or clastic, but crystallized from solutions at a temperature of from 200°–300°C.

Enargite, as compared with the tourmaline, is generally considered to be a mineral formed at an intermediate temperature, at least higher than that usually associated with deposition by meteoric waters. Such a mineral by itself might not be of much significance, but when accompanied by such evidence as stated above, the presence of enargite may also be of importance in supporting this recent theory.

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THULITE IN NEW MEXICO

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Since thulite has been reported in North America from only two localities, at Hampton, Maryland,[1] and at Haddam, Connecticut,[2] its occurrence in New Mexico is worthy of record. Thule is an ancient name of Norway; the mineral has been found at three localities in Norway, at one locality in Austria, and at one in Italy. There are probably few American mineralogists who have seen thulite in the field.

The new locality is just south of Pilar Post Office (village formerly known as Cieneguilla), Taos County, New Mexico, approximately in the N.E. $\frac{1}{4}$ Sec. 2, T. 23 N., R. 11 E., on the east bank of the Rio Grande. From Pilar the Rio Grande flows southwestward for about six miles and has cut down through pre-Cambrian metamorphics, leaving a steep cliff facing northwestward. The main highway between Santa Fe and Taos lies at the foot of the cliff along the east bank of the river. The locality is northwest of the Copper Hill or Picuris mining district and northeast of the Glenwoody district.

According to Graton,[3] the pre-Cambrian rocks of the region in-

[1] Lee, John W., *Am. Jour. Sci.*, vol. **11**, pp. 171–172, 1901.

[2] Foye, Wilbur G., *Am. Mineral.*, vol **11**, pp. 210–213, 1926.

[3] Graton, L. C., The Ore Deposits of New Mexico: *U. S. Geol. Survey*, Prof. Paper **68**, pp. 89–91, 1910.

clude granite and granitic gneiss, basic intrusives, and a variety of metamorphic rocks such as quartzites and knotty schists containing quartz, sericite, biotite, tourmaline, garnet, corundum, sillimanite, andalusite, cyanite, staurolite, magnetite, epidote, etc. Numerous pegmatite dikes, varying in width from a few inches to more than one hundred feet, have intruded the pre-Cambrian complex. About three miles to the southeast of the thulite locality is the Harding lepidolite mine, described by Schaller in 1926.[4] On a recent hurried trip to the Harding mine the following minerals were obtained: lepidolite, purple muscovite, albite, microcline, apatite, spodumene, tantalite, green and yellow garnets, beryl, andalusite, and microlite.

At the northeastern end of the cliff of pre-Cambrian rocks just south of Pilar there are numerous prospect drifts and pits. It is at one of these hillside drifts in a large pegmatite that the thulite was discovered. The mineral occurs at the floor level of the drift but the exact geologic relations could not be determined. However, it can be stated definitely that the largest masses occur in a quartz vein, varying in width from a fraction of an inch to about two inches, which traverses a mica schist. The vein is undoubtedly related to the pegmatite. In places the thulite has penetrated and apparently replaced the schist.

The mineral has an attractive color which has been described usually as peach-blossom pink; a polished specimen from Norway is illustrated in color by Farrington.[5] The New Mexico material is somewhat darker and richer, between rose-red and geranium-pink. The one perfect cleavage is well-exhibited; the luster is vitreous; the mineral is brittle; thin slivers are subtranslucent. For a distance of one to two inches from the vein contact the white schist contains an abundance of acicular, deeply striated prisms of thulite, up to 3 mm., and rarely 5 mm., in length. Dana gives 3.124 as the specific gravity. For the Haddam material Foye obtained 3.19.[6] An average of five determinations of the New Mexico material, with fragments ranging up to $10\times10\times16$ mm., gives 3.15. In addition to quartz the only conspicuous mineral associated with the thulite is actinolite, and this is rare. Because of extensive jointing and

[4] Schaller, W. T., and Henderson, E. P., Purple muscovite from New Mexico: *Am. Mineral.*, vol. **11**, pp. 5–16, 1926.

[5] Farrington, O. C., Gems and Gem Minerals, p. 195, **1903.**

[6] Foye, Wilbur G., *loc. cit.*

faulting of the schist and vein it was difficult to obtain specimens larger than two inches across. Many of the joint surfaces are coated with psilomelane dendrites, some of which exhibit slickensides. Unfortunately there does not seem to be much more of the mineral available. Possibly by blasting some could be obtained.

The following analysis of the New Mexico material was made by S. B. Lippincott of the Chemistry Department of the University of New Mexico. The only other analysis of thulite found by the writer is that of material from Tellemark, Norway (quoted by Dana, page 514, 6th edition, *System of Mineralogy*).

	Norway	New Mexico
SiO_2	42.81	49.19
Al_2O_3	31.14	24.26
Fe_2O_3	2.29	3.38
CaO	18.73	19.90
MgO	1.63	none
Na_2O	1.89	none
MnO_2	not given	1.62
H_2O	0.64	1.39
Total	99.13	99.74

The higher percentage of silica in the New Mexico material is due partly to the fact that it was impossible to obtain fragments of thulite entirely free of vein quartz. In this respect the analysis is rather unsatisfactory.

The writer gratefully acknowledges the assistance of Professor William E. Ford in the determination of the mineral.