

ART. XXV.—*Cyprine and Associated Minerals from the Zinc Mine at Franklin, N. J.*; by J. VOLNEY LEWIS and LAWSON H. BAUER.

The following notes refer chiefly to cyprine, the sky-blue variety of vesuvianite, in intimate microscopic mixture with willemite, and to the associated rhodonite (var. bustamite) and andradite (var. polyadelphite).

1. *Vesuvianite, var. Cyprine*.—Bluish green fibrous cyprine was found in granite in the Parker shaft, at Franklin, in 1905, and was described by Professor Palache,¹ who also published the analysis by Steiger, which is quoted below for comparison.

The mineral here described was found in the ore body near the hanging wall in a crosscut 374.5 feet south and 361.5 feet west of the Parker shaft, and 10 feet above the 850-foot level. It is sky-blue in color; in texture it varies from fine granular and fibrous to dense. To the naked eye, and even under the hand lens, it appears to be homogeneous. The analysis (A, below) showed nearly 22 per cent. zinc oxide, and since the oxide ratios fell within the limits of variation of vesuvianite, it was supposed that a new variety of this mineral had been found.

Thin sections showed, however, that while vesuvianite is the dominant mineral, it is plentifully sprinkled with rounded grains and hexagonal crystals of willemite, with dimensions up to .16 mm. in diameter. Measurements by the Rosiwal method showed that this mineral constitutes 29 per cent. of the volume, or 33.3 per cent. of the mass. If the zinc, iron, and manganese of the accompanying analysis (A) are assigned to willemite, the calculation gives 32.68 per cent. of this mineral. The remaining constituents, calculated to 100 per cent., represent approximately the composition of the vesuvianite. A few minute particles of metallic copper were visible under the microscope, but doubtless most of the copper determined is in combination.

The analysis of this mixture and the results of the calculations are given here, together with Steiger's analysis² of cyprine from the Parker shaft.

¹ Charles Palache: Contributions to the Mineralogy of Franklin Furnace, this Journal, (4), 29, p. 184, 1910.

² U. S. Geol. Survey, Bulletin 591, p. 315, 1915. This statement of Steiger's analysis, which is followed here, differs slightly from that given by Professor Palache.

Analyses of vesuvianite from Franklin, New Jersey.

	(A)	(B)	(C)	(D)
SiO ₂	32.42	8.70	35.14	36.41
Al ₂ O ₃	14.07		20.86	17.35
FeO .....	.77	.77		1.86
MnO	1.50	1.50		1.75
ZnO	21.71	21.71		1.74
CuO .....	.99		1.47	1.48
CaO	25.22		37.40	33.21
MgO	1.08		1.60	1.38
H ₂ O	2.38		3.53	(— .24 (+3.51
Others .....	.....	.....	.....	1.15 ^a
	<hr/> 100.14	<hr/> 32.68	<hr/> 100.00	<hr/> 100.08

A. Vesuvianite-willemite mixture, apparently homogeneous.
L. H. Bauer, analyst.

B. Willemite calculated from A.

C. Remainder of A, recalculated to 100 per cent.—approximately the composition of the vesuvianite.

D. Steiger's analysis of vesuvianite from the Parker shaft.
Sp. gr. 3.451, carefully freed from specks of metallic copper.

2. *Rhodonite, var. Bustamite*.—Pale pink in color; elongated cleavable to coarsely fibrous in texture. Calcium replaces manganese to a remarkable degree, as shown by the analysis (E), by L. H. Bauer, with which is compared (F) the mineral from Långban, Sweden, as given by Dana (System of Mineralogy, p. 380):

Analyses of bustamite from Franklin, N. J. and Langban, Sweden.

	(E)	(F)
SiO ₂	46.72	47.66
Al ₂ O ₃	1.34	
FeO .....	.46	.48
MnO	26.51	31.65
ZnO	1.34	
CaO	22.24	18.16
MgO	1.27	1.18
Others .....		.98 ^b
	<hr/> 99.88	<hr/> 100.11

^a PbO tr.; Na₂O .44; K₂O .50; F .36; less O = F .15.

^b BaO .19; alkalis .27; gangue .52.

3. *Andradite, var. Polyadelphite.*—The brown granular garnet associated with the vesuvianite approaches typical andradite in composition (analysis G, by L. H. Bauer) more nearly than the specimens from Franklin represented by the older analyses, (H) and (I), quoted by Dana:

Analyses of Andradite from Franklin, N. J.

	(G)	(H)	(I)
SiO ₂	34.28	34.83	33.72
Al ₂ O ₃	3.12	1.12	7.97
Fe ₂ O ₃	25.53	28.73	17.64
MnO	7.41	8.82	16.70
CaO	29.20	24.05	25.88
MgO .....	.39	1.42	(Ign. .08)
	<hr/> 99.93	<hr/> 98.97	<hr/> 101.99

Besides the minerals named above, brown and reddish brown phlogopite is also abundant in scales and crystals, and in places coarse cleavable feldspars. Some of the latter give extinction angles corresponding to labradorite and others to anorthite. There are also very rare grains of pyrite, a small amount of cleavable calcite, and a little dark green pyroxene.

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