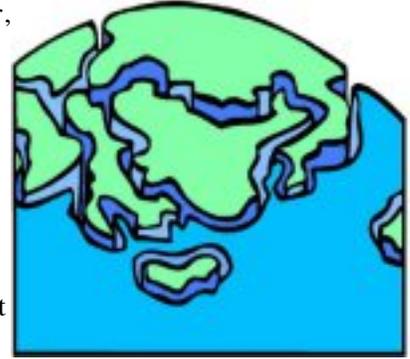


Passing Plates I - The Theory

By Trista L. Pollard

¹ You have heard of dinner plates, dessert plates, and license plates. However, did you know that our earth has its own set of plates under its surface? In 1912, German meteorologist Alfred Wegener thought so. In fact, he was the first to propose the **continental drift** theory.

² Wegener developed this theory after noticing that the bulge of Brazil on the eastern coast of South America appeared to match up with the dent of the southwestern coast of Africa. From his observation he argued that the two continents were once together, but they drifted apart. He also believed that our world was once a single continent called *Pangea*. Although Wegener stated that this continent existed throughout earlier geologic time periods, it eventually separated and drifted apart to the seven continents we have today. Wegener said that the continents were made of lighter rocks and that they rested on heavier crystal material. Wegener also pointed out that the fossils of a 270 million year old Mesosaur were found in eastern South America and western Africa. Even though other scientists used the idea of a land bridge to explain the fossils, Wegener held on to his continental drift theory.



³ Due to their makeup, Wegener believed that the continents were not rigidly fixed, but that they slowly moved about one yard per century. Ok, so our current continents shifted from their original positions. Was it magic? Well, this was the only point Wegener could not answer. In the area of earth science, Wegener was ahead of his time. Unfortunately, the scientific community did not take his theory seriously at first.

⁴ In 1929, an English scientist named Arthur Holmes, added more information to Wegener's theory. He believed that a convective flow of heated rock located in the Earth's mantle beneath the crust was behind the force that moved our continents. When this rock in the mantle heats up, it becomes less dense and rises to the surface. Once it reaches the surface, it cools and sinks back to the mantle where it will be reheated again. Holmes believed that this convective flow provided the force that caused the continents to drift. Even with Holmes' help, Wegener's continental drift theory was not accepted by other scientists until the late 1960's.

⁵ In the late 1960's (about 1967), J. Tuzo Wilson from the University of Toronto (Canada) was studying **seafloor spreading** in the Pacific Ocean. Wilson believed that the ocean floor had mid-ocean ridges with faults that were perpendicular to those ridges. He believed that the presence of these faults caused the tearing of the ocean crust from edge to edge. During his studies, he also invented the term **plate** which meant large masses of moving rock. Now the **plate tectonic theory** really starts shaking! Wilson proposed that our planet was divided into seven large plates and several smaller plates. The plates were part of the **lithosphere** which was the hard outer layer of the earth. The lithosphere is about sixty miles thick and rests on a softer layer called the **asthenosphere**. The asthenosphere is made up of a mixture of gases. These plates would move in relation to each other above hotter deeper zones. Along the boundaries of these shifting plates you have some of the world's most active volcanoes or **plate-boundary volcanoes**.

⁶ Now Wegener's theory is widely accepted by geologists and earth scientists around the world. Scientists now believe that the "super continent" *Pangea* was eventually divided into two continents called *Laurasia* (northern continental mass) and *Gondwanaland* (southern continental mass). From these two land masses there was the separation of North America, Eurasia, South America, Africa, and India. The last continents to separate were Australia and Antarctica.

⁷ So what are these seven major plates? They are the North American Plate, the Eurasian Plate, the Pacific Plate, the South American Plate, the African Plate, the Indian-Australian Plate, and the Antarctic Plate. In *Passing Plates II*, we will look at plate boundaries and faults.

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<p>1. Plates are large masses of moving _____.</p> <p><input type="radio"/> A Rock</p> <p><input type="radio"/> B China</p> <p><input type="radio"/> C Trees</p> <p><input type="radio"/> D Plants</p>	<p>2. The Continental Drift Theory states that the earth's continents have remained in the same position since the earliest recorded time.</p> <p><input type="radio"/> A False</p> <p><input type="radio"/> B True</p>
<p>3. The hard outer layer of earth is called the _____.</p> <p><input type="radio"/> A Asthenosphere</p> <p><input type="radio"/> B Lithosphere</p> <p><input type="radio"/> C None of the answers below</p> <p><input type="radio"/> D Hemisphere</p>	<p>4. According to J. Tuzo Wilson, what is the force that may cause the shifting of the continents?</p> <p>_____</p> <p>_____</p>
<p>5. The earth's plates are part of the lithosphere.</p> <p><input type="radio"/> A False</p> <p><input type="radio"/> B True</p>	<p>6. <i>Laurasia</i> was the _____ that broke away from <i>Pangea</i>.</p> <p><input type="radio"/> A Northern continental mass</p> <p><input type="radio"/> B Eastern continental mass</p> <p><input type="radio"/> C Southern continental mass</p> <p><input type="radio"/> D Western continental mass</p>
<p>7. Explain Wegener's fossil theory. How would this support his continental drift theory?</p> <p>_____</p> <p>_____</p>	<p>8. What is seafloor spreading?</p> <p>_____</p> <p>_____</p>

