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NOTES AND NEWS

ORIENTED GROWTHS OF CRYPTOMELANE IN SYLVITE, CARLSBAD, NEW MEXICO

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INTRODUCTION

Cryptomelane, a potassium manganese oxide mineral, is relatively common in New Mexico (Hewett and Fleischer, 1960). Both supergene and hypogene cryptomelane have been recognized. However, the occurrence of cryptomelane as oriented growths in sylvite has not been reported previously. In September 1960, samples of sylvite containing oriented growths of cryptomelane from Carlsbad, New Mexico, were collected by Mr. T. L. Gambill, senior geologist of the United States Borax & Chemical Corp. Mr. Thomas M. Cramer, of the same corporation, provided a sample for this study.

OCCURRENCE

Crude sylvite having a very dark gray cast occurs in small quantities in a potash bed about 30 feet above the roof of the present mine workings of the United States Borax & Chemical Corp., near Carlsbad, New Mexico. The bed is about 950 feet below the surface. Stratigraphically, it is part of the Permian Salado formation in the Delaware basin and lies about 450 feet below the bottom of the Permian Rustler formation. The crude sylvite contains oriented growths of cryptomelane; hence the dark-gray cast. Red or pink sylvite contains a small amount of hematite. Uncontaminated sylvite is colorless or white. The crude dark-gray sylvite occurs in quantities of less than five pounds at each spot where it has been observed. Small quantities of such sylvite are also sparsely disseminated in the potash bed that is being mined.

IDENTIFICATION

After identification of the sylvite by the immersion method, selected grains of the mineral were dissolved in distilled water. The solution was decanted. The residue consisted of rectangular three-dimensional network of dark hairs. After washing and drying, the network withered into a blotch on a watchglass. When soaked in water, the blotch was restored to the original form of the network and was suspended in water. The residue was collected on a tiny pyrex glass rod and rolled into an x-ray spindle. Several x-ray powder patterns were taken. The data of one of the patterns are listed in Table 1. Most of the d values agree well with the

TABLE 1. *X*-RAY POWDER DIFFRACTION DATA OF CRYPTOMELANE, CARLSBAD, NEW MEXICO

Radiation: Fek_α=1.93728 Å; Mn filter; Camera diam.=114.59 mm.

d (Å)	I	*d* (Å)	I
6.96	7	1.931	<1
4.92	7	1.836(b)	3
4.24 (quartz)	<1	1.642(b)	3
3.50	1	1.577*	<1
3.32 (quartz)	2	1.543	5
3.11	10	1.410*	<1
2.825 ($CaCl_2 \cdot 2H_2O$?)	2	1.356	4
2.779*	<1	1.264	<1
2.484	1	1.154	<1
2.464	1		
2.400	4		
2.222	1		
2.202	1		
2.160	3		
1.995	4		

b=blurred.

* Not previously reported.

data for cryptomelane previously published by Ramsdell (1942), Fleischer and Richmond (1943), and Mathieson and Wadsley (1950). Two quartz lines, 4.24 Å and 3.32 Å, are present. The line 2.825 Å is probably a strong line of calcium chloride dihydrate. Three very weak lines, 2.779 Å, 1.577 Å, and 1.410 Å, have not been reported previously. Other patterns show the presence of a small amount of hematite. None of the patterns show the presence of clay minerals or other insoluble salts.

A semiquantitative spectrographic analysis of the dark-gray sylvite (Table 2) shows that barium is not a major constituent of the cryptomelane. Spectrographic analyses show that halite and some hematite-contaminated sylvite contain only trace amounts of barium. Because of the lack of barium in the dark-gray sylvite, the presence of a detectable amount of psilomelane is ruled out. Although the dark-gray sylvite contains myriad of cryptomelane hairs (Fig. 1), its manganese content is only about 0.02 per cent.

