## Developing the Theory

**Alfred Lothar Wegener (1880-1930)**

Alfred Wegener was born in Berlin, Germany, on November 1, 1880. He studied the natural sciences at the University of Berlin, receiving a doctorate in astronomy in 1904. He did not pursue a career in astronomy but instead turned to meteorology.

In 1905, he went to work at the Royal Prussian Aeronautical Observatory near Berlin. There, he used kites and balloons to study the upper atmosphere. He als flew in hot air balloons, and in 1906, with his brother Kurt broke the world endurance recorded by staying aloft for more that 52 hours.

Thanks to this work, he was invited to join the 1906 Danish expedition to Greenland mapping the northeast coast. Following the expedition he accepted a position at the small University of Marberg, Germany where he lectured on meteorology and astronom Here he demonstrated his ability for weaving seemingly dissimilar facts into theory and pioneered an interdisciplinary approach coupling meteorology, geology, and paleontology.

In 1911, while only 30 years old, Wegener collected his meteorology lectures into a book, *The Thermodynamics of the Atmosphere*, which became a standard te throughout Germany.

Recuperating and bed-ridden in a military hospital from an injury suffered as a German soldier during World War I, Wegener formulated the theory would becom one of the most influential and controversial books in the history of science.

Published in 1915, *The Origin of Continents and Oceans* proposed a theory that would ignite a firestorm of criticism and threatened long held foundations of geology.

Visionary in scope, *The Origins of Continents and Oceans* provided a solution to a series of longstanding geological questions: how could there be parallel geological formations separated by great distance of sea, what could account for isolated life forms on widely separate areas, and how could pre-Pleistocene glaciation be explained? These questions were resolved through the application of the theory of continental drift.

Wegener proposed a radically different view of the continents and oceans. He pointed out that the continents are made of different, less dense rock (granite) tha the volcanic basalt that makes up the deep-sea floor. He reasoned that the continents floated on the mantle of the Earth somewhat like icebergs in water. He disputed the previous notion that the continents remained fixed and unmovable. Furthermore, he cited geological and paleontological evidence and information about ancient climates as proof of the existence of a supercontinent, Pangaea, stretching from pole to pole. He speculated that this supercontinent tore apart about 200 million years ago. The drift of the pieces of this continent would eventually be the current continents as we know them.

Publicly ridiculed by the established geologic community and lacking a fundamental component to the theory, namely the force necessary to propel the continent Wegener views were seen as “geopoetry” and fairy tales!

Wegener returned to Greenland in 1930 as the leader of 21 other scientists and technicians. He coordinated a meteorological expedition to establish a winter weather station to study the jet stream in the upper atmosphere. Plagued by problems from the onset of extreme cold and supply problems, Alfred Wegener die from exposure at the age of 50.

Wegener was an energetic and brilliant researcher who, only a year before his death in 1929, published the fourth revised edition of his classic book. In that edition, he expanded and clarified some of his earlier thoughts, including the observations that oceans were geologically younger than continents.

Had he not died in 1930, Wegener doubtless would have used emerging data suggesting a Mid-Atlantic Ridge and may have speculated on the process responsible for the seafloor spreading that was hypothesized 30 years after his death. Wegener’s ideas clearly served as the catalyst and the framework for the development of the theory of plate tectonics – the single most important concept in geology.

Alfred Lothar Wegener (1880-1930), the originator of the theory of continental drift.

**Continental Drift**

Continental drift was hotly debated off and on for decades following Wegener's death before it was largely dismissed as being eccentric, preposterous, and improbable. However, beginning in the 1950s, a wealth of new evidence emerged to revive the debate about Wegener's provocative ideas and their implications In particular, four major scientific developments spurred the formulations of the plate-tectonics theory: 1) theories as to the nature of the Earth's layers; 2) seafloc spreading and ocean crust; 3) confirmation of repeated reversals of the Earth magnetic field in the geologic past; and 4) precise documentation that the world's earthquake and volcanic activity is concentrated along oceanic trenches and submarine mountain ranges.

Plate tectonics have proven to be as important to earth sciences as the discovery of the structure of the atom was to physics and chemistry and theory of evolution was to the life sciences.

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