

*Rammelsbergite from the southern uplands of  
Scotland.*

(With Plate XVI.)

By A. K. TEMPLE, B.Sc., Ph.D., F.G.S.

Department of Geology, University of Leeds.

[Taken as read November 4, 1954.]

**D**URING an investigation of the mineralization of the Leadhills-Wanlockhead lead and zinc mining district, rammelsbergite ( $\text{NiAs}_2$ ) was identified as an associate of niccolite ( $\text{NiAs}$ ), reputed to have come from no. 4 level on the west branch of the New Glencrieff vein. The identification was confirmed on further material collected from the dumps at the Glencrieff mine, Wanlockhead, Dumfriesshire, and on specimens from the Scottish Mineral Collection (nos. 1952.5.18; 20; 21).

The niccolite from the Glencrieff mine,<sup>1</sup> with which the rammelsbergite is invariably associated, has a rounded or 'pseudo-conglomeratic' form, and is in contact with brecciated fragments of the country-rock, a fine-grained, shaly greywacke. Niccolite from Cassencarrie, Kirkcudbrightshire, has a similar form.

The rammelsbergite borders and veins the niccolite, the junction of the two minerals being irregular but clearly defined. In polished section the rammelsbergite is seen to be anisotropic, and to be of a strong white colour, against which galena appears light grey. The hardness of the rammelsbergite is comparable with that of niccolite.

Although the maximum width of the rammelsbergite was only 0.2 mm., successful etch tests were carried out. With nitric acid the mineral effervesced and was stained black, the reaction commencing only when the niccolite had ceased to react with the acid. The mineral was slowly stained light brown with ferric chloride, whilst no reaction was given with mercuric chloride, hydrochloric acid, potassium cyanide, or potassium hydroxide.

<sup>1</sup> R. Brown, More about the mines and minerals of Wanlockhead and Leadhills. Trans. Dumfries. and Galloway Nat. Hist. Antiq. Soc., 1927, vol. 13 (for 1925-26), pp. 58-79 (p. 75). [M.A. 4-468.]

The above description applies either to rammelsbergite or pararammelsbergite,<sup>1</sup> but the presence of the former was confirmed by the X-ray diffraction pattern, which compares with the data for rammelsbergite published by Peacock and Dadson (1940). It was not practicable to separate the rammelsbergite from the niccolite for chemical analysis; spectrographic analysis of the mixed material showed Ni and As as the major elements, with traces of Co, Sb, Bi, Sn, &c.

TABLE I. X-ray powder data for rammelsbergite.

1.		2.		1.		2.	
<i>d</i> (Å.).	Int.						
3.66	vw	3.68	m	1.58	w	1.593	m
3.01	w	3.02	vw	1.52	vw	1.530	m
2.84	vs	2.85	s	1.43	m	1.439	s
2.56	vs	2.56	s	1.37	vw	1.373	vw
2.47	s	2.47	s	1.22	w	1.236	m
2.38	vwv	2.40	vw	1.15	w	1.157	m
2.20	vw	2.21	w	1.12	vvw	1.121	w
2.02	w	2.02	w	1.09	vvw	1.096	w
1.87	s	1.871	s	1.06	vvw	1.071	w
1.80	w	1.796	w	1.05	vw	1.052	w
1.76	w	1.763	m	1.03	vw	1.037	w
1.69	m	1.690	m	1.02	vw	1.024	m
1.62	w	1.635	m	1.01	vw	1.011	m

1. Rammelsbergite from Glencierff mine, Wanlockhead, Dumfriesshire. Filtered Cu- $K\alpha$  radiation.
2. Rammelsbergite from Eisleben, Thuringia. Unfiltered Cu radiation ( $\beta$  diffractions omitted). Data by M. A. Peacock and A. S. Dadson, *Amer. Min.*, 1940, vol. 25, p. 570. [M.A. 8-3.]

The paragenetical relationships of rammelsbergite, niccolite, and galena were ascertained from polished sections. The rammelsbergite both borders and veins the niccolite; the niccolite-galena junction is irregular, and occasional small inclusions of galena are present in the margin of the niccolite. It would appear, therefore, that the order of deposition was galena, niccolite, and rammelsbergite, and that the rammelsbergite was deposited after the niccolite had come into contact with the galena. Ankerite is earlier and quartz later than the metallic minerals (pl. XVI).

The only previous record of rammelsbergite in the British Isles was given by Goodchild,<sup>2</sup> who pointed out that on one of the tickets of the

<sup>1</sup> W. Uytendogaardt, *Tables for microscopic identification of ore minerals*. Princeton and London, 1951. [M.A. 12-6.]

