THE OCCURRENCE OF THULITE AT HADDAM, CONNECTICUT

Wilbur G. Foye, *Wesleyan University, Middletown, Conn.*

Haddam, Connecticut, has long been famous for its rare minerals. It was rather surprising, however, to discover a striking pink mineral in masses a foot or more across in a district so frequently visited. Blocks composed of a coarse aggregate of quartz, epidote, and thulite were first found on the southeast

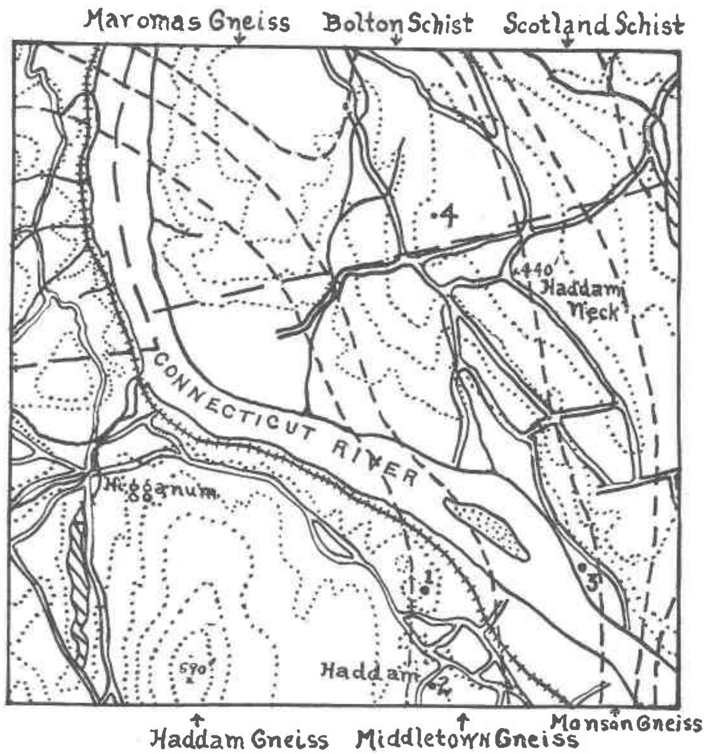

Fig. 1

slope of Walkley Hill in the spring of 1924. Later it was discovered that the blocks came from the top of the hill and were thrown aside during the construction of a private road.

The exact locality may be obtained from the sketch map. (Figure 1). Locality (1) is the thulite locality; locality (2) marks a pegmatite dike which has transformed the adjacent limestone to epidote; locality (3) is the Gillette quarry at which many rare tourmalines were found; and at locality (4) there is a pegmatite dike so rich in lepidolite that it was once quarried as a commercial source of lithium.

It will be seen that the thulite occurs in the Middletown gneiss close to its contact with the Haddam tonalitic gneiss. The Middletown series at this point is composed of quartz-biotite schists containing amphibolitic lenses and is much granitized by pegmatitic fluids. A rather complete study of the Middletown series in southeastern Connecticut has shown that there were never very thick deposits of limestone included among its members. Such lenses as were present were almost completely transformed to amphibolites at the time of the intrusion of the tonalitic batholiths.

Occasionally small pockets of impure limestone remained. These were later brought into contact with pegmatitic fluids and were transformed to epidote. The evidence of radioactive minerals tends to show that the last transformation took place during the Devonian or Carboniferous period, 300 to 400 million years ago![1]

The thulite at Walkely Hill occurs as a band 6 to 10 inches in width interbedded with other bands of such minerals as would characterize a sedimentary gneiss derived from a calcareous sandstone. Three thin sections were cut at intervals of two to three inches across the contact between the thulite and the sandy schist. The first section nearest the schist was a typical quartz-biotite schist showing a mosaic texture composed of 60 to 70 percent of quartz, 20 to 25 percent of biotite, and 15 to 20 percent of oligoclase. The second section was composed of 70 to 80 percent of quartz, 20 to 25 percent of actinolite, and 5 to 6 percent of andesine. The optical properties of the actinolite showed that it was close to tremolite in composition. The third section showed 10 to 15 percent of quartz in large irregular fragments, 50 to 60 percent of labradorite (Ab_{35}),25 to 30 percent of epidote and 5 to 6 percent of thulite. The presence of so basic a plagioclase in association with a lime-rich epidote and thulite leads one to suppose that the pegmatitic fluids reacted with an impure limestone to develop this abnormal grouping of minerals. The actual presence of a limestone with epidote at an adjacent locality lends support to this supposition.

