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A PROBABLE SECOND OCCURRENCE OF JAMBOR'S "FIBROUS IRON SULFIDE"

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ABSTRACT

Material similar to the fibrous iron sulfide described by Jambor from the Muskox Intrusion has been found in the Lizard ultramafics in Cornwall, England. Approximate microprobe analysis gave Fe 46, Mg 6, and S 25 wt. %, but the mineral, which is unstable at 85°C, could not be separated for X-ray diffraction study.

Jambor (1969, pp. 446–7) has briefly described the occurrence in the Muskox intrusion of an unusual fibrous sulfide, intimately associated with coalingite. Electron microprobe analysis confirmed the presence of major iron, magnesium and sulfur; these elements totalled to only 79 percent, and the balance was ascribed to H_2O, yielding the tentative formula $3FeS.2(Mg,Fe^{3+})(OH)_{2+x}$.

An apparently similar mineral has been recognised as a minor constituent of valleriite-bearing talc-minnesotaite-calcite veinlets cutting serpentinized peridotite of the Lizard ultramafic body at Pol Cornick, some $2\frac{1}{3}$ miles southwest of Mullion, Cornwall, England. Microscopic and electron microprobe studies have shown that the valleriite, with a composition corresponding to that deduced by Evans and Allmann (1968), is in part interlaminated with several additional minerals showing a fibrous or platy structure, including: (1) an iron-poor chlorite; (2) an unidentified, pale green, copper-iron sulfide phase, containing major Al and Mg, but distinguished from valleriite by the presence of variable amounts (~2–8 weight percent) of Si; and (3) the fibrous iron sulfide. Magnetite and native copper occur as sparse disseminations of rounded, ovoid grains in the vicinity of the valleriite and its associated intergrowths.

The iron sulfide, not visible in hand-specimen, forms sheaves of extremely thin (<5 μm) laths, sensibly opaque in transmitted light, but with moderate brownish-yellow internal reflections in incident illumination, partially obscuring a weak bireflectance (in air), from medium to pale gray. The mineral is strongly anisotropic, with pale to dark bluish-gray interference colors. The small grain size prevents measurement of micro-indentation hardness, but polishing abrasion effects indicate a very low hardness, of the same order as that of valleriite. The white-light reflectivity falls in the approximate range 30–35 percent.

Electron microprobe analysis of a 20 μm-wide area comprising several laths of the sulfide mineral together with thin, hairline intercalations of probable chlorite, using Elba pyrite and synthetic MgO as standards, gave an approximate, partial composition of Fe 46, Mg 6, and S 25 weight percent; Cu, Cr, Co, Mn, Ni, V, Zn, Al, and Si were looked for but not detected. These estimates are considered to be accurate only to ±3 percent in the case of the Fe and S, and ±1 percent for the Mg, but the analysis is clearly closely comparable to that of Jambor. A small proportion of the Mg may have been contributed by the associated chlorite, but the sulfide certainly contains major Fe and Mg. Wavelength scans along the lengths of the laths revealed no significant compositional variations.

In vacuo heating-quenching experiments were carried out on polished intergrowths containing the fibrous sulfide, as part of an investigation of the thermal stability of valleriite. No changes in the optical properties of the sulfide were observed after annealing at 50°C for six hours, but it was wholly converted to an intergrowth of pyrrhotite, magnetite, and an unidentified transparent phase by heating at 85°C for one hour. Liquid droplets, probably of water, adhered to the tube walls in the quenched run.

Attempts to separate this sulfide for X-ray study have been unsuccessful, and there is still insufficient data for its adequate characterisation. However, the compositional similarity of the Pol Cornick and Muskox minerals lends some support to its validity as a distinct species or two, very closely related species. The assemblages involving the fibrous sulfide in the Lizard Intrusion are complex and little understood, but it is possible that this peculiar mineral represents a by-product of the chloritization of valleriite, itself probably formed as a result of the breakdown, during serpentinization, of primary chalcopyrite and copper-bearing silicates in the peridotite. It may, therefore, bear a complementary relationship to the associated native copper, which locally attains ore-grade concentrations in this intrusion.

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