STIBNITE IN QUARTZ

Noel H. Stearn, *St. Louis, Missouri.*

At least two known localities in the United States have yielded what may be considered to be a rare mineral association—stibnite inclusions in quartz crystals.

In August, 1932, Dr. Paul F. Kerr, Professor of Mineralogy at Columbia University, New York, discovered at the Golden Spike mine, Imlay Canyon, Pershing County, Nevada, a number of quartz crystals containing slender, acicular inclusions of stibnite. They were associated with a gold-bearing quartz vein in a small prospect tunnel on the west side of Humboldt Range. One crystal furnished for this study (see Figure 1-A) is about 4 centimeters long, terminated by broken and irregular ends as if it had grown directly across a cavity and anchored at both extremities. The 6 irregular crystal faces of a unit prism, all showing distinct horizontal striations, have not been symmetrically developed.

Within the crystal, and never quite reaching its surface at any place, are numerous thread-like inclusions recognized by their crystal habit, lead gray color, and metallic luster to be stibnite. These have a maximum length of about 3 centimeters. All are oriented at angles to the principal axis of the crystal so that the inclusions form a criss-cross net work of slender stibnite rods which are fairly evenly distributed throughout the middle portion of the crystal. For the most part the stibnite rods are straight and oriented in such a way as to simulate parallelism with one or another of the rhombohedral, pyramidal, or trapezohedral faces which would be expected to terminate the prism if the quartz crystal were complete, although this parallelism may be suggestive rather than actual. A similar orientation of slender rutile threads may be observed in a quartz crystal in the collection of Prof. W. O. Shipton at Washington University, St. Louis, Mo.

In May, 1932, numerous smaller quartz crystals containing stibnite inclusions were found at the Parnell Hill and Gap Ridge Mines of the Southwestern Quicksilver Company in the recently discovered cinnabar district of Pike County, Arkansas. In this locality they occur associated with cinnabar and dickite in fractures in a massive quartzite formation. Rarely the quartz crystals are to be found completely embedded in dickite so that they show terminations at both ends. An example of such crystals is shown at B in Fig. 1. The ends are terminated by the rhombohedrons $r(10\bar{1}1)$

and $z(01\bar{1}1)$ which are not quite equally developed, but their departure from symmetry is not marked. No other modifying faces appear. Within this singularly clear and glassy crystal the stibnite inclusions occur as very fine, cobwebby, lead gray threads with a gunmetal luster. None of the stibnite threads is straight, and the longest of them barely exceeds 1 centimeter in length, few being over $\frac{1}{2}$ centimeter long. They are very irregularly distributed

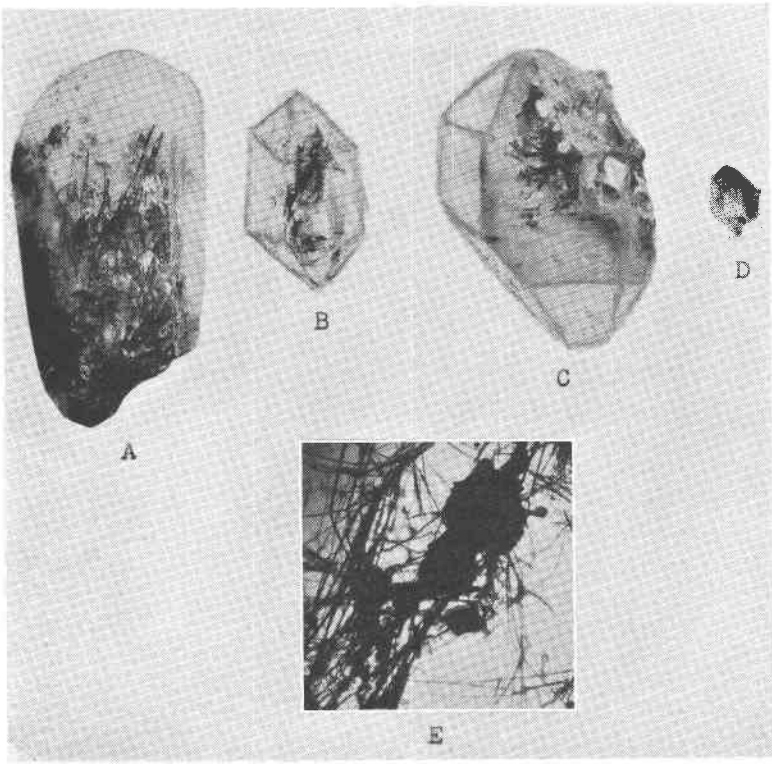

FIG. 1

(Photographs by H. L. Koch, Washington Univ., St. Louis, Mo.)

through the crystal, occurring as twisted, tangled nests with a cord of stibnite threads connecting them. It is as if a rope of stibnite included near the junction of two prism faces of the crystal had been frayed at each end, giving off a tangled jumble of broken threads. Under high magnification it can be seen that the threads themselves are still further frayed and split into smaller threads.

