SHORT COMMUNICATIONS

Riebeckite from near Sultan Hamud, Machakos District, Kenya

FINE specimens of striated, bladed prismatic and acicular riebeckite, sometimes radiating or platy, from the western flank of Masokani Hill, 9 miles NNW. of Sultan Hamud, Machakos District, Kenya, were acquired by the British Museum (Natural History) in 1944 (B.M. 1944, 105–9, 111) by exchange with Dr. C. Stansfield Hitchen, then Senior Government Geologist in Kenya. The riebeckite crystals, which are up to 6 cm in length, appear to have grown in a small vug or pocket, associated with quartz and, to a lesser extent, platy ilmenite and goethite pseudomorphing chalybite. Crocidolite (asbestiform riebeckite) has also been found. In one specimen (B.M. 1944,107) the riebeckite and quartz grow out of a highly weathered granitic rock, largely consisting of microcline microperthite, with some quartz and riebeckite.

In 1946, a magnificent specimen of riebeckite prisms intergrown with and included in large quartz crystals, of total weight 97 lb (fig. 1), was presented to the Museum by Major H. W. J. Lambert, who relates how he found the specimen in 1940 at a locality some 10 miles south of Sultan Hamud railway station, had it carried on a pole and canvas stretcher to the railway line, waved down the train, and conveyed it safely to Nairobi, where it was exhibited at the Coryndon Museum. The largest riebeckite crystals on this specimen are 18 cm long and 1·6 cm across; the acicular crystals included within the quartz are randomly oriented, in the rutile habit. Dr. Hitchin saw the specimen and considered that it was almost certain to have originated at Masokani Hill and been taken to the second locality by the local inhabitants.

The original specimens were exhibited by Dr. Hitchen with other minerals from the Machakos District at the meeting of the Mineralogical Society of 8 June 1944 and described by one of us (W. C. S.) at the Society's meeting of 2 November 1944; the large specimen was exhibited by the Department of Mineralogy, British Museum of Natural History, at the meeting of the Society on 6 June 1946.

Goniometric measurements on the original specimens gave an angle between the prism faces {110} of 55° 34′, *bm* being 62° 13′. Other faces present in this zone are (010) and high index vicinal forms near (100). One crystal with terminal faces showed the presence of (121) and also the forms {101} and {001}.

An analysis of the riebeckite with its optical and physical properties is given in table I. The X-ray data were first determined by Dr. F. A. Bannister from single-crystal photographs and have been confirmed by powder measurements. For comparison, the analysis and other data of a riebeckite from the Mpyupyu Hill pyrochlore–aegirine–riebeckite syenites, Malawi (Garson, 1960) is also given. The Kenyan riebeckite is

FIG. 1. Riebeckite with quartz from near Sultan Hamud, Machakos, Kenya. Approx. $\frac{1}{4}$ natural size.

slightly more magnesian (Mg ratio: 5·0) than the specimen from Malawi (1·5) but in general the two analyses are similar. Closer resemblance with the Kenyan amphibole lies with the zinc- and lithium-bearing riebeckitic arfvedsonite from the fine riebeckite granite (PB 57) of the Sara–Fier complex, Northern Nigeria (Borley, 1963) and, especially, the crocidolite from the banded ironstones of Kliphuis, Griqualand, South Africa (Peacock, 1928), with Mg ratios of 6·2 and 6·3, respectively, calculated in the former case with Li substituting for Mg. In physical and optical properties the Kenyan riebeckite strongly resembles the amphibole, described by Souza-Brandao (1904–7), which occurs in large crystals, up to 40 cm in length, in the rock, later named pedrosite, from Alter-Pedroso, Portugal. Unfortunately, no analysis is given.

