

# Pluton and Plutonic Bodies

## Encyclopedia Article

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# Pluton and Plutonic Bodies

Plutons or plutonic bodies are masses of intrusive igneous **rock** that have solidified underground, as opposed to volcanic (extrusive) rocks that solidify only after erupting onto the surface. Plutonic rocks are characterized by a coarse crystalline texture in which individual **crystals** can be easily seen by the naked eye. The word plutonic is derived from the name of Pluto, the Greek god of the underworld.

The composition of plutonic rocks ranges from **mafic** (gabbro and diorite) to **felsic** (granodiorite and **granite**), and the coarse crystalline texture develops because plutonic rocks are insulated by the surrounding **country rock** and cool very slowly. Plutons, however, are classified according to their size, shape, and relationship to the surrounding rock rather than the kind of rock composing the pluton. Of the many varieties of plutons, four types are described below.

Batholiths are large plutons with more than about 38.6 mi<sup>2</sup> (100 km<sup>2</sup>) of surface exposure in map view, such as the Sierra Nevada **batholith** that forms the core of the Sierra Nevada mountain range. Batholiths are discordant plutons, meaning that they cut across the layering of the rocks that they have intruded, and generally do not have an identifiable bottom. Detailed studies have shown that batholiths are most commonly composed of many different igneous intrusions with chemical compositions that vary in **space** and time.

Laccoliths are concordant plutons that follow the existing rock layers and push up overlying strata to form an intrusion that is mushroom-shaped in cross section, as exemplified by the Henry Mountains in Utah. Laccoliths tend to be circular, or nearly so, in map view and less than approximately 5 mi (8 km) in diameter. The thickness of laccoliths can range from a few meters near the edges to several hundred meters near the center of the intrusion. Laccoliths are understood to form when **magma** rises through a feeder **dike**, then begins to spread laterally along a plane of weakness such as a **bedding** plane separating different layers of sedimentary rock.

Two relatively common kinds of small plutons, both tabular in shape, are dikes and sills. Dikes are discordant whereas sills are concordant. In both cases, the thickness of the pluton is very small compared to its lateral extent.

## See Also

Dike; Granite; Igneous Rocks; Intrusive Cooling; Sill