Hydrothermal Quartz and Barite Veins in the Basalt of New Britain, Connecticut

by F.W. Miller
Harvard University
Mineralogical Museum Association

Late in 1979 when construction was begun on a new high-speed connector from State Route 72 in New Britain, Connecticut north to Interstate 84 between Hartford and Farmington (see map #1), excavation exposed numerous veins of barite and quartz in the basalt of the Hartford Basin formation. Collectors were quick to follow the work at this site, and were rewarded with a seemingly unending supply of quartz and barite crystals. They also found a variety of copper, iron, and lead sulphides and carbonates (see table of species).

The primary vein material is barite, in intergrown crystalline masses, with occasional nicely formed individual crystals and crystal groups in pockets that hadn't been reduced to fragments by earth movement or by the current blasting. As the excavation and collecting continued, more and more species were encountered. In one limited area roughly in the middle of the southwest bound lane, a small number of nicely formed, euhedral crystals of galena were found in 1982. These show a basic cube modified by the octohedron. Pseudomorphs of two types were seen in most veins - malachite after chalcopyrite, and limonite after dolomite. The latter are fragile and difficult to preserve, because they are so porous and unconsolidated. Nonetheless, they are worth some care because of their unusual nature.

The quartz crystals which are so common here appear in three types of occurences, the first being as one of a set of species in typically open seams. These contain quartz and calcite on barite, with lesser amounts of dolomite, minor chalcopyrite, siderite, and alteration products. In these pockets, the quartz is often tinted with a gold irridescence - a product, no doubt, of the repeated series of percolating waters which the variety of minerals also indicates. The second sort of occurrence is in veins, in which clusters of quartz crystals are often the only mineral formed on a grainy, rhyolite-like gangue material. These crystals are sometimes stained by the limonite, and range from clear to smoky, with a few phantom crystals known to the author. Multiple terminations which appear in these veins are probably the result of closely set parallel crystals grown together as repeated flows of percolating silicic acid waters made their way through the veins. The third type of occurrence is as floaters in limonitic-clay pocket fillings in the thicker barite veins. Large pockets in these veins produced many crystals, generally clear, and often doubly-terminated, as well as good barite crystals.

Geological History

About 210 million years ago, as the Triassic Period came to a close and ushered in the Jurassic, the ancient mega-continent Gondwanaland started to split apart to create the Atlantic Ocean. Rift valleys formed along an irregular line from Nova Scotia to Florida, but these, in several places, were 'failed rifts' which did not succeed in separating. In what is now the Connecticut River Valley, this failed rift later filled with basalt flows over the 'red beds' which comprise the bulk of the basin. This "Holyoke Basalt" formation underlies an area stretching from north central Massachusetts south into Long Island Sound. It is known for a number of analogous hydrothermal vein occurrences which appear in such places as Cheshire, Bristol, and Middletown, in Connecticut, and, to the north, at Hatfield, Easthampton, and Loudville, in Massachusetts.

The New Britain veins occur in normal faults, trending NE to SW, at about 045 degrees. There is no particular, identified event connected with these faults, but the earth movement which brought about the faults was evidently not a one-time happening. It is thought that the faulting and the hydrothermal activity took place reasonably close in time after the flow of basalt. That is now dated to about 190 to 200 million year before the present.

Scott Ryan of the University of Connecticut at Storrs examined this locality, and reported in a Geological Society of America abstract that the sulphides which are commonly associated with spheres of vitreous bitumen ("anthraxalite"), occur sporadically in almost all of the veins. Ryan also showed three types of fluid inclusions in the quartz; 1) two phase, liquid dominant aqueous-gas; 2) two phase gas dominant aqueous-gas; and 3) three phase (aqueous liquid) - (Co^2 rich liquid) - (Co^2 rich gas) inclusions. Temperatures of homogenization indicate mineral deposition between 200° and 123°C. Alternate carbonate and quartz precipitation resulted from repeated faulting, while barite precipitated last at temperatures below 150°C. Ryan proposed that regionally heated groundwater that reached the sediments of the Hartford Basin was the probable source of the hydro-thermal waters.

Collecting Sites

Within this general locality, there are several specific sites (see map #2). The primary one is that one defined by the deep (up to 30' or more) excavations in the basalt which carry the new roadbed through what is essentially down-town New Britain (see photos). Here, the combination of barite veins and datolite pockets in the basalt are collectible - or, rather, were collectible. It is in this area that most of the mineral species shown in the accompanying list were found. Many fine crystals of calcite have been uncovered here (see illustration). It should be noted that the alteration of chalcopyrite is probably responsible for the presence of such species as cuprite, covellite, malachite, and azurite. Generally, this area is mared by X's in the large scale map (map #2). While the highway is not yet opened to traffic, construction is completed and the area is now effectively closed to collecting.

The second site, at Ellis Street, came about through the addition of a new exit from Route 72 south of the city center. It has provided some of the same mix of material, except that it was more productive of the typical basalt pockets. In these, the principal mineral is datolite, accompanied by quartz (including amethyst), calcite, prehnite, laumontite, and anhydrite (and casts of anhydrite). It was here that in 1984, two collectors, Dana Jewell and Larry Venezia, found a large pocket of datolite with clusters of what was first thought to be stilbite, because of its cauliflower-like form, and orange-pink color. The groupings form attractive combinations with the yellowish datolite, and some show the flat edge of an anhydrite cast. Further examination (by x-ray powder diffraction analysis) proved it to be adularia, a member of the potassium feldspar series which has not previously been reported from the Connecticut Valley basalts. This area is now levelled and collecting is no longer possible. It is marked on the map by circled X's.

A third area, at the northern end of the construction site, is the area where the company has stockpiled all of its excavated rock for future use in extending the new road, and as a source of fill, Jim Cahoon and Paul Young found (in late 1985) more of the adularia material here, but, again, in small quantities. Of course, it has also provided collectors with many more specimens typical of the area. Until further construction takes place, this area should remain collectible, although, at last report, the material here is being seriously depleted as it is being used for road fill elsewhere.

A curious observation is that the basalt here does not present the rich variety of zeolites which are common in the Tomaso Quarry, just to the west of New Britain at the intersection of I-84 and S-72. This large quarry has been closed to collectors for some years, but it did at one time provide fine zeolite specimens.

I am indebted to a number of people for sharing with me their information about this interesting site, chief among them being Steve Garza (who was one of the first on the scene in 1979), Jim Cahoon, Paul Young, Dana Jewell, Larry Venezia, and, for help in preparing this article, Dr. Carl A. Francis of the Harvard Mineralogical Museum.

Table of mineral species reported from Rte. 72 intersection excavation in New Britain, Connecticut

Actinolite (var. Byssolite)	Dolomite
Adularia	Galena
Anglesite	Goethite
Anhydrite	Hematite
Aragonite	Heulandite
Aurichalcite	Laumontite
Azurite	Limonite
Barite	Malachite
Bornite	Marcasite
Calcite	Prehnite
Chalcocite	Pyrite
Chalcopyrite	Quartz (incl. var. Amethyst)
Copper (Native)	Siderite
Covellite	Smithsonite
Cuprite (Micros)	Sphalerite
Datolite	Stilpnomelane