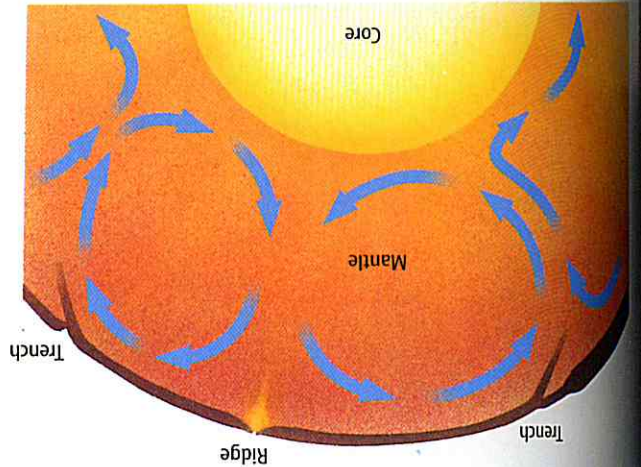


Causes of Plate Tectonics

Many new discoveries have been made about Earth's crust since Wegener's day, but one question still remains. What causes the plates to move? Scientists now think they have a good idea. They think that plates move by the same basic process that occurs when you heat soup.

Convection Inside Earth Soup that is cooking in a pan on the stove contains currents caused by an unequal distribution of heat in the pan. Hot, less dense soup is forced upward by the surrounding, cooler, denser soup. As the hot soup reaches the surface, it cools and sinks back down into the pan. This entire cycle of heating, rising, cooling, and sinking is called a **convection current**. A reason of this same process, occurring in the mantle, is thought to be the force behind plate tectonics. Scientists suggest that differences in density cause hot, plasticlike rock to be forced upward toward the surface.

Moving Mantle Material Wegener wasn't able to come up with an explanation for why plates move. Today, researchers who study the movement of heat in Earth's interior have proposed several possible explanations. All of the hypotheses use convection in one way or another. It is, therefore, the transfer of heat inside Earth that provides the energy to move plates and causes many of Earth's surface features. One hypothesis is shown in **Figure 12**. It relates plate motion directly to the movement of convection currents. According to this hypothesis, convection currents cause the movements of plates.



Mini LAB

Modeling Convection Currents

Procedure

1. Pour water into a clear, colorless casserole dish until it is 5 cm from the top.
 2. Center the dish on a hot plate and heat it. **WARNING:** Wear thermal mitts to protect your hands.
 3. Add a few drops of food coloring to the water above the center of the hot plate.
 4. Looking from the side of the dish, observe what happens in the water.
 5. Illustrate your observations in your *Science Journal*.
- Analysis**
1. Determine whether any currents form in the water.
 2. Infer what causes the currents to form.

Cultural Diversity

Hawaiian Terms The Hawaiian Islands are volcanoes that formed as a result of magma rising through a "hot spot" in the middle of a plate. Some volcanic rocks have names that were made common in Hawaii. *Pahoehoe* (pa-hoe-eh-hoe-eh), from the Hawaiian word meaning "rope," forms in linear ridges. *Aa* (ah-ah) forms with sharp, jagged surfaces.

Figure 12 In one hypothesis, convection currents occur throughout the mantle. Such convection currents (see arrows) are the driving force of plate tectonics.

Assessment

Process Direct students to add informative labels to the drawings they made of their observations. The labels should be numbered and in sequence, explaining the steps in the formation and movement of convection currents. Use *Perforated Science Classroom*, p. 127.

the cycle again.

1. Some students will observe currents; others won't.
2. The transfer of thermal energy from the burner to the dish warms the water near the bottom of the dish. The cooler, denser water at the top of the dish sinks, displacing the warmer, less dense water, which then moves toward the top of the dish. As the warmer water cools, it becomes denser and sinks to start the cycle again.

Analysis

dish is stove-top safe.

Safety Precautions Students must wear thermal mitts. Be sure the dish is stove-top safe.

Teaching Strategy Have students note any movement in the

Materials clear glass casserole dish, water, hot plate, food coloring, thermal mitts

Visual-Spatial

Purpose Students model and observe currents.

L2 ELL 1A

Mini LAB