NOTES AND NEWS

ANTIMONIAL SILVER ORE FROM COBALT, ONTARIO

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Qualitative examination of the specimen showed, besides silver and antimony, small quantities of bismuth with mercury. A quantitative analysis gave the following results, although the determination of the antimony was not wholly satisfactory:

Silver	84.10 per cent
Antimony	13.55
Bismuth	1.06
Mercury	0.52
Gangue	0.05
	99.28

S, As, Se, Te, Au, Pt, Tl, Fe, Ca and similar metals could not be detected.

The silver is too high to correspond to the formula of "antimonide of silver," Ag_3Sb (Ag = 73.0 per cent, Sb = 27.0 per cent). Although the formula Ag_7Sb might represent the composition, it seems unlikely that such a compound is to be assumed. The reasons for discarding a definite formula and considering the mineral to be an alloy of varying composition are as follows.

The composition seems to vary from point to point, as indicated by the inequality of the tarnishing in air. Mercury would undoubtedly diffuse with ease and so produce inequalities of composition. Moreover, alloys are not definite compounds as a rule. In this particular case alloys of silver and antimony over all ranges of composition have been thoroughly studied.[2] The melting points of both silver and antimony are lowered by

[1] Published by permission of the Director, U. S. Geological Survey. The MS of this note, dated April 15, 1910, was found among the papers left by the late Chief Chemist, R. C. Wells [1877–1944] and forwarded to me by Dr. Michael Fleischer and later again by Dr. Earl Ingerson, with permission to publish in *Contributions to Canadian Mineralogy*. The ore was collected by S. F. Emmons of the U. S. Geological Survey, and forwarded to C. W. Hayes (January 29, 1910) with a request that the Chief Chemist (then F. W. Clarke) should authorize its analysis. The analysis and discussion by R. C. Wells deserve publication as the first accurate description of the famous Cobalt silver, which has long been erroneously called dycrasite. In the light of recent work (*Univ. Toronto Studies, Geol. Ser.*, **44**, 31, 1940) the sample analyzed by Wells was probably an intergrowth of dycrasite (Ag_3Sb) and antimonial siver (Ag, Sb).—M.A.P.

[2] G. I. Petrenko, *Z. anorg. Chem.*, **50**, 139, 1906.

the presence of the other metal, reaching a eutectic at 45 per cent of antimony which melts at 485°. Alloys richer in antimony are found upon microscopic examination to consist of crystals of antimony and eutectic. Alloys containing 27 per cent of antimony are found to consist of one species of crystals which is in fact the compound Ag_3Sb, and this is the only compound which has been detected by the study of the artificial alloys. Alloys with small percentages of antimony consist of mixed crystals of silver and antimony, i.e. "solid solutions" of antimony in silver. The composition of this mineral falls in the last category. Its melting point, if the pure silver contained 13.5 per cent of antimony would be about 790°. As a matter of fact the presence of the bismuth would probably lower this point somewhat. Bismuth forms no definite compound with silver. The crystalline nature of the mineral is shown by the accompanying microphotograph (Fig. 1) of a surface which had been polished and etched with a mixture of nitric and tartaric acids. The method of lighting the specimen was not adapted to show the exact nature or form of the crystals.

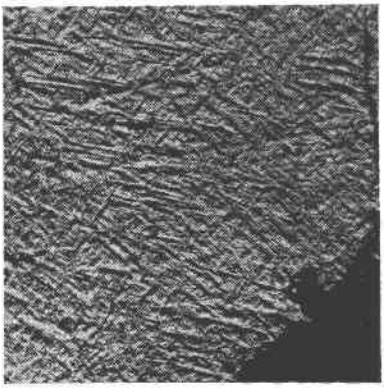

Fig. 1

This mineral, therefore, consists of "mixed crystals," which are solid solutions of the metals of which it is composed, in each other.

With respect to the origin of such a deposit the simplest explanation seems to be that a mixture of metals or compounds has been reduced by organic matter, or hydrogen, but other explanations are by no means excluded.