Below the crust is the mantle. The uppermost mantle is solid and rigid, and the lower mantle is fluid molten rock. Tectonic plates are made up of the earth's crust and the solid section of the mantle below it. Some tectonic plates are huge, even larger than continents, and some are much smaller. Tectonic plates rest on a layer of hot magma. Imagine some large tiles, like those on a kitchen floor, but with a layer of thick honey underneath. The thick honey won't allow the tiles to move too fast, but the tiles will move nonetheless. In a similar way, tectonic plates move slowly but steadily.

The locations where these tectonic plates meet are called plate boundaries. Wherever you find plate boundaries, events like earthquakes can occur, and features like mountains, volcanoes, and ocean trenches are common.

A convergent plate boundary is where two plates collide. When plates collide, there are a couple of things that can happen. One plate may go underneath the other during the collision, or one or both plates may be pushed up. Mountain ranges like the Rocky Mountains in North America may form along convergent plate boundaries. Other possible formations along these boundaries are deep trenches in the ocean and volcanic islands. The island chain of Hawaii is an example of volcanic islands.

Plate boundaries also exist where plates pull away from each other. These are called divergent plate boundaries. At these boundaries, magma from beneath the earth's crust rises to the surface and pushes apart the tectonic plates. Ocean basins are created where these plates separate. Eighty-five percent of volcanic eruptions occur along these boundaries, as do many small earthquakes.

When tectonic plates move, they move very slowly. Some plates move as fast as fingernails grow, while others move a little slower. These speeds may seem very slow, but our planet is over 4 billion years old. The gradual movement of continents over billions of years has caused large changes in the earth's geography.

One scientific theory states that Earth looked very different just millions of years ago. This theory states that continents used to make up a supercontinent called Pangaea. This supercontinent formed about 300 million years ago and was basically one giant piece of land. Then about 220 million years ago, the pieces that formed Pangaea started to break apart. When this happened, the gaps that opened between continents slowly formed the oceans we know today.

One of these gaps contains the Mid-Atlantic Ridge. The ridge is a volcanic mountain range located on a plate boundary in the middle of the Atlantic Ocean. Forming the current Atlantic Ocean, the plates on either side of the Mid-Atlantic Ridge have been moving apart slowly. At the same time, magma has been flowing out of the volcanoes to create new seafloor. This means

the Atlantic Ocean has been getting larger by 2 to 5 centimeters per year. That's an average of about 2 inches a year. This adds up to millions of inches over the course of millions of years!

While the Atlantic Ocean is getting larger every year, the Pacific Ocean is actually getting smaller. There is a massive plate called the Pacific Plate that makes up most of the Pacific Ocean. The plate stretches from Asia on part of its western side to North America on part of its eastern side. Scientists have figured out that this plate grows on its eastern side, but it is destroyed when it goes under the plates on its western side. Calculations show that the plate is destroyed faster than it can grow, thereby reducing the size of the Pacific Ocean.

You can think of Pangaea as a big, completed jigsaw puzzle. Now imagine the puzzle breaking apart and spreading out. These puzzle pieces are the continents we now know, and they are part of different tectonic plates. As the plates moved, they carried the continents to the places we find them today. Take a look at South America and Africa. Don't they look like two puzzle pieces that used to fit together? The theory of Pangaea also suggests that present-day Canada, Spain, and the Sahara Desert were all once very close to each other and not separated by the Atlantic Ocean.

There is interesting evidence to support the theory of Pangaea. Scientists have found identical plants and animals on continents that are now very far apart; for example, fossils of a reptile that looked like a cross between a dog and snake, called *Cynognathus*, have been found in both South America and Africa.

Evidence is found in the rocks of these two continents too. Africa and South America are more than 1,500 miles apart today, but share very similar rock layers and patterns. These shared rock layers and patterns may indicate that the two continents (and their rocks) used to form a larger body of land.

Whether Pangaea existed or not, one thing is for sure: our planet is changing every day and it's because of the moving tectonic plates. The earth may be changing very slowly, but just imagine what it will look like in another 200 million years!