<sup>2</sup> J. G. Goodchild, supplement in M. F. Heddle, *The mineralogy of Scotland*, 1901, vol. 2, p. 195. [M.A. 3-24.]

Scottish Mineral Collection (no. 602.3) Dr. Heddle had stated that rammelsbergite occurred with niccolite at 'Menimuir Burn, Cassencarrie'.

Further investigation of the Scottish Mineral Collection specimens revealed the presence of rammelsbergite in three instances, viz. no. 71.4, Cassencarrie, Kirkcudbrightshire; no. 602.3, Hilderston, Linlithgowshire (locality queried); and no. 602.4, Cassencarrie (locality queried). In all three cases the rammelsbergite is associated with niccolite, and has the same relationship towards it as has been described above.

*Acknowledgements.*—Grateful acknowledgement is made to Dr. C. D. Waterston, of the Royal Scottish Museum, for the loan of specimens; to Professor W. Q. Kennedy and Mr. O. von Knorring for their interest and advice; to Mr. W. L. Wilson for polished specimens; and to Mr. T. F. Johnston for assistance with the photomicrographs.

#### EXPLANATION OF PLATE XVI.

Rammelsbergite (r), niccolite (n), and galena (g), from Glencrieff mine, Wanlockhead, Dumfriesshire. The gangue mineral at the top is ankerite, and across the middle quartz.

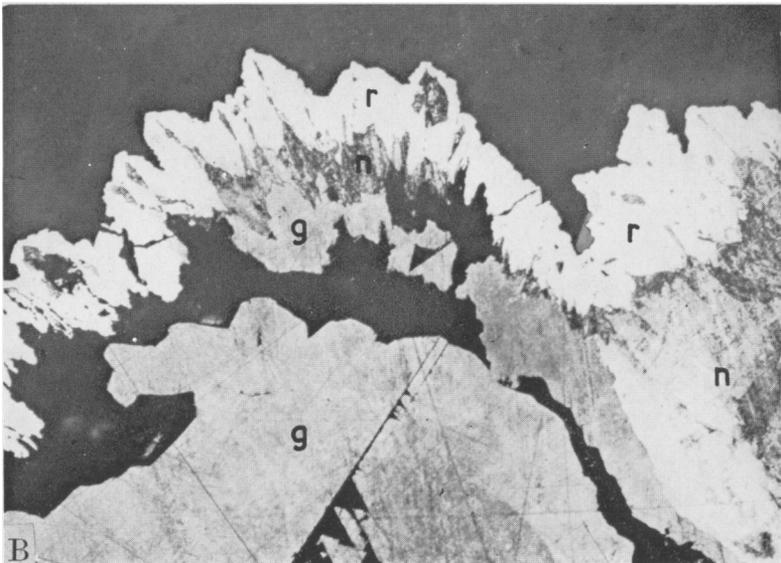
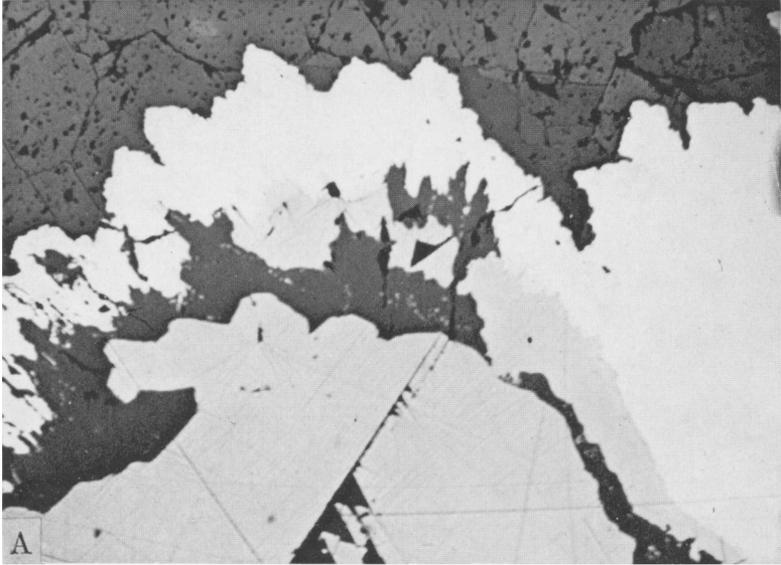
A. Unetched, reflected light,  $\times 70$ .

B. Galena and niccolite etched with nitric acid to display the rammelsbergite bordering the niccolite. Reflected light,  $\times 70$ .

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*Present address:*

c/o Dominion Gulf Company,  
165 Bloor Street East,  
Toronto, Canada.



A. K. TEMPLE: PHOTOMICROGRAPHS OF RAMMELSBERGITE,  
WANLOCKHEAD, SCOTLAND.