

Continental Drift

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CHAPTER 1

Continental Drift

Lesson Objectives

- Be able to explain the continental drift hypothesis.
- Describe the evidence Wegener used to support his continental drift idea.
- Describe how the north magnetic pole appeared to move, and how that is evidence for continental drift.

Vocabulary

- continental drift
- magnetic field

Introduction

To develop plate tectonics, first scientists had to accept that continents could move. Today they do. But it took a long time for scientists to accept that this could happen (**Figure 1.1**). This idea is called continental drift.

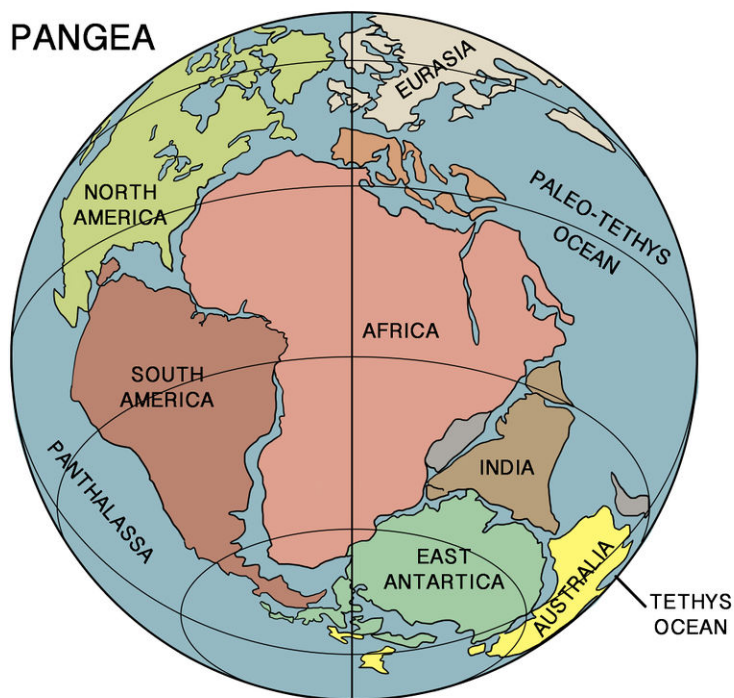


FIGURE 1.1

The supercontinent Pangaea contained all of the modern day continents.

The Continental Drift Idea

Alfred Wegener was an early 20th century German meteorologist. Wegener believed that the continents were once all joined together. He named the supercontinent Pangaea, meaning “all earth.” Wegener suggested that Pangaea broke up long ago. Since then, the continents have been moving to their current positions. He called his hypothesis **continental drift**.

Evidence for Continental Drift

Wegener and his supporters collected a great deal of evidence for the continental drift hypothesis. Wegener found that this evidence was best explained if the continents had at one time been joined together.

Rocks and Geologic Structures

Wegener found rocks of the same type and age on both sides of the Atlantic Ocean. He thought that the rocks formed side by side. These rocks then drifted apart on separate continents.

Wegener also matched up mountain ranges across the Atlantic Ocean. The Appalachian Mountains were just like mountain ranges in eastern Greenland, Ireland, Great Britain, and Norway. Wegener concluded that they formed as a single mountain range. This mountain range broke apart as the continents split up. The mountain range separated as the continents drifted.

Fossil Plants and Animals

Wegener also found evidence for continental drift from fossils (**Figure 1.2**). The same type of plant and animal fossils are found on continents that are now widely separated. These organisms would not have been able to travel across the oceans.

Fossils of the seed fern *Glossopteris* are found across all of the southern continents. These seeds are too heavy to be carried across the ocean by wind. *Mesosaurus* fossils are found in South America and South Africa. *Mesosaurus* could swim, but only in fresh water. *Cynognathus* and *Lystrosaurus* were reptiles that lived on land. Both of these animals were unable to swim at all. Their fossils have been found across South America, Africa, India and Antarctica.

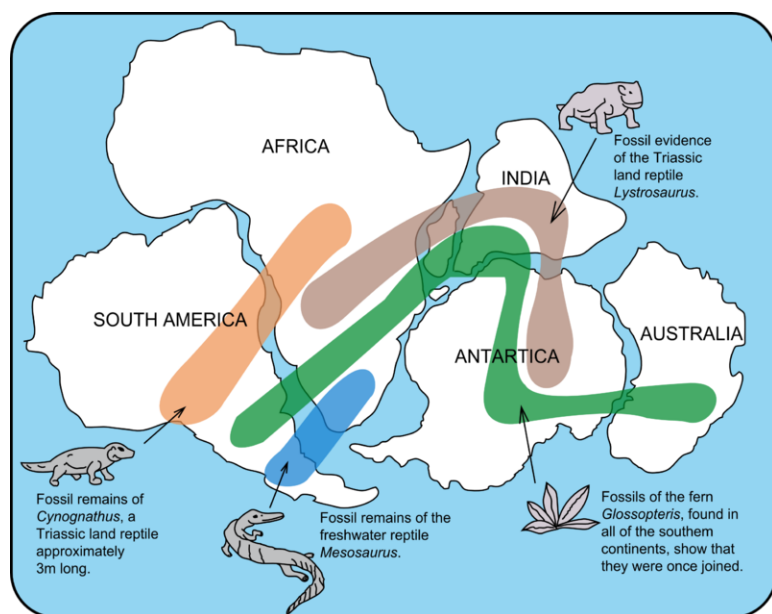
Wegener thought that all of these organisms lived side by side. The lands later moved apart so that the fossils are separated.

