Continental Drift

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GRADES
5 - 12+

SUBJECTS
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The theory of continental drift is most associated with the scientist Alfred Wegener. In the early 20th century, Wegener published a paper explaining his theory that the continental landmasses were “drifting” across the Earth, sometimes plowing through oceans and into each other. He called this movement continental drift.

**Pangaea**

Wegener was convinced that all of Earth’s continents were once part of an enormous, single landmass called Pangaea.

Wegener, trained as an astronomer, used biology, botany, and geology to describe Pangaea and continental drift. For example, fossils of the ancient reptile mesosaurus are only found in southern Africa and South America.

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Mesosaurus, a freshwater reptile only one meter (3.3 feet) long, could not have swum the Atlantic Ocean. The presence of mesosaurus suggests a single habitat with many lakes and rivers.

Wegener also studied plant fossils from the frigid Arctic archipelago of Svalbard, Norway. These plants were not the hardy specimens adapted to survive in the Arctic climate. These fossils were of tropical plants, which are adapted to a much warmer, more humid environment. The presence of these fossils suggests Svalbard once had a tropical climate.

Finally, Wegener studied the stratigraphy of different rocks and mountain ranges. The east coast of South America and the west coast of Africa seem to fit together like pieces of a jigsaw puzzle, and Wegener discovered their rock layers “fit” just as clearly. South America and Africa were not the only continents with similar geology. Wegener discovered that the Appalachian Mountains of the eastern United States, for instance, were geologically related to the Caledonian Mountains of Scotland.

Pangaea existed about 240 million years ago. By about 200 million years ago, this supercontinent began breaking up. Over millions of years, Pangaea separated into pieces that moved away from one another. These pieces slowly assumed their positions as the continent we recognize today.

Today, scientists think that several supercontinents like Pangaea have formed and broken up over the course of the Earth’s lifespan. These include Pannotia, which formed about 600 million years ago, and Rodinia, which existed more than a billion years ago.

**Tectonic Activity**

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Scientists did not accept Wegener’s theory of continental drift. One of the elements lacking in the theory was the mechanism for how it works—why did the continents drift and what patterns did they follow? Wegener suggested that perhaps the rotation of the Earth caused the continents to shift towards and apart from each other. (It doesn't.)

Today, we know that the continents rest on massive slabs of rock called tectonic plates. The plates are always moving and interacting in a process called plate tectonics.

The continents are still moving today. Some of the most dynamic sites of tectonic activity are seafloor spreading zones and giant rift valleys.

In the process of seafloor spreading, molten rock rises from within the Earth and adds new seafloor (oceanic crust) to the edges of the old. Seafloor spreading is most dynamic along giant underwater mountain ranges known as mid-ocean ridges. As the seafloor grows wider, the continents on opposite sides of the ridge move away from each other. The North American and Eurasian tectonic plates, for example, are separated by the Mid-Atlantic Ridge. The two continents are moving away from each other at the rate of about 2.5 centimeters (1 inch) per year.

Rift valleys are sites where a continental landmass is ripping itself apart. Africa, for example, will eventually split along the Great Rift Valley system. What is now a single continent will emerge as two—one on the African plate and the other on the smaller Somali plate. The new Somali continent will be mostly oceanic, with the Horn of Africa and Madagascar its largest landmasses.
The processes of seafloor spreading, rift valley formation, and subduction (where heavier tectonic plates sink beneath lighter ones) were not well-established until the 1960s. These processes were the main geologic forces behind what Wegener recognized as continental drift.

**FAST FACT**

**Colliding Skyward**

The collision of the Indian subcontinent and Asian continent created the Himalayan mountain range, home to the world's highest mountain peaks, including 30 that exceed 7300 meters (24,000 feet). Because continental drift is still pushing India into Asia, the Himalayas are still growing.

**FAST FACT**

*Urkontinent* Alfred Wegener’s original name for his proposed, ancient continent was “Urkontinent”—*ur* meaning “first or original,” and *kontinent* meaning “continent” in Wegener’s native language, German. A more popular name for this huge ancient landmass is Pangaea, which means “all lands” in Greek.
Audio & Video

University of California: Museum of Paleontology—Continental Drift

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