



Reading 2.1 – What Is Continental Drift?

Getting Ready

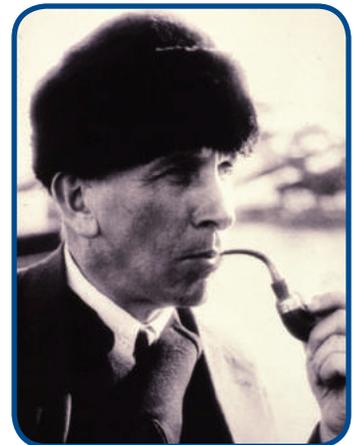
In class, you examined some of the phenomena that Alfred Wegener used as evidence to develop the theory of continental drift. Continental drift is the theory that the continents are moving around on the Earth's surface, both in the past and currently. Before you started this unit, maybe you also thought that the continents have always been where they are now. What are some things that make the theory of continental drift difficult to accept?



How Did the Theory of Continental Drift Start?

The following reading is adapted from the United States Geological Survey article, "Historical Perspective."

In 1596, a mapmaker named Abraham Ortelius suggested that the continents have not always been where they are now. He suggested that the Americas were "torn away from Europe and Africa . . . by Earthquakes and floods." In 1912, his ideas about the continents moving began to be seriously considered as a scientific theory called *continental drift*. People paid a lot of attention to these ideas when a German meteorologist named Alfred Wegener introduced them in two articles that he wrote and other scientists read. Wegener wrote that around 200 million years ago, the supercontinent Pangaea began to split apart. Alexander Du Toit, a geology professor, proposed that Pangaea first broke into two large continental landmasses.



The continental landmasses continued to break apart into the smaller continents that exist today. Wegener based his ideas on what appeared to him to be the fit of the South American and African continents, as Ortelius also described. Wegener was also intrigued by the discovery of unusual geologic structures and of plant and animal fossils on the coastlines of South America and Africa, which are now widely separated by the Atlantic Ocean.

He reasoned that it was physically impossible for most of these organisms to have swum or have been carried across such vast water. To him, the presence of identical fossil species along the coastal parts of Africa and South America was the most convincing evidence that the two continents were once joined.

In Wegener's mind, the drifting of continents after the breakup of Pangaea explained many things. It explained the matching fossils, and it also explained the evidence of dramatic climate

changes on some continents. For example, the discovery of fossils of tropical plants in Antarctica led to the conclusion that the frozen land of Antarctica must once have been closer to the equator, where the climate would allow lush, swampy vegetation to grow. Other mismatches of geology and climate included distinctive fossil ferns (green plants) discovered in areas that are now polar regions. Also, glacial deposits were discovered in what are now arid (dry) parts of South Africa.

The theory of continental drift ignited a new way of viewing the earth, but at the time that Wegener introduced the theory, most scientists firmly believed that the continents and oceans were permanent features on the earth's surface. Many, many scientists did not like his ideas, even though his theory seemed to agree with the scientific evidence available at the time. One big weakness in the theory of continental drift was that it could not answer the most basic and important question raised by people who criticized Wegener: What kind of forces could be strong enough to move such large masses of solid rock over such great distances? Wegener suggested that the continents simply plowed through the ocean floor. Harold Jeffreys, a geophysicist, argued correctly that it was physically impossible for a large mass of solid rock to plow through the ocean floor without breaking apart.

Wegener devoted the rest of his life to pursuing additional evidence to defend his theory. He froze to death in 1930 during an expedition crossing the Greenland ice cap, but the controversy continued. After he died, new evidence from ocean floor exploration and other studies interested scientists in the theory once again. The ideas Wegener wrote about led to scientists developing the theory of plate tectonics.

As you read, see how your ideas compare with those of people who first heard the theory. Why was the scientific community dissatisfied with the theory of continental drift?

