

GRAFTONITE FROM A NEW LOCALITY IN  
NEW HAMPSHIRE

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Graftonite, one of the most interesting of the iron-manganese phosphates, has hitherto been found only at one locality!<sup>1</sup> A new occurrence of this mineral in superior specimens and comparative abundance seems, therefore, worthy of record.

The specimens described in this paper were collected at the Palermo Mica Mine on Bald Face Mountain, a mile and a half southwest of North Groton, New Hampshire. The granite pegmatite<sup>2</sup> from which mica was mined for many years is intruded in Montalban schist in a direction parallel to the schistosity.

None of the graftonite specimens examined were found in place but were all picked from one portion of the dump at the southeast corner of the pegmatite, near the wall rock. Several of the specimens weighed over five pounds, and one mass, partly crumbled, weighed over nine pounds, indicating that the pocket in which the material was found was large. It seems to have been similar in size to a triphylite pocket seen in place in the immediate vicinity of the dump where the graftonite was found, which measured four feet in greatest diameter, two feet across, and extended into the pegmatite for some distance. The specimens present a striking appearance due to the large number of bands of clear brown graftonite alternating with deep purple heterosite,<sup>3</sup> an alteration product of triphylite. The graftonite bands, which do not exceed 4 mm. in width are, as a rule, wider than the bands of heterosite. Figure 1. shows the relation of the two minerals in a

<sup>1</sup> Penfield, S. L.; On Graftonite, a new mineral from Grafton, New Hampshire, and its Intergrowth with Triphylite. *Am. J. Sci.*, Vol. 9, p. 20, Jan. 1900.

<sup>2</sup> A more detailed description is given by Sterrett, *Bull. U. S. Geol. Surv.* 580F, p. 72, 1914.

<sup>3</sup> The optical properties, by means of which heterosite has been identified in this paper, are close to those given by Larsen in *Bull.* 679, *U. S. Geol. Surv.* for purpurite. Schaller, in *Bull.* 490, *U. S. Geol. Surv.* proposes to restrict the name heterosite to the ferric phosphate and the name purpurite to themanganic phosphate. Neither of the end members have as yet been reported as occurring in nature so that the distinction seems somewhat arbitrary. Heterosite and purpurite vary in their optical properties to a marked degree, even within the same specimen so that it is difficult to differentiate the two minerals optically. Lacking a chemical analysis of the material the author, therefore, uses the older name heterosite for the occurrence at Palermo Mine.

thin section. The same banded structure and association with altered triphylite characterizes the type material from Grafton, New Hampshire.

It is interesting to note that while the triphylite found in association with the graftonite is completely altered to heterosite, in which the iron and manganese are in a higher state of oxidation, the graftonite is unaltered, although the manganese and iron in it are present as MnO and FeO. A study of the optical properties of the graftonite from Palermo indicates that it is similar in composition to the original material from Grafton.

The minerals found in association with graftonite were, muscovite, biotite, almandite garnet coated with a uranium mineral probably uranochalcite, and a few small zircon crystals. The pocket in which the graftonite occurred seems to have been lined with muscovite and biotite in which zircon and almandite crystals are embedded. Most of the specimens also contain considerable amounts of triphylite without graftonite so that a portion of the pocket probably had a considerable amount of this mineral.

A specimen picked up on the dump some distance from the place where the graftonite was found consisted of an intimate mixture of apatite and quartz spotted with a blue mineral which has not been identified. Another specimen presented by the

Mineral	Optical Character	2V	Indices			Pleochroism			Dispersion
			$\alpha$	$\beta$	$\gamma$	$\alpha$	$\beta$	$\gamma$	
Graftonite	+	50° ±	1.704	1.706	1.725				$\rho > v$ fairly strong
Heterosite <sup>3</sup>	+	very small	1.85	1.86	1.91	green grey	blood red	deep purple red	fairly strong
Vivianite	+	medium	1.584	1.600	1.634	deep blue	almost colorless	colorless	
Blue mineral	-	medium	1.620	1.635	1.643	colorless	light blue	deep blue	
Almandite*			$n = 1.830$						

\* This value for the index of refraction corresponds to the data given by Larsen in *Bull. 679, U. S. Geol. Survey*, for the pure mineral.

superintendent of the mine, and probably from the same deposit, was essentially triphylite with narrow bands of vivianite throughout the mass. There are also pyrite cubes, pyrrhotite and some chalcopyrite distributed in the triphylite, all of which are somewhat oxidized.

The table on page 171 presents the optical properties of some of the minerals occurring at the Palermo mine.

On the dump of the Valencia Mine, about two miles from the Palermo Mine, a crystal was found embedded in quartz, which proved to be a pseudomorph of heterosite after triphylite. The crystal is 4 cm. long with a diameter of about 2 cm. It is somewhat similar in habit to the triphylite from Bodenmais, as figured in Dana p. 756. The following forms are present:  $c(001)$ ,  $b(010)$ ,  $e(101)$ ,  $(021)$ ,  $m(110)$ ,  $l(120)$ .