Baker (1954), who mapped the area south of Machakos, shows the area around Masokani Hill to consist of migmatite and biotite gneiss of

TABLE I. Analyses of riebeckites

	1	2		Numbers of ions on the basis of 24 (O,OH,F) 1		2	
SiO_2	50·21	49·1	Si	7·802	8·00	7·728	7·93
TiO_2	0·12	0·9	Al^{iv}	0·198		0·205	
Al_2O_3	1·66	1·1					
Fe_2O_3	16·51	14·1	Al^{vi}	0·106	5·07	—	4·70
FeO	21·23	19·3	Ti	0·014		0·106	
MnO	0·09	2·2	Fe^{3+}	1·931		1·676	
MgO	1·07	0·3	Mg	0·248		0·070	
CaO	0·55	1·1	Fe^{2+}	2·759		2·549	
Na_2O	6·46	7·7	Mn	0·012		0·294	
K_2O	0·52	1·6					
H_2O^+	1·65	0·9	Na	1·946	2·14	2·358	2·84
H_2O^-	—	0·1	Ca	0·092		0·164	
F	0·10	2·5	K	0·103		0·322	
Total	100·17	101·0	OH	1·711	1·76	0·95	2·19
Less O ≡ F	0·04	1·1	F	0·049		1·244	
Total	100·13	99·9	100 Mg/(Mg+Fe^{2+}+Fe^{3+}+Mn)	5·0		1·5	

	1		2	
α	1·695	deep prussian blue	1·691	deep inky greenish-blue
β	1·700	blue-grey	1·695	bluish-violet
γ	1·703	pale straw yellow	1·700	greenish-brown
α: [001]	1°		2½–3°	
D	3·388		3·295	
a (Å)	9·76		—	
b	18·04		—	
c	5·33		—	
β	103·54°		—	
V(Å³)	912·4			

1. Riebeckite, Masokani Hill, Sultan Hamud, Kenya (B.M. 1944,109). Anal. M. H. Hey.
2. Riebeckite, riebeckite microsyenite, Mpyupyu Hill, Lake Chilwa, Malawi (B.M. 1964,454). (Garson, 1960, pp. 30 and 33). Anal. D. I. Bothwell (includes P_2O_5, 0·1).

the Basement System (≡ Mozambiquian), with some amphibolite, kyanite, and staurolite. There is considerable development locally of red lateritic earth. Baker mentions the riebeckite, crocidolite, and ilmenite locality as comprising infilled and overgrown excavations and workings on the northern ridge of the Masokani range, and presumes their origin to have been pegmatitic. The association with crocidolite, goethite after chalybite, and ilmenite is suggestive of a banded ironstone paragenesis. However, since the nearest known outcrop of Banded Ironstone lies some 140 miles to the west, in the Nyanzian of Tanzania, from which crocidolite is not recorded, the former, pegmatitic, origin is considered to be rather more probable.

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[*Manuscript received 6 June 1968*]

A magnesioriebeckite–gorceixite schist from south-west Tanzania

A SCHIST from the Mkulwe area of south-west Tanzania (Q.D.S.242, International Sheet No. SC.36 C.III) is of interest because of the nature of the alkali amphibole it contains and the presence of a phosphate mineral of the plumbogummite group.

The schist occurs near the Zambian border, in a region occupied by NNW.-striking, sheared, slightly gneissose biotite–muscovite post-orogenic granite, tentatively ascribed to Karagwe–Ankolean age. The granitic terrain is separated by the Kanda fault and a wide eluvial plain from the Ufipa gneisses, which occur in the north-west–south-east escarpment to the north-east. The Ufipa gneisses and other metamorphic groups further to the north and east belong to the Ubendian System. The area has been mapped by van Loenen and Kennerley (1962), who make no mention of the schist in their brief description, and its field relations are uncertain.

In hand specimen the rock is grey, fine- to medium-grained, and somewhat schistose in appearance. The thin section shows the schistosity clearly, resulting from the tendency of the dark minerals, especially biotite, to occur in bands. The predominant mineral is albite, forming a mosaic of small grains. Interspersed in this are large, porphyroblastic crystals