

Batholith Encyclopedia Article

Batholith

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Batholith

Batholiths are large bodies of intrusive igneous **rock**. Formed when **magma** cools and crystallizes beneath Earth's surface, batholiths are the largest type of **pluton**. By definition, a batholith must cover at least 39 mi² (100 km²), although most are even larger. Many batholiths cover hundreds to thousands of square miles. The Idaho batholith, for example, has a surface **area** of over 15,500 mi² (40,000 km²).

Batholiths are generally not comprised of one continuous magmatic intrusion; rather, they are produced by repeated intrusions, and most batholiths are made up of multiple individual plutons. Intruded rock cools and solidifies, later to be exposed at the surface through **erosion**. Because they cool beneath Earth's surface, batholiths have a coarse grained texture, and most are granitic in composition.

Usually associated with mountain building, batholiths are often emplaced near continental margins during periods of subduction. As the subducting slab descends, it begins to melt, and multiple plutons are intruded beneath the continent to form the core of the volcanic arc. The Sierra Nevada Mountains, for example, are comprised of a granitic batholith, which is made up of hundreds of individual plutons intruded over a period of several million years. Emplacement of the Sierra Nevada batholith occurred during a mountain building episode known as the Nevadan **orogeny**, initiated during the Jurassic. Uplift and erosion of the area later exposed the batholith, which now forms the spine of the famous mountains.

The Sierra Nevada batholith not only forms a major mountain chain, but also was responsible for driving the California gold rush. Precious **minerals** including gold are commonly associated with granitic batholiths. As mineral-rich solutions move along cracks in the rock body, gold, copper, and other minerals, especially **quartz**, precipitate out. Gold may be mined from deposits known as quartz veins that form along the fractures. The Mother Lode in the Sierra Nevada is possibly the most famous of such deposits.

Determining the mechanism for batholith emplacement has been a topic of much debate. When gigantic batholiths are intruded, the surrounding rock, known as the **country rock**, must somehow make room for the intrusion. Several models have been suggested, but most geologists now agree that a mechanism known as forceful injection is probably responsible for emplacement. Apparently, as the body of magma rises, it deforms the country rock, pushing it out of the way.

See Also

Intrusive Cooling; Mineral Deposits; Pluton and Plutonic Bodies