Associated with the stibnite inclusions are about one dozen small scarlet inclusions, the largest being about half the size of a pinhead. These are too irregular in shape to be called globules and too rounded to be called crystals. They resemble former crystals which have had all corners fused or dissolved into gently rounded shapes. In some cases they hang to the stibnite threads like minute red berries with stibnite stems. In other cases they are found intimately associated with a rope of stibnite threads and are penetrated by them. In one case the scarlet inclusion shows a fuzzy halo of stibnite threads. From their color, the vague remnant of their crystal form, and their general association the inference is drawn that they are composed of cinnabar.

Figure 1-E shows a photograph of the inclusions in Figure 1-B magnified 7 times. The frayed threads of stibnite are immediately recognizable. The irregular, opaque masses in the middle of the photograph are cinnabar.

High magnification shows rare colorless inclusions of shapes and sizes similar to the cinnabar inclusions, suggesting that they are casts of cinnabar inclusions from which the cinnabar has disappeared. There also appear slender, colorless inclusions resembling casts of stibnite from which that mineral has been removed.

The order of crystallization as shown by the association in this crystal seems to have been: first, stibnite; second, cinnabar; and third, quartz.

In the same locality numerous other quartz crystals have been found containing cinnabar and stibnite inclusions. The habit of the stibnite inclusions differs in different crystals. Stibnite sometimes occurs as tiny flakes, sometimes as minute ribbons with the flat faces showing silvery gray luster, sometimes as masses shaped like small burrs, and sometimes with no observable regularity of habit or distribution. In Figure 1-C a combination of a threadlike and a flaky habit is illustrated.

In the same place where these crystals were found, drusy masses of smoky quartz crystals intimately intergrown with cinnabar crystals have been frequently noted. The association suggests that the discoloration of the smoky quartz is due to stibnite. Figure 1-D shows one crystal from such a drusy quartz mass in which the stibnite inclusions can be definitely recognized. The terminated end is clear quartz. The inclusions begin about where the rhombohedral faces join the prism faces, and grade rapidly into a dense, black mass. The evidence from this crystal suggests that the smoky quartz in this locality is colored by stibnite.

Some parts of the faces of the quartz crystal shown in Figure 1-C are etched and pitted with finely granular pyrite which has been partly oxidized. This is significant in indicating that the quartz crystals came from the sulphide bearing hot water solutions associated with the deposition of the cinnabar and stibnite, rather than from later meteoric waters depositing silica in previously mineralized fractures. The sequence of crystallization as observed from all specimens is: first, stibnite; second, cinnabar; third, quartz; fourth, pyrite; and fifth, dickite.

SCHROECKINGERITE FROM BEDFORD, NEW YORK

E. J. Armstrong, *Bryn Mawr College.*

On a recent visit to Kinkel's quarry, just outside of Bedford, N. Y., pegmatite specimens were collected that exhibited a few small fragments of a greenish yellow mineral, thought at the time to be autunite. On further examination, however, it was found that its optical constants, especially its indices of refraction, were not in agreement with those of autunite.

The mineral was finally determined to be schroeckingerite, a hydrous uranium carbonate, named after Baron Schroeckinger in 1873 by A. Schrauf.[1] It is stated by Winchell[2] to be an alteration product of uranium minerals. Schrauf's material came from Joachimstal in northwestern Czechoslovakia,[3] as did that later described by E. S. Larsen.[4] The mineral has not, to the writer's knowledge, been described from any other locality.

The mineral is apparently monoclinic and has perfect {010} and distinct {100} cleavages, giving a large number of laths exhibiting inclined extinction and the acute bisectrix, with a smaller number exhibiting parallel extinction and a flash interference figure. All the laths are extremely small, the larger fragments of the material being made up of clusters of small laths.

The optical characteristics were determined to be as follows: Extinction $30° \pm$; $r > v$ strong. Very strong crossed dispersion giving

[1] *Tscherm. Min. Mitt.*, **1873**, p. 137.

[2] Winchell, A. N., *Elements of Optical Mineralogy*, 3rd edit., 1933, Part **II**, p. 86.

[3] Hintze, *Handbuch der Mineralogie*, Bd. **1**, Abt. 3, Hälfte 1, 1930.

[4] Larsen, E. S., *The Microscopic Determination of the Nonopaque Minerals*, *U.S.G.S., Bull.* **679**, 1921.