

GEOLOGY OF THE APPALACHIAN TRAIL NEAR BEAR MOUNTAIN, NY

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The geologic history of the Bear Mountain area is long and varied. It is part of the Hudson Highlands, the northern segment of the Reading Prong. This geologic-physiographic province contains some of the oldest rocks in the Appalachians. The now crystalline rocks were originally formed in a volcanic arc as volcanic and sedimentary rocks about 1.2-1.3 billion years ago. The area was probably similar to modern Japan at that time. As a result of the collision between North America and South America about 1 billion years ago all rocks were converted into the gneisses that we see today and intruded by magma that formed granite plutons. This collision is known as the Grenville Orogeny and helped to build the supercontinent Rodinia. At the end of the Grenville Orogeny, a large fault system similar to the San Andreas of California developed in the area. In the late stages of faulting, fluids deposited extensive magnetite deposits within the faults. This magnetite supplied iron ore to America from colonial times to the late 19th century. Besides several times of magma intrusion and minor faulting, the area remained fairly quiet until it was glaciated during the last ice age which ended about 12,000 years ago. Active research projects are further refining this history.

Many of the features of all of these events can be observed in the rocks of the Highlands. Exposures of rock display textbook quality examples of geologic processes within these events. Several of them may be observed in the rocks around Bear Mountain. The features are divided into two types, bedrock and surficial. Bear Mountain is a granite pluton but the east side contains many of the other bedrock units of the area. There are folds in rock strata, faults that formed under a variety of conditions, intrusions of magma, water-bearing and transporting fracture zones and even several old magnetite mines in the area. The glacial features include glacial erratics (balanced boulders), polished rock surfaces, ice striations, pot holes, moutonee roche, a glacial delta and even the fjord of the Hudson River. Because rocks cannot be endangered by human influence (besides graffiti), permanent trails may visit even the most delicate geologic features. Trails may be located to visit as many sites as possible within reason including those that are appropriate to close observation as well as panoramic views. Geologists could scour the areas where the trails are proposed to be located to find the best exposures and minor changes in the routing of the trails could allow hikers to observe them.

The Hudson Highlands first gained attention by virtue of the vast iron deposits that were developed by the mining industry of the 18th and 19th centuries. Of late, there has been a concerted effort to preserve the Highlands on the private, state and federal level primarily to protect our water resources. Both of these reasons for attention are geological in nature. The science behind the industrial development and environmental issues can be shown in rock exposures along the trails thus benefiting hikers.