NOTES AND NEWS

CRYSTALLIZED NATIVE COPPER FROM FRANKLIN, NEW JERSEY

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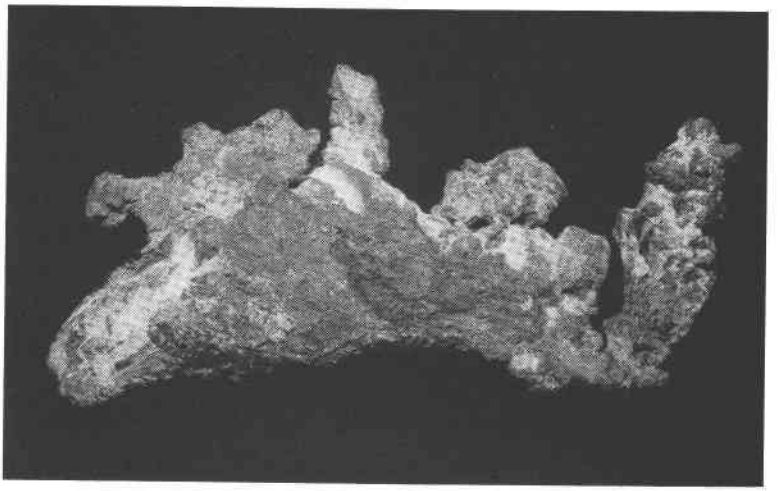
In the latter part of July, 1933, the writer found on the picking table at Franklin, New Jersey, an exceptionally large specimen of native copper. The ore from which the specimen came was being removed through the Palmer shaft. The actual level then being worked, or the mode of occurrence could not be ascertained. The mass is roughly rectangular in outline; $10\frac{3}{4}$ inches (27 cm.) in length and $5\frac{1}{4}$ inches (13 cm.) in width. Two octahedra of native copper are present at one end of the specimen, both being about 15 mm. in horizontal section. There are, moreover, several smaller octahedra of the same substance, possessing somewhat sharper terminations. Cleaned and trimmed, the nugget weighed 3056.5 grams, or, something over six and one-half pounds. Approximately one-quarter of the surface is encrusted with typical granular willemite-franklinite ore. Calcite, green copper carbonate, barite, and hodgkinsonite complete the mineral association. The latter mineral is relatively scarce at Franklin.

The willemite-franklinite mixture is in the form of a rather thin incrustation. It nevertheless possesses the definitely banded character so often seen in the massive granular ore. The willemite is of a very pale yellowish-green color and is strongly fluorescent. The white barite has crystallized in platy forms. The copper appears to be later than this mineral, and to bear a simple interstitial relationship to an intergrowth of barite crystals of prismatic habit. This can be demonstrated on only a portion of the specimen.

The hodgkinsonite has the characteristic rose-pink color, and exhibits a brilliant, clean cut cleavage parallel to (001) on the fresh surface. It generally occurs in massive form as an incrustation on the copper. However, one small crystal, about 6 mm. in thickness, is found in a recessed portion of the copper. The crystal faces are somewhat dull and etched, so that no reflections could be obtained. The optical properties of the hodgkinsonite are anomalous, and it was found convenient to identify it by comparison of x-ray diffraction patterns. The hodgkinsonite pattern was compared with a pattern of hodgkinsonite secured from one of the first specimens of

this mineral to be found at Franklin, now in the collection of the Department of Geology and Mineralogy, Columbia University.

Only one other known specimen of native copper comparable in size has hitherto been reported from Franklin. It is now in the U. S. National Museum. The specimen here described is not only unusual because of the size and crystalline character of the copper, it is of further interest to note the mineral association. In 1898 Wolff[1] described four occurrences of native copper from this locality. In each case the metallic copper was present in the form of



1 inch = appr. 3 inches

PHOTOGRAPH OF CRYSTALLIZED NATIVE COPPER FROM FRANKLIN

thin, fragile sheets and films. In two instances the copper occurred with the willemite-franklinite ore mixture, zincite, and calcite. Wolff noted that in these examples the copper films occupied seams bounded by slickensided surfaces, which was suggestive of dislocation and simple vein filling. In the remainder of his specimens the copper was associated with biotite, calcite, polyadelphite, and an "earthy light pink manganese mineral."[2] In 1913, Palache and Schaller,[3] in a paper describing the then new mineral hodgkin-

[1] Wolff, J. E., Occurrence of native copper at Franklin Furnace, New Jersey: *Am. Acad. Arts and Sci., Proc.*, vol. **33,** pp. 430–431, 1898.

[2] Wolff, J. E., *Op. cit.*, p. 431.

[3] Palache, C., and Schaller, W. T., Hodgkinsonite, a new mineral from Franklin Furnace, N. J.: *Jour. Wash. Acad. Sci.*, vol. **3,** p. 474, 1913.

sonite, remarked: "It occurs in seams in massive granular ore of the typical willemite-franklinite mixture; the seams are generally very thin with but a film of the mineral which is always associated with white barite and not uncommonly with plates of native copper." It will be noted that there is a very substantial similarity of association. It is not certain what mineral Wolff was referring to as "an earthy light pink manganese mineral," although this description is suggestive. On the whole, it appears that the association of barite, hodgkinsonite, and native copper at Franklin is normal. Other minerals, such as pyrochroite, axinite, and native lead, are also reported to occur with the three above.

Wolff[4] noticed the altered character of the garnet gangue on one of his specimens, and believed that the deposition of the copper might have been related to this change. He also pointed out that the copper was always later than the associated minerals, basing his conclusion on the fact that the seams are always bounded by fracture and gliding planes. Palache and Schaller[5] believed that the association and mode of occurrence of hodgkinsonite indicated a pneumatolytic origin for that mineral. This might also denote a pneumatolytic origin for the copper. In 1929, Palache[6] stated again that all three minerals, barite, hodgkinsonite, and native copper, are pneumatolytic in origin. Irrespective of classification, this new occurrence of native copper with its associated minerals, is additional evidence of their constant genetic relationship.[7]

[4] Wolff, J. E., *Op. cit.*, p. 431.

[5] Palache, C., and Schaller, W. T., *Op. cit.*, p. 475.

[6] Palache, C., Paragenetic classification of the minerals of Franklin, New Jersey: *Am. Min.*, vol. **14,** no. 1, p. 11, 1929, and included table.

[7] I wish to acknowledge the interest manifested by Dr. Paul F. Kerr, Professor of Mineralogy, and the aid extended by him in the preparation of this paper.

METHODS OF HANDLING AND DETERMINATION OF DETRITAL GRAINS AND CRUSHED ROCK FRAGMENTS

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I read with interest in your April issue Mr. F. C. Calkins' contribution on the handling of grains under the microscope. Perhaps the methods used in South Africa might also interest your readers.

In the Mineralogical Laboratory of the Geological Survey of the