NOTES AND NEWS

AN OCCURRENCE OF ILSEMANNITE

E. D. GOLDRING,
Saratoga, Wyoming.

Introduction

Ilsemannite, $MoO_3 \cdot SO_3 \cdot 5H_2O$, was first described a number of years ago, and the literature contains numerous references to its occurrence. Despite these facts, it remains one of the lesser-known minerals; few of its physical and chemical properties have been determined. Dana (1) classified it as a molybdenum molybdate, assigning to it the formula, $MoO_2 \cdot 4MoO_3$. Schaller (2) proved it to be a hydrous molybdenum sulfate, a fact later confirmed by Hess (3).

During the course of some investigations conducted early in the year at the fluorspar mine operated by the Western Fluorspar Corporation, in northern Jackson County, Colorado, a blue incrustation, superficially resembling azurite, was noted on the drift walls. The writer was informed that the material had been identified as ilsemannite by the late Professor Wm. E. Ford. More recently, developement work has yielded a muck which, after a few days' exposure on the mine dump, has become ilsemannite-incrusted, although no indication of the mineral was apparent in the freshly mined ore. Because of some unusual features of the occurrence a brief description may be of interest.

Geology of the Occurrence

Workings at the mine referred to above are confined to drifts and stopes on two parallel fault fissure veins, approximately fifty feet apart and dipping nearly vertically. The country rock is a reddish pre-Cambrian granite, changing into a bluish granite in the vicinity of the veins. The vein filling is largely fluorspar mixed with fragmented granite torn from the walls during processes of faulting. Huge granitic "horses" are not uncommon. The granite inclusions are rusty brown in color, and have been partly replaced by fluorite.

While the ilsemannite, and ore which has subsequently become incrusted with it, has been found in various parts of the mine, the most important source has been a zone of disturbance thirty feet in width crossing the veins at an angle of about 25°. This zone is occupied by fault breccia consisting of angular fragments of fluorspar, quartz, and granite, in a matrix which is highly decomposed, and is commonly friable and somewhat argillaceous.

Description of the Ilsemannite

The ilsemanite generally occurs as a cryptocrystalline or powdery incrustation on fluorite or altered granite. Frequently it appears as a halo, varying in thickness from a mere film up to several millimeters. It has also been noted as an impregnation in the matrix.

The color ranges from azure to blackish-blue. The lighter shades may well be due to the presence of intimately mixed, light-colored impurities. The streak is a pale blue. No method of obtaining material sufficiently pure for hardness and specific gravity determinations has been devised at the mine laboratory. Possibly the lack of data on these properties in the literature is due to a similar difficulty having been experienced by other investigators.

The mineral is sparingly soluble in distilled water. The solubility is greatly increased by the presence of small amounts of acids or alkalies. Cases are on record where the waters issuing from some mines are colored blue due to dissolved ilsemannite. Although much water originates in that part of the mine where the mineral is most abundant, no coloration has been imparted to it.

Mention has been made of the impossibility of separating pure ilsemannite for experimental purposes. Samples chosen for their above-average quality have invariably assayed low in molybdenum. The following partial analyses of picked specimens illustrate this:

Sample No.	Mo	Fe	S
83	0.185% (0.610%)*		
84	0.153% (0.504%)	1.592%	0.490%
85	0.614% (2.025%)	7.662%	3.211%
94	0.087% (0.288%)	0.860%	0.701%

* Figures in parentheses are Mo calculated to ilsemannite. 83—ilsemannite-bearing granite; 84—ore incrusted with ilsemannite; 85—disintegrated fault matter; 94—ilsemannite-incrusted ore.

Associates

Associated with the ilsemannite are quartz, feldspar, fluorite, ochre, chlorite, pyrite, gypsum, and melanterite. The first three make up the greater part of the vein matter. Chlorite and ochre are locally abundant, while the others are rare. No sulphides, other than pyrite, have been noted.

Commonly the fluorite exhibits a banded structure parallel to the vein walls. Granite inclusions are often surrounded by concentric fluorite

"shells." An unusual structural phase for this mineral may be observed where the fissures have not been completely filled. Here it tends to become reniform on a large and spectacular scale. Well defined cubic crystals are uncommon and always small.

Scattered disseminations account for the greater part of the pyrite content. Occasionally inclusions, usually of fluorite, are found, surrounded by concentric rings of the sulphide—the so-called "cockade ore" (1). Some classic examples of this type have been collected from the deposit.

It has been stated that melanterite, $FeSO_4 \cdot 7H_2O$, always accompanies ilsemannite. Here it is found as a powdery, greenish-yellow incrustation, having the usual astringent taste. It is not always apparent in hand specimens, its presence being masked by other minerals, particularly ilsemannite and ochre. In some cases the melanterite and ilsemannite are mixed so intimately that a dark green product results.

Acknowledgments

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REFERENCES

1. DANA, E. S., *A System of Mineralogy.*
2. SCHALLER, W. T., *Jour. Wash. Acad. Sci.*, **7**, July 19 (1917).
3. HESS, FRANK L., *U. S. Geol. Surv., Bull.* **750**, 1–16 (1925).
4. LINDGREN, WALDEMAR, *Mineral Deposits*, 4th ed., p. 170 and fig. 59.

At the May meeting of the Philadelphia Mineralogical Society, Dr. Lincoln Dryden of Bryn Mawr College addressed the Society on the subject "Heavy Minerals as Guides to Geologic History." At the June meeting Dr. A. L. Patterson of Bryn Mawr was the speaker, his topic being "W. H. Bragg and his Contributions to Crystallography."

The following officers were recently elected by the New Jersey Mineralogical Society: President, J. D'Agostino; Vice-Presidents, Dr. S. S. Cole and O. I. Lee; Treasurer, O. B. J. Fraser; Secretaries, G. R. Stilwell and H. Hageman; Librarian, Edna M. Hensel; Curator, James M. Dupont.