MICROSCOPIC DESCRIPTION

Photomicrographs of the sylvite containing oriented growths of cryptomelane are shown in Fig. 1. The sylvite grains were immersed in oil of

TABLE 2. SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS OF DARK-GRAY SYLVITE, CARLSBAD, NEW MEXICO

Spectrographer: A. Davis Odom, Houston, Texas

Element	Per cent (approximate)
K	52.
Al	0.002
Ba	Trace
B	Not detected
Ca	0.02
Cr	Not detected
Cu	0.0002
Fe	0.005
Mg	0.04
Mn	0.02
Si	0.02
Na	0.2
Sr	Trace
Ti	Not detected
V	Not detected

$n = 1.520$ when the photomicrographs were taken. Two sets of translation-gliding planes, namely {110} and {100}, were recognized in the dark-gray sylvite. No conclusive evidence was found for the presence of {111} translation-gliding planes. Most of the cryptomelane hairs occur along the intersections of the {100} translation-gliding planes. These hairs are about 0.3μ in diameter, as measured on the photomicrograph, Fig. 1A. The hairs along the intersection of the {110}, or {110} and {100} translation-gliding planes are larger; about 0.6μ in diameter. Many of these make 45-degree angles with the intersections of the {100} planes as shown in Fig. 1A. Because of continued cohesion of the portions of sylvite along the translation-gliding planes, there is no room for the deposition of cryptomelane along such planes. Therefore, cryptomelane film is rare in the dark-gray sylvite. However, by changing focus gradually from the top to the bottom of a sylvite grain, the trace of a narrow cryptomelane film shifting along a (011) translation-gliding plane has been observed.

Bending of the sylvite is shown in Fig. 1B. The spacing of the cryptomelane hairs is very irregular, and most of them coalesce at their junctions. A few hairs with random orientation are shown in Fig. 1C. Perhaps these random hairs occur along intersections of some fracture and the translation-gliding planes. Bubble inclusions are fairly common in the dark-gray sylvite (Fig. 1A).

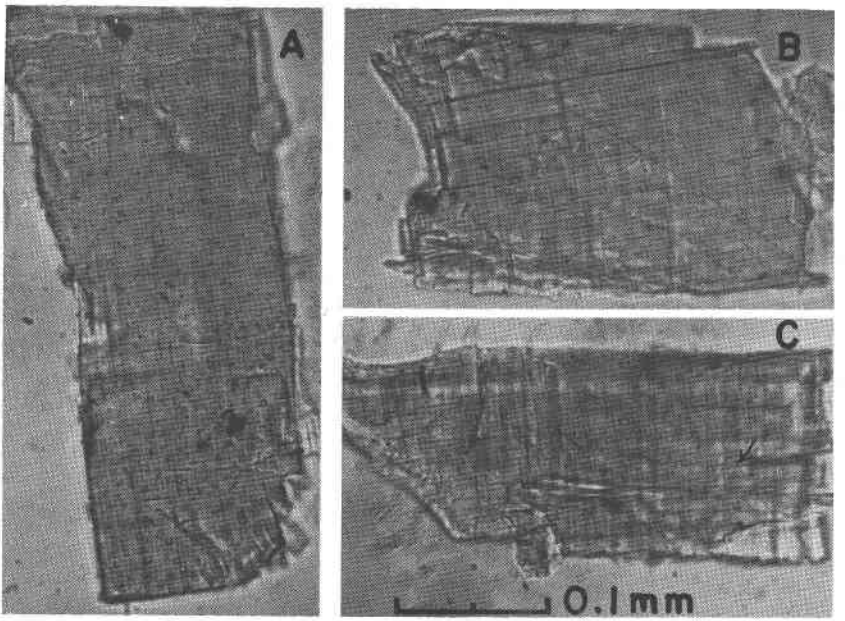

FIG. 1. Cryptomelane hairs in sylvite. ×200, A. Oriented hairs along intersection of {100} and {110} translation-gliding planes; and bubble inclusions. B. A bent sylvite crystal. C. A random cryptomelane hair is indicated by an arrow.

Some sylvite contains hematite either as original inclusions or as introduced impurities. Metasomatism in the potash bed is prevalent (Jones, 1960). Cryptomelane has been introduced into the sylvite. There is no evidence, however, to indicate whether it was introduced by circulating ground water (supergene) or by hydrothermal solution (hypogene). Therefore, its genetic nature has not been determined.

ACKNOWLEDGMENTS

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