

OBJECTIVES

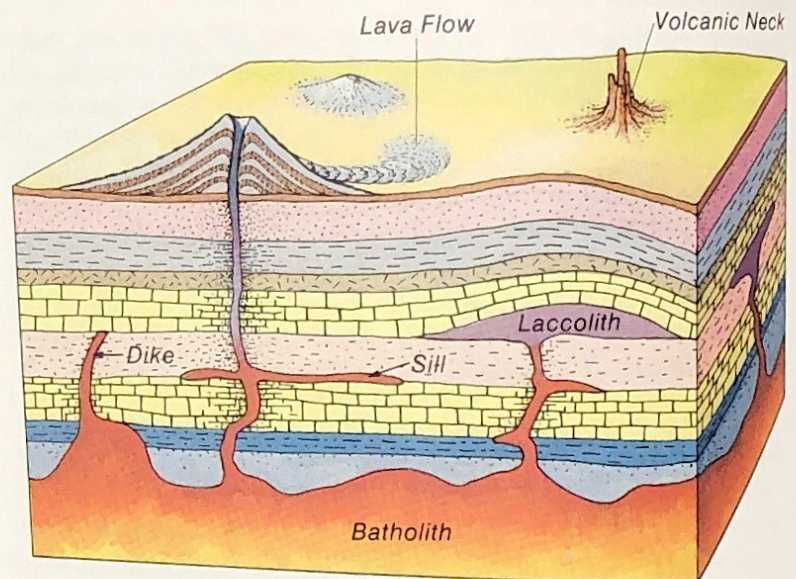
- A** Identify and give examples of the various types of igneous intrusions.

IV Plutonic Activity

Topic 13 Plutons and Volcanism

Volcanoes and lava flows are the surface activities of volcanism. However, much more magma is present below Earth's surface. Magma forces its way into fractures in the bedrock. Magma squeezes between rock layers and pushes up overlying rocks to form domes. Great masses of magma solidify far below the surface to form the cores of mountains.

The rock masses that form when magma cools inside other rocks are called *igneous intrusions*, or **plutons**.



14.15 There are many volcanic formations below the surface where magma forced its way between existing rock layers. These formations are visible where erosion has removed the surface layer.



14.16 Two basalt dikes

Topic 14 Dikes, Sills, Laccoliths, Necks

Dikes are sheets of igneous rock that cut across the rock layers they intrude. They form when magma is forced into vertical cracks. Dikes come in all lengths and thicknesses. They are common in old volcanic regions. Their rock is usually basalt or diabase.

In contrast to dikes, which cut across layers, are **sills**. **Sills** are sheets of igneous rock that are parallel to the layers they intrude. They form when magma is forced along bedding planes between rock layers. They too are usually basalt or diabase. They can be hundreds of meters thick and many kilometers long. The Palisades of the Hudson River in New York are the face of a great diabase sill that has been exposed by erosion. It is about 50 kilometers long.

In some places, the magmas that intrude between rock layers are very stiff and unable to flow easily. Instead of spreading to form



sills, these magmas bulge upward to form domelike masses called **laccoliths**. The rock layers above the laccoliths are also pushed up into a dome. Laccoliths can be found in the Henry Mountains of Utah and the Black Hills of South Dakota.

When an extinct volcano is almost completely eroded, a **volcanic neck** may be left. A neck is the plug of hardened magma left in the vent from which lava flowed. One example of a neck is the famous Ship Rock in New Mexico. It is 400 meters high. Volcanic necks form the diamond-bearing rock of the great Kimberley mines of South Africa.

14.17 (left) An igneous sill intruded between sedimentary layers at Big Bend National Park, Texas (right) A volcanic neck in Monument Valley, Arizona

Topic 15 Batholiths and Stocks

Batholiths are the largest of all igneous intrusions. They form the cores of many of Earth's mountain ranges. When erosion removes the overlying rock layers, the batholith rocks are exposed. They are usually either granite or granodiorite. The largest batholith in North America forms the core of the Coast Range of British Columbia. Other examples of these plutons are the Idaho batholith in western Idaho and the Sierra Nevada batholith in California.

A small batholith in which less than 100 square kilometers is exposed at the surface is called a **stock**.