Glaciation

Wegener also looked at evidence from ancient glaciers. Glaciers are found in very cold climates near the poles. The evidence left by some ancient glaciers is very close to the equator. Wegener knew that this was impossible! However, if the continents had moved, the glaciers would have been centered close to the South Pole.

Climate

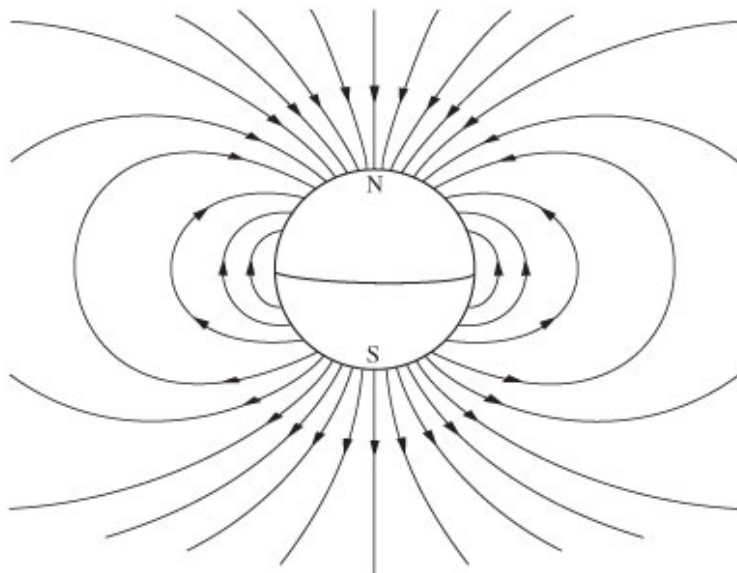
Coral reefs are found only in warm water. Coal swamps are also found in tropical and subtropical environments. Wegener discovered ancient coal seams and coral reef fossils in areas that are much too cold today. Wegener thought that the continents have moved since the time of Pangaea.

**FIGURE 1.2**

Wegener used fossil evidence to support his continental drift hypothesis. The fossils of these organisms are found on lands that are now far apart. Wegener suggested that when the organisms were alive, the lands were joined and the organisms were living side-by-side.

Magnetic Evidence

Some important evidence for continental drift came after Wegener's death. This is the magnetic evidence. Earth's magnetic field surrounds the planet from pole to pole. If you have ever been hiking or camping, you may have used a compass to help you find your way. A compass points to the magnetic North Pole. The compass needle aligns with Earth's **magnetic field** (**Figure 1.3**).

**FIGURE 1.3**

Earth's magnetic field is like a magnet with its north pole near the geographic north pole and the south pole near the geographic south pole.

Some rocks contain little compasses too! As lava cools, tiny iron-rich crystals line up with Earth's magnetic field.

Anywhere lavas have cooled, these magnetite crystals point to the magnetic poles. The little magnets point to where the north pole was when the lava cooled. Scientists can use this to figure out where the continents were at that time. This evidence clearly shows that the continents have moved.

During Wegener's life, scientists did not know how the continents could move. Wegener's idea was nearly forgotten. But as more evidence mounted, new ideas came about.

Lesson Summary

- Alfred Wegener gathered evidence that the continents had moved around on Earth's surface.
- The evidence for continental drift included the fit of the continents; the distribution of ancient fossils, rocks, and mountain ranges; and the locations of ancient climate zones.
- Although the evidence was extremely strong, scientists did not yet know how continents could move, so most rejected the idea.

Lesson Review Questions

Recall

1. How do the continents resemble puzzle pieces?
2. List the evidence Wegener had for continental drift.

Apply Concepts

3. What other regions fit together besides South America and Africa?

Think Critically

4. Make a case before a scientific jury to convince them that continental drift is real. Line up all your evidence. Does the lack of a mechanism for continents to move destroy your case?
5. What ideas can you come up with for what could drive continental motions?

Points to Consider

- Why is continental drift referred to as a hypothesis and not a theory?
- Why is Wegener's continental drift idea accepted today?
- Explain how each of these phenomena can be used as evidence for continental drift:
 - The fit of the continents
 - The distribution of fossils
 - The distribution of similar rock types
 - Rocks from ancient climate zones

References

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