MINERALOGRAPHY

(GEOLOGY 9 REPORT)

"THE CORRECT IDENTITY OF THE SO-CALLED JAMESONITE IN SULLIVAN ORE"

by M.Lunde

10/4/'41

Vancouver,B.C.

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Introduction.

The character of the mineral long miscalled "Jamesonite" in the Sullivan ore was duly investigated by the writer after some doubt had arisen concerning the correctness of this identification. As may be inferred, the research disclosed evidence showing conclusively that the mineral is not Jamesonite but one in many respects closely related to it. Throughout the investigation, methods of procedure and interpretations of findings were executed in accordance with directions and criteria found in M.N. Short's "Microscopic Determination of the Ore Minerals". All data was obtained from the examination of ten mounted, polished sections selected from different parts of the ore.

Description of the mineral.

The physical properties of the mineral have been adequately described elsewhere. Needless to say, the description aptly fits any one of several minerals, which must therefore be systematically eliminated on the basis of other properties. The process of elimination and the ultimate result thereof, will now be outlined.

Microchemical examination.

Since the mineral has hardness classed as "Soft", its constituent elements are necessarily restricted to relatively few of the common metallic elements found in ores.

These are as follows: (1)Co, Ni, Fe, Zn, Cu, Cd (2) Pb, Sb, Bi (3) Ag, As, Te. While elements such as Mn, Sn, Hg, Mo, Ge,etc. might be included here, general considerations of the nature of the mineral in question pretty well preclude the possibility of their presence in important amounts. Each of the ore sections was tested only for those elements grouped above. Of the members in the first group(1), none was detected microchemically, employing the potassium mercuric thiocyanate test which in a single solution treats all of these elements simultaneously. The test was repeated two or more times on each specimen but the results proved invariably negative. This finding alone disproves the identity of the mineral as Jamesonite which under these conditions shows a clear indication of the iron that is an intregal part of its formula, $4PbS.FeS.3Sb_2S_3$. In group(2) the potassium iodide-cesium chloride reagent was effectively used, excellent and irrefutable evidence of the presence of Sb and Pb resulting in all cases. Further microchemical analysis for Ag, As and Te proved negative although the presence of silver had been somewhat anticipated. It was finally concluded, therefore, that only two metallic elements comprise the mineral and that it may be classed as a sulphantimonite. Thus, this phase of the analysis reduced the original number of possibilities to the group of minerals listed below:

Plagionite($5PbS.4Sb_2S_3$) Boulangerite($5PbS.2Sb_2S_3$)

Zinkenite($PbS.Sb_2S_3$) Semseyite($9PbS.Sb_2S_3$)

Geocronite($5PbS.Sb_2S_3$) Keeleyite($PbS.Sb_2S_3$)

Meneghinite($4PbS.Sb_2S_3$) might well be included here were it not for the fact that it contains about three percent of copper, readily

detected microchemically. It will be recalled that microchemical observations showed the absence of copper.

Microscopic examination.

In this, the final analysis, the mineral was singled out by a further process of elimination. Etch reactions, color and hardness were used as the chief criteria. The following is a tabulation of the properties of the minerals just outlined and the mineral under investigation, denoted by X.

Reagent	Boulangerite	Mineral X	Plagionite	Zinkenite	Geocronite	Keeleyite	Semseyite
HNO_3	Effervesces Black stain	As in boulangerite	As in boulangerite	Effervesces Darkens	As in boulangerite	Negative	As in boulangerite
HCl	Some specimens tarnish; others negative	As in boulangerite	As in boulangerite	Slight tarnish	Tarnish	Negative	Slight tarnish and stain
KOH	Negative	Negative	Grey to brown stain	Iridescent stain	Negative	Black stain	Iridescent stain. Slow
$FeCl_3$	Negative	Negative	Negative	Negative	Negative	Tarnish Slow	Negative
KCN	Negative	Negative	Negative	Negative	Negative	Negative	Negative
$HgCl_2$	Negative	Negative	Negative	Negative	Negative	Negative	Negative
Color	Galena white	Galena white	White	Grey	Grey. In contact galena is greenish.	Grey	Grey
Hardness	B	B	C	C	B	C	C

A summary showing wherein the properties of each of the minerals differ from those of mineral X is tabulated below:

(1)Plagionite differs in the KOH etch reaction, color and hardness.

(2)Zinkenite in KOH etch reaction, color and hardness.

(3)Geocronite in color only. Fortunately, the mineral X was more or less intimately mixed with galena in all sections. This favorable circumstance greatly facilitated the determination of color and hardness.

(4)Keeleyite in all etch reactions but two, color and hardness.

(5)Semseyite in KOH etch reaction, color and hardness.

(6)Boulangerite in no properties. It is identical with mineral X.

Conclusion.

Unquestionably the word "Jamesonite" is a misnomer. In addition to the microchemical evidence already noted, this statement finds further support in that (1) Jamesonite shows a positive etch reaction with KOH (2) tarnishes iridescent (not black as in X) with HNO_3.

The properties of the mineral under investigation check in detail with those of boulangerite rather than jamesonite. It is concluded, therefore, that the correct identity of the so-called jamesonite in Sullivan ore is in reality the mineral boulangerite.

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Color	Galena white	Galena white	White	Grey	Grey. In contact galena is greenish.	Grey	Grey
Hardness	B+	B+	C	C	B	C	C

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