

NOTE ON THE CYPRINE FROM FRANKLIN FURNACE,
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Specimens of a beautiful blue mineral recently found for the first time at Franklin Furnace have, within the past year, been widely circulated in mineral collections as cyprine. Specimens of this blue vesuvianite have been received at this laboratory, but when examined were found to be made up of such intimate mixtures of several minerals that it was almost impossible to distinguish the blue mineral from those intergrown with it, and quite impossible to secure a homogeneous sample for analysis. Some doubt was entertained as to the correctness of the identification of the material. In order to settle this question Mr. R. B. Gage recently sent a very fine specimen of this blue mineral from the Roebbling collection to the Museum, with the permission of Col. Roebbling to remove what was necessary of the material for an analysis. The results of the examination substantiate beyond a doubt the correctness of the original identification of this mineral as the blue cupriferous variety of vesuvianite, which has been given the varietal name cyprine. Since this is the first American occurrence of this variety and no complete description of the New Jersey material seems to be available, the results of the examination are set forth in some detail.

The specimen, which weighs approximately 350 grams (12 oz.), consists of approximately 80% of the cyprine and 20% of massive resinous brown garnet (polyadelphite) and nearly white bustamite. The cyprine forms radial, columnar aggregates of closely packed prisms which reach a maximum length of 2 cm. In color it is chiefly a beautiful azure blue although it varies abruptly to green in places. A sample of pure material, separated from the associated minerals with heavy solutions and proven homogeneous by optical examination, was analyzed with the results given in column 1 below, while in column 2 is given, for comparison, Lindstrom's analysis of the original cyprine from Tellemarken, Norway.

The composition of the Franklin material does not differ in any important respect from that of the Norwegian occurrence, nor from the average of available analyses of vesuvianite. While the constitution of the mineral need not be discussed here, it may be noted

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ANALYSES OF CYPRINE

	1	2
	FRANKLIN	TELLEMARKEN
SiO ₂	34.98	37.90
TiO ₂	—	0.26
Al ₂ O ₃	16.30	19.47
Fe ₂ O ₃	3.00	0.40
B ₂ O ₃	0.89	—
FeO	—	0.21
MnO	3.11	0.91
CaO	34.70	36.06
MgO	1.38	2.17
ZnO	1.42	—
CuO	1.21	0.73
Na ₂ O	—	0.14
K ₂ O	—	0.11
H ₂ O	0.64	0.67
F	1.62	1.72
Total	99.25	100.75

that the above analysis yields very nearly the simple formula, $4R''O \cdot R'''_2O_3 \cdot 3SiO_2$, with O in part replaced by (OH)₂ and F₂. The value given for fluorine was not determined directly but represents the difference between total loss upon ignition and the water found by direct determination. Boric acid was determined directly on two portions using the method of Wherry and Chapin. The states of oxidation of the iron and manganese were not definitely determined although these are stated above as ferric and manganous, respectively.

Heated in platinum the powdered mineral turns first green and, at a higher temperature, black and at a bright red it fuses quietly to a clear black glass. In the forceps the mineral yields a mixed flame in which the red of calcium predominates, with streaks of green which is doubtless due to copper rather than boric acid as they become blue when the fragment is moistened with hydrochloric acid. In the closed tube at a high temperature the mineral yields strongly acid water and the tube is conspicuously etched by the fluorine. The hydrochloric acid solution, obtained by dissolving a sodium carbonate fusion of the mineral, reacts faintly for boric acid with turmeric paper.

Under the microscope the mineral is transparent and crystalline. The optical properties as determined by Dr. E. S. Larsen are: uniaxial, negative; indices of refraction $\epsilon=1.698$, $\omega=1.710$;

Pleochroic, ϵ = colorless, ω = pale blue-green. It thus differs from the average vesuvianite only in slightly higher birefringence.

The writer wishes to acknowledge his indebtedness to Col. Roebing, Mr. Gage, and Ward's Natural Science Establishment for the privilege of examining specimens and to Dr. Larsen for the optical determinations.

POLARIZATION PHENOMENA OF CERTAIN FLUORITES

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While determining the refractive index of fluorite by the method of minimum deviation the writer introduced a nicol prism before the telescope of the goniometer to determine the plane of polarization of the refracted ray. On rotating the nicol no difference in the intensity of light could be observed, but on examining the reflected ray nearly complete polarization was obtained so that it was thought that the prism was not cut at the angle that should give polarization if Brewster's law applies to isometric crystals. A new prism was then cut from a crystal of fluorite from Madoc, Ontario, so that the angle between the reflected ray and the refracted ray should be ninety degrees. With this new prism the same phenomena were observed. A second nicol was now introduced between the collimator and the crystal so that the signal was extinguished. On rotating the two nicols simultaneously extinction was obtained throughout a complete rotation so that it would appear as though we may accept without question the statement that a ray of light passing through fluorite vibrates with equal facility in all directions at right angles to the direction of propagation and is not polarized.

On examining a standard glass prism for comparative purposes the refracted ray was found to be polarized in a plane at right angles to the plane of polarization of the reflected ray, indicating a marked difference in optical character between an amorphous substance and a cubic crystal, both of which give a single signal by the method of minimum deviation and are isotropic under the microscope.

To account for this behaviour of fluorite two hypotheses have occurred to the writer:

(1) Fluorite is singly refracting. The objection to this hypothesis appears in the polarization of the reflected ray with the absence of polarization in the refracted ray, for it is at once evident that if a