

Hokutolite: A National Natural Monument

Hokutolite, called *hokutoseki* in Japanese, is a mildly radioactive mineral composed of barium and lead sulfate with lead and radium. Hokuto is the Japanese name for the Beitou hot spring region of Taiwan where it was discovered in 1906. In 1911, it was found that the hokutolite discovered in Taiwan was actually the same mineral as one previously discovered at Semboku's Tamagawa Onsen hot spring (then called Shibukuro Onsen) in 1898.

At Tamagawa Onsen, hokutolite forms when hot water from Obuki, the spring's fountainhead, begins to cool as it flows down the Yugawa River. The hot spring water contains barium, lead, and strontium ions, which begin to crystalize as the temperature of the water drops.

The crystalized ions form a crust on the stone surface of the riverbed, which grows at a rate of one millimeter every ten years. A cross-section of the crust reveals a pattern of dark-brown and white streaks. The pattern of the streaks depends on the ratio of barium sulfate to lead sulfate as well as on differences in iron oxide content. It is the radium content that makes hokutolite slightly radioactive.

Hokutolite is rare, only found in the Beitou region of Taiwan and Tamagawa Onsen in Japan. The mineral is protected in both countries, and in Japan is a designated Special Natural Monument and therefore illegal to collect or remove.