Volcanic Hot Spots

By Cindy Grigg

[1] Earth's crust is made up of a dozen or so major plates, each moving about four inches a year. Most volcanoes and earthquakes occur at these plate boundaries. Volcanoes form when hot molten rock called magma rises to the surface. Rising magma pushes the plates apart in the middle of the oceans. This forms mountains underwater called the mid-ocean ridge.

[2] Sometimes, though, a volcano can form over a hotspot. A hotspot is a place in the middle of a tectonic plate where hot magma rises. It may start where there is a "bump" in the mantle. Hot magma rises in the bump. It melts the rock above it, and then it burns through the crust like a blow torch burns through metal. Hot magma comes out of the vent. A volcano has formed. Over time, more eruptions cause the volcano to rise above the water level to form an island volcano. The hotspot stays in one place, but the tectonic plate keeps moving over it. This creates a chain of volcanoes like the Hawaiian Islands. Each volcano was once located above the hotspot, but they were carried away from it as the Pacific Plate drifted to the northwest. Eruptions from the Hawaii hotspot have left a trail of underwater mountains across the Pacific over millions of years.

[3] This hotspot theory was first suggested by a geologist named Tuzo Wilson in 1963. If his theory is correct, the volcanoes of the Hawaiian Islands should get older the farther they travel from the hotspot. Evidence supports his theory. The oldest volcanic rocks on Kauai, the westernmost Hawaiian island, are about five million years old. By comparison, on the Big Island of Hawaii the oldest rocks are less than seven hundred thousand years old. New volcanic rock is continually being formed there. It appears that the Big Island is still positioned over the hotspot.

[4] Hotspot volcanoes can also form on continents. Yellowstone National Park, in Wyoming, is one of the most famous hotspots found on a continent. Yellowstone sits on three different calderas (large craters of volcanoes that have collapsed). These are the remains from three gigantic volcanic eruptions in the last two million years. The last eruption has been dated to about six hundred thousand years ago. Ash deposits from this last eruption have been found as far away as Texas and northern Mexico. The underlying magma is the reason for Yellowstone's famous geysers and hot springs. Underground water is heated by the magma source underneath it. The boiling water expands, making steam. Water and steam burst through the cracks in the crust, erupting as a geyser.

[5] Geologists have identified between forty and fifty different hotspots around the world. Hawaii, the Galapagos Islands, Yellowstone, and Iceland are some of the most active ones today.

Name _____ Science Pd _____

Volcanic Hot Spots

1. Where do most volcanoes form? (A) Over a hotspot (B) At plate boundaries (C) In the ocean	2. What is a hotspot? (A) A place where ocean water is hot (B) A place where volcanoes are erupting (C) A place in the middle of a tectonic plate where magma rises
3. The hotspot stays in one place, but the tectonic plate continues to move over it. What does this form? (A) A series of earthquakes (B) A chain of volcanic mountains (C) A series of ocean trenches	4. Who first suggested the hotspot theory? _____ _____
5. Is there any evidence for the hotspot theory? _____ _____	6. Hotspot volcanoes only form under the oceans. (A) False (B) True
7. When was the last volcanic eruption at Yellowstone? (A) Six hundred thousand years ago (B) Seven hundred thousand years ago (C) Five million years ago	8. What is the cause of hot springs and geysers at Yellowstone? (A) Hot magma beneath the Earth's surface (B) A volcano (C) Too much water underground