MINERALOGICAL NOTE

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Gratonite from the Isle of Man

DURING a study of sulphide mineralization in the Isle of Man, the mineral gratonite ($Pb_9As_4S_{15}$) was identified. As this appears to be the first recorded occurrence of a Pb-As sulphosalt from the British Isles, a brief description of the occurrence seems warranted. The gratonite-bearing samples were found in waste material on the dumps of the North Laxey mine, by the side of the Ballaglass stream (O.S. 1:50,000 grid reference: SC423888).

The mineral deposits of the Isle of Man are predominantly vein deposits containing pyrite, chalcopyrite, sphalerite, and argentiferous galena. Very small amounts of Ni and Sb ore have also been recorded, the latter consisting of stibnite, 'plumosite', 'polytelite', and 'silver fahlerz' (Lamplugh, 1903). The principal gangue minerals are quartz and carbonates (calcite, siderite, or dolomite), with lesser barite and fluorite. The steeply-dipping veins are hosted by regionally metamorphosed slates and grits of the Manx Group (Cambro-Ordovician age). Although Caledonian (410 Ma) granites are present, the mineralization is probably of much younger age, possibly post-Carboniferous. The mines of the Laxey group were very extensive and most productive during the latter part of the 19th Century; lead and zinc, with lesser silver and copper, were the main products. The North Laxey mine was a relatively small concern which worked a N-S striking quartz vein, although it appears to have been uneconomic (Lamplugh, 1903).

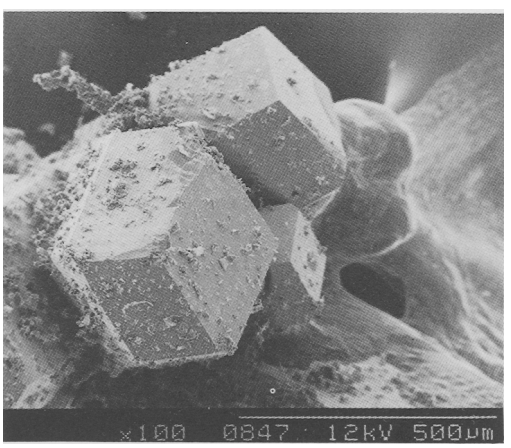

FIG. 1. Scanning electron microscope image of crystals of gratonite from the Isle of Man.

The gratonite occurs as well-formed trigonal crystals up to 2 mm in size. The terminal form {0221} and the prism {1120} are well shown in Fig. 1. Also present in the samples are galena pyrite, pyrrhotite, sphalerite, and arsenopyrite. The samples are coated with a white powdery material which from XRD and chemical analysis appears to be zincian melanterite. Lamplugh (1903) also recorded the presence of Cu sulphate and melanterite as supergene minerals in the ores from the Laxey mine.

The gratonite was identified by XRD and by its optical characteristics in reflected light. Its chemical composition was established by energy dispersive (ED) X-ray analysis. On the basis of 15 sulphur atoms in the formula unit, the chemical formula derived from these analyses is $Pb_{9.9}As_{4.2}S_{15.0}$. This is similar, although not identical, to the ideal fommla of $Pb_9As_4S_{15}$, and, considering that these analyses were obtained by ED methods, they compare favourably with those of gratonite from the literature (see Table 1; Anthony *et al.*, 1990; Criddle and Stanley, 1993).

This occurrence is very unusual considering the lack of As-bearing minerals in the Isle of Man mineralization. Furthermore, although there are numerous records and descriptions of lead-antimony sulphosalts from the British Isles as a whole, this seems to be the first description of the occurrence of a lead-arsenic sulphosalt. Robson (1949) recorded the presence of jordanite, $Pb_{14}(As,Sb)_6S_{23}$, at Penberthy Croft mine in Cornwall and this record was subsequently listed by Spencer (1958) in his compilation of British mineral species; however no confirmation or description of this occurrence was presented. Gratonite is often associated with other rare As-bearing minerals and further examination of

TABLE 1. Chemical analyses of gratonite

	1	2	3
Pb	72.8	71.1	70.5
As	11.0	10.8	11.3
Sb	n.d.	0.2	
S	17.0	17.4	18.2
Total	100.8	99.9	100.0

All values are in wt.%; n.d. = not detected.
1: Mean of 3 analyses of gratonite from the Isle of Man.
2: Gratonite from Peru, quoted by Anthony *et al.* (1990); total includes 0.4% Fe.
3: Ideal composition of gratonite.

Analyses in this study were obtained using a Jeol electron microscope coupled with a Link systems energy dispersive X-ray analyser.

samples from this locality is likely to reveal the presence of additional interesting phases.

The samples used in this investigation will be deposited in the collection of the Natural History Museum, London.

References

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D. H. M. ALDERTON
D. MITCHELL
Department of Geology,
Royal Holloway (University of London),
Egham,
Surrey TW20 0EX, UK

R. GIDDENS
Department of Geology,
Imperial College (London University),
London SW7 2BP, UK

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