

THE EARTH'S STRUCTURE

Geology is the study of the earth, including its structure, rocks, minerals, history, and the forces that affect it. The Earth's surface has not always had its present form; it has changed over time. The three main layers of the Earth, the crust, mantle, and core, are all made of different materials (Figure 1). The crust is solid rock and can range in thickness from three miles (the ocean floor) to 37 miles (mountain ranges). Project Mohole, begun by U.S. scientists in 1959, was designed to drill a hole all the way through the crust into the mantle. The drilling began under the Pacific Ocean, but the project ran out of money and was stopped in 1967. To date, no one has been able to get a sample of material from the mantle, but it is thought to be hotter and denser or heavier than the crust and more plastic or able to flow and change its shape under pressure. The mantle reaches 1800 miles below the crust (84% of the earth's volume). The core contains more than 15% of the earth's volume. Many geologists are unwilling to guess what the core is made of, but they think it must be very hot and dense.

The earth's crust is broken into several pieces called plates. These plates rest on and slide across the mantle. These plates are constantly drifting and moving the continents with them. Geologists believe that, millions of years ago, all of the continents were one huge land mass. They refer to this mass as pangaea. As the plates moved, due to continental drift, the pangaea broke. The movement of plates creates mountains and volcanoes. Earthquakes occur when two plates that rub against each other suddenly slide several inches or several feet.

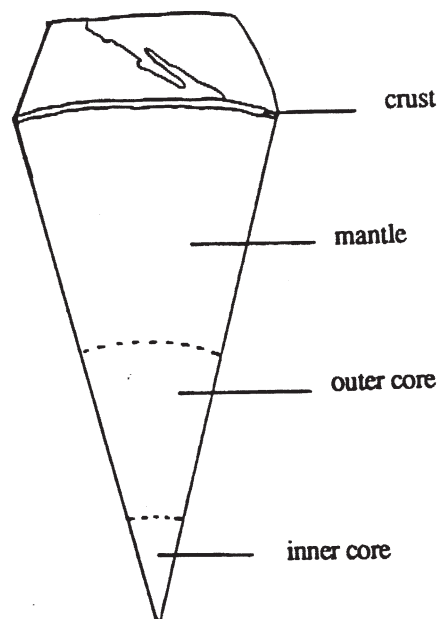


Figure 1. Layers of the Earth

ROCKS AND MINERALS

A mineral is a solid material that forms the rock of the earth's crust. Sometimes minerals are pure elements such as gold or silver. Minerals are made of nonliving materials. Rocks are formed through the natural combination of one or more minerals. Rock is the solid material that forms the earth's crust. Rocks are divided into three groups: sedimentary, igneous, and metamorphic.

Some rocks are broken into fragments that are transported and deposited elsewhere by water. These deposits harden to form sedimentary rock. Igneous rocks are formed by the process of hardening and crystallization of magma. This molten material can be in the form of liquid rock, gases, and mineral crystals. Sedimentary and igneous rocks that have been changed by heat, pressure, or chemical action into new forms are called metamorphic rocks.

Sedimentary rocks are usually deposited in layers. These layers can be tilted to almost any angle by movement of the earth's crust. One of the most fascinating things about sedimentary rock is that it often contains fossils. A fossil is the imprint or the remains of a living plant or animal that has been preserved by natural processes. Sandstone is one of the most common fossil-bearing rocks.

The building block of our language is the alphabet. If letters are put in the correct order, words are formed. If words are placed in the correct order, a sentence is formed. If sentences are placed in the correct order, a paragraph is formed. Paragraphs assembled together make a story. In the same way, minerals are the building blocks of geology. When minerals are combined together, rocks are formed, many rocks together are called formations, and many formations together are called mountains.

EARTHQUAKES

Most earthquakes occur where the continental plates come together. Many earthquakes are too small for people to notice. However, some reach levels that destroy life and property.

The size of an earthquake is rated on the Richter scale. This number represents the energy released by the quake - the higher the number, the stronger the quake. Quakes with a rating of 3.0 or more are noticeable. A quake whose rating is 7.0 or over is called a "major" earthquake. Scientists say if an earthquake of 10.0 occurred anywhere on earth, people everywhere in the world would will feel the shaking. The highest recorded earthquakes have been 8.6 on the Richter scale. This has occurred four times, in Alaska in 1899, Columbia in 1906, Tibet in 1950, and Alaska again in 1964.