Alfred Wegener's New Idea

"At the heart of science is an essential balance between two seemingly contradictory attitudes—an openness to new ideas, no matter how bizarre or counterintuitive they may be, and the most ruthless skeptical scrutiny of all ideas, old and new. This is how deep truths are winnowed from deep nonsense."

— Carl Sagan

Part of science is the pursuit of truth. Scientists want to understand what makes up our world and how it works. Sometimes, this involves leaving behind old, comfortable ideas and embracing unusual new ones.

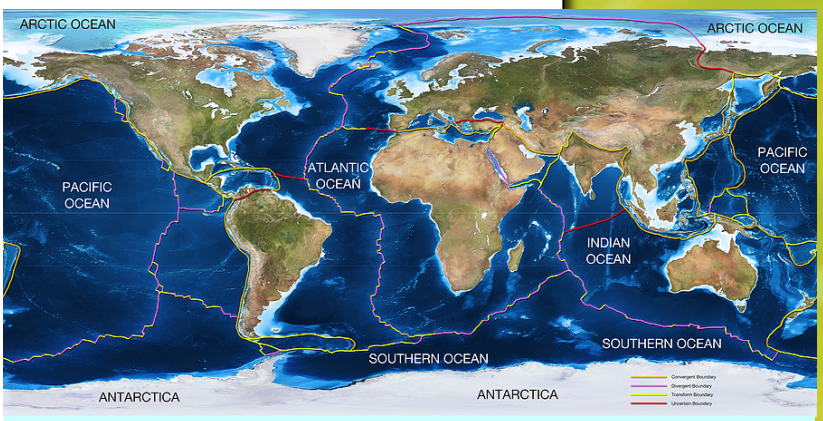

Plate tectonics theory owes a great deal to the revolutionary thinking of Alfred Wegener.

Very long ago, astronomers believed that Earth was the center of everything. It is easy to see why people believed that. One could simply look up at the sky, and see the Sun, planets, and other stars appear to circle around our planet. Eventually, the evidence the astronomers gathered showed that the Sun, not Earth, is the center of the solar system.

The idea of continental drift also took a long time to gain acceptance by the scientific community. Some scientists had suggested that the continents were moving in very slow motion. But one man was able to garner enough evidence to support the idea as a scientific theory. His name was Alfred Wegener, and this is his story.

Young Scientist

Alfred Lothar Wegener's tale starts at the end of the 19th century. He was born in Berlin, Germany, in 1880. His father, Richard, was a minister and manager of an orphanage. As a child, Alfred developed a special interest in Greenland. He studied it intensely. He also walked, hiked, and skated

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throughout his youth to prepare himself for scientific expeditions in that wintry land.

Wegener earned a Ph.D. in astronomy from the University of Berlin when he was just 24. However, Wegener's interests did not stop there. He dove into the fields of geophysics, meteorology, and climatology. He was especially interested in using kites and balloons to study weather. In 1906, he and his brother, Kurt, set a world record during an international balloon contest by flying their entry for 52 hours.

Wegener studied at the University of Berlin.

That same year, he made his first trip to Greenland to explore polar air circulation. When he returned, he took a tutoring position at the University of Marburg in Germany. It was there that the notion of continental drift began to form in his mind.

A Theory Emerges

Wegener had noticed that the coastlines of the continents on each side of the Atlantic Ocean looked like puzzle pieces. Soon after, he discovered a scientific paper that discussed identical fossils of plants and animals found on the coasts of those same continents. It was too much of a coincidence to ignore. The idea of *Kontinentalverschiebung*—or, in English, "continental displacement"—became rooted in his mind.

At the time, scientists believed that land bridges had once connected distant continents. But Wegener found more and more evidence that the continents had once been completely joined. He discovered that the Appalachian Mountains of eastern North America were geologically similar to the Scottish Highlands. He found rock layers in Brazil that matched rock layers in South Africa. He also learned of fossils suggesting very different climates from the ones where they were found.

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In 1911, he published a book explaining the way heat flows in the atmosphere. He continued to develop the theory of continental drift. The next year was a very busy one for Wegener. He went on a second expedition to Greenland. He also married Else Koppen, the daughter of a renowned meteorologist from Hamburg, Germany.

Wegener served in the German Army briefly during World War I, but a combat injury forced him to spend most of his time in the Army weather forecasting department.

In 1915, Wegener organized all of his ideas and evidence about continental drift into a book, known in English as *The Origins of the Continents and Oceans*. He proposed that all the continents of the world had once been a single land mass. He called it "Pangaea," which is Greek for "all Earth." The book experienced a bitterly cold reception, however. Although Wegener believed the continents were moving, he could not provide a satisfactory explanation for *how* they moved. He thought that forces having to do with the Moon and with Earth's rotation were forcing the continents to plow their way across the Earth's crust.

The Reaction

Many of the most respected scientific minds of his day, including his father-in-law, scorned Wegener's theory. However, some scientists, including South African geologist Alexander Du Toit and Swiss geologist Émile Argand, supported Wegener. Over the years, support for Wegener's theory grew.

Wegener journeyed across Greenland in a 4-week expedition.

The End

Alfred Wegener's fascination with Greenland continued. In September 1930, Wegener was part of an expedition taking a year's worth of weather readings there. He led a small group resupplying a forward camp known as *Eismitte*, or "Mid-Ice." Temperatures plunged to –60 °C, and only Wegener and two

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others completed the 4-week trek to the forward camp; 12 others turned back.

By the time of Wegener's return march to the base camp, winter was near. Wegener and one other person, Rasmus Villumsen, took minimal supplies and started to march back. They never made it. Wegener's body was found the following summer, buried under ice. His colleagues reburied him in an area now known as the Wegener Peninsula.

Wegener's Legacy

Until Wegener's death, most scientists continued to use land bridges as a way to explain identical fossils separated by an ocean. However, in the 1950s, scientific exploration of the Earth's crust, especially the ocean floor, revived interest in continental drift theory. By the late 1960s, Wegener's theory was widely accepted.

Wegener's ideas about continental drift led directly to plate tectonic theory. Scientists discovered that chunks of Earth's crust float on the planet's asthenosphere (a layer of the mantle). This finding addressed a major problem in Wegener's theory: Scientists could finally explain how the continents moved.

Scientists now use the ideas behind both theories to learn about Earth's surface. For example, we know that the rock farthest from a ridge is the oldest, because it has traveled the greatest distance from its point of origin. Also, we know that colliding plates make mountains and can lead to earthquake and volcanic activity.

Wegener's theory, rejected in his lifetime, is now recognized as the foundation of our understanding of Earth's structure.