It was hoped that an analysis might be made of the thulite but the epidote and the thulite are so intimately intergrown that

[1] H. V. Ellsworth, *Am. Jour. Sci.*, **9**, p. 143 (1925).

it was found impossible to obtain pure material. The two minerals have almost the same middle index of refraction (approximately 1.69), are practically colorless in thin sections and hence show no pleochroism. They are most easily distinguished by their extinction angle. The thulite is orthorhombic and hence has parallel extinction; the epidote is monoclinic and extinguishes at an angle of 35°. Their optical characters differ as well. Thulite is positive and epidote is negative.

The two photomicrographs, one in plane polarized light and the other of the same area between crossed nicols, illustrate the intergrowth of the feldspar, thulite, and epidote. Between the members of the epidote group and the plagioclase feldspar there has very evidently been resorption. A study of the sections indicates that the epidote minerals were replaced by the feldspar.

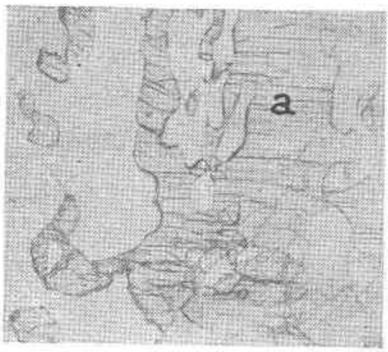

Fig. 2. Thulite and epidote
× 28

Fig. 2. Thulite and epidote
+ nicols. × 24

The crystal labelled (a) in the two photographs shows the intimacy of intergrowth of the epidote and thulite. In plane polarized light the cleavage would indicate a single mineral. Yet between crossed nicols the inner portion of the crystal has a position of extinction parallel to the cleavage.

An attempt was made to obtain a fairly pure sample of the thulite. Bits of the pink mineral, 4 to 5 mm. in diameter, were picked out. They were finely powered and a separation was obtained by a heavy solution. The greater part of the powder showed a specific gravity of 3.19.

So few occurrences of thulite are reported in the United States that it was thought wise to record the facts concerning the Haddam locality. There is a considerable amount of material available for those who would like to add it to their collections. The contrasting pink of the thulite and green of the epidote make the specimens attractive.

A description of a similar occurrence of thulite was contained in notes by John W. Lee.[2] The specimens he described were obtained from a gneiss quarry near Hampton, Maryland, in 1895.

A NOTE ON CYANOTRICHITE

CHARLES PALACHE AND H. E. VASSAR, *Harvard University*

Cyanotrichite is a basic copper sulphate which has been long accepted as a definite mineral species. Nevertheless, the evidence for its identity is in reality slight. On Dana's System analyses of this mineral by three authors from four localities are given which agree fairly well with one another and with the formula somewhat doubtfully proposed. But examination of the original papers from which these analyses are derived, shows that every one of them was made upon a minute amount of material which in no case had been examined optically. The two latest papers concerning this mineral[1] emphasize the need of optical data for cyanotrichite and better correlation with a reliable analysis.

In the Harvard Mineralogical Museum there is an unusually handsome specimen of cyanotrichite brought from the Grandview mine, Grand Canyon, Arizona, in 1906 by Professor J. E. Wolff. A surface of about 24 square inches is entirely covered with a dense mat of the pure blue fibres, admixed only with an occasional green crystal of brochantite. In parts of the specimen the cyanotrichite is implanted upon limonite in the most delicate and perfect spherulites, deep blue at their centers and shading to almost white at the tips of the delicate needles. It was possible to remove about half a gram of the fibres without serious injury to the specimen. This very pure material was studied optically by Professor E. S. Larsen and was analyzed by Miss Helen E. Vassar. The material is clearly identical with that studied by Rogers and Gordon in the papers cited.

[2] *Am. Jour. Sci.*, **11,** 171–172 (1901).

[1] Rogers, A. F. The optical properties and morphology of Bisbeeite, *Am. Mineral.*, **7,** 153 (1922).

Gordon, S. G. Recently described "bisbeeite" from the Grand Canyon is cyanotrichite, *Idem.* **8,** 92 (1923).