

Herkimer Diamond Mine Field Trip

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Herkimer "diamonds" are doubly-terminated quartz crystals found near Herkimer, New York. The clarity and perfection of these crystals make them one of central New York's most collectable minerals. The crystals are found in muddy pockets, or vugs, up to a meter in diameter in the Late Cambrian Little Falls formation near Middleville, Little Falls and Herkimer, New York. As many as 1000 crystals have been found in a single pocket (Moore, 1989).

This trip will visit the Herkimer Diamond Mine, owned by the Herkimer Diamond Development Co. near Middleville, New York. The trip will be led by Hugh Humphreys. Hugh has been an avid miner and collector of Herkimer diamonds for 15 years. After a visit to the museum at the mine, he will discuss the occurrence of the crystals and will demonstrate different mining techniques. Ample time will be provided for participants to explore the mining area and search for "diamonds." Although this trip is scheduled for a half-day, you may stay as long as the mine is open. The following description is taken from information displayed with Herkimer diamonds in the mineral collection at Hamilton College, Clinton, New York.

The exact origin of the pockets and the quartz crystals is unknown; several related theories exist. One theory is that in Late Cambrian time, quartz sand grains and minor amounts of clay were deposited in a predominantly carbonate environment where there was significant algal growth. The sand, clay, and algae were incorporated into limestone, which was dolomitized by circulating waters. The formation is a rather normal dolostone or dolomitic sandstone.

After burial, entrapped sea water or water from some other source dissolved some of the sand grains, dolomite, and algae to form the pockets. Many pockets today contain a black carbonaceous material called anthraxolite, which may represent an insoluble residue from the algae. Thus, the algae may have served as sites for solution and pocket formation.

As the pH of the water in the pockets decreased, quartz crystals started to grow. The source of the silica was the dissolved sand and clay or the remains of silica-secreting animals such as radiolaria. Some quartz crystals started their growth on the pocket wall and grew into the pocket. Many crystals, however, grew freely in the pocket water or in the mud that was the insoluble residue from pocket formation, allowing the doubly-terminated crystals to form. Most of the crystals are short hexagonal prisms terminated by rhombohedrons.

Some crystals show solid or fluid inclusions. Solid inclusions are usually specks of anthraxolite. Fluid inclusions are mostly salt water with bubbles of CO₂ or water vapor. Based on a homogenization temperature of 51°C, the crystals formed at a depth of approximately 3500 feet (Dunn and Fisher, 1954).

References

- Dunn, J.R. and Fisher, D.W., 1954, Occurrence, properties, and paragenesis of anthraxolite in the Mohawk Valley [New York]. American Journal of Science, v. 252, n. 8, p. 489-501
- Moore, B.S., 1989, *Herkimer Diamonds*, Herkimer Diamond Development Company, Herkimer, NY, 63 p.

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