

*Helvine from a lithium pegmatite near Salisbury,
Southern Rhodesia.*

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Summary. A new occurrence of helvine, the rare manganese end-member of the helvine group, is described. The mineral is found in a granite pegmatite associated with microcline-perthite, petalite, spodumene, muscovite, and spessartine. A chemical analysis of the mineral is given.

DURING the summer of 1957 the writer had an opportunity of examining the Casa Ventura lithium pegmatite, situated in Pre-Cambrian rocks some 16 miles to the east of Salisbury, in Southern Rhodesia. During the examination tiny crystals of a sulphur-yellow mineral, considered possibly to be microlite, were observed, but, on subsequent chemical and X-ray examination, they have been identified as the rare manganese-beryllium silicate helvine.

The area in question forms part of the Pre-Cambrian Basement Complex of the Bulawayan System (Macgregor, 1951) and consists of a belt of metamorphosed basic volcanics and igneous rocks referred to as greenstones and greenschists. These are interbedded with various crystalline schists and ironstones of sedimentary origin and enveloped by intrusive granitic rocks.

Apart from important gold occurrences, numerous pegmatites generally rich in a suite of lithium minerals are found within this region. The present pegmatite has the shape of an inclined lenticular sheet surrounded by greenstone. The main body of the pegmatite consists of grey coarse microcline perthite associated with a large amount of dark grey, resinous petalite, forming veins and isolated pods, which intersect and in part replace the feldspar. Abundant quartz with a yellowish muscovite and, in places, containing large amounts of spessartine garnet, constitutes a later phase of mineralization. To this late sequence belong also isolated veins and irregular bodies composed of fine-grained fibrous spodumene, quartz with some muscovite, and albite. Due to its fineness and in part to the striking resemblance to the albite variant cleavelandite,

the spodumene is not always recognized. The helvine is almost invariably associated with the spodumene and forms regular tetrahedral crystals with an edge length of about 1–2 mm. Some larger aggregates of helvine have been observed, together with lepidolite, but also in this case the mineral is confined to the spodumene veinlets.

Small amounts of columbite and a blue manganiferous apatite have also been noted. Large-scale hydrothermal alteration of petalite into rose-pink montmorillonite has taken place, especially along contacts with spodumene veins. Similar alteration of petalite has been recorded from Okehampton, Devon, by McLintock (1923) and from the Varuträsk pegmatite in northern Sweden by Quensel (1937). It is interesting to note that in the present case neither the spodumene nor the microcline show any alteration of this kind.

TABLE I. Chemical analyses of helvines.

		1.	2.	3.
SiO ₂	33.62	31.42	31.54
TiO ₂	n.d.	—	—
Al ₂ O ₃	1.21	0.36*	0.37
BeO	12.88	10.97	13.60
FeO	2.24	2.99	18.02
MnO	45.46	51.64	26.51
ZnO	1.20	—	5.61
MgO	tr.	—	none
CaO	0.30	—	1.62†
Na ₂ O	0.03	—	—
K ₂ O	0.08	—	—
Li ₂ O	0.15	—	—
H ₂ O—	0.02	—	0.06
S	5.64	4.90	5.34
		102.83	102.28	102.68
Less O ≡ S	2.81	2.45	2.67
		100.02	99.83	100.01
Sp. gr.	3.22 ± 0.01		3.334
		(Berman balance)		
n	1.732 ± 0.002		1.746

1. Helvine from Casa Ventura pegmatite, near Salisbury, S. Rhodesia. Analyst: O. von Knorring.

2. Helvine from a pegmatite, Amelia County, Virginia. Analyst: B. E. Sloan (Glass *et al.*, 1944, p. 180).

3. Helvine from a tactite, Iron Mountain, New Mexico. Analyst: R. E. Stevens (Glass *et al.*, 1944, p. 170).

* TiO₂, Al₂O₃, CaO, Na₂O, K₂O, H₂O.

† Partly due to the presence of fluorite.

Observations in the field show that the helvine was formed during the hydrothermal stage of pegmatite consolidation and is connected with the other manganiferous minerals, spessartine, manganapatite, and columbite.

Helvine has been recorded principally in the following types of mineral deposits (Glass *et al.*, 1944; Neumann, 1950): granite pegmatites, nepheline syenite pegmatites, contact metasomatic deposits, hydrothermal veins, and as a cavity mineral in syenite. The mineral is found most frequently and often in large amounts within contact metasomatic deposits, e.g. skarns and tactites, and is of comparatively rare occurrence in granite pegmatites. Helvine with a chemical composition and a mineral association close to the present one has been reported from a granite pegmatite in Amelia County, Virginia, where it occurs with spessartine as the last mineral to crystallize (Holser, 1953, p. 608). Table I shows the composition of the present helvine compared with analyses of helvines from Amelia County, and Iron Mountain in New Mexico. The material used for analysis had some finely intergrown quartz, feldspar, and spodumene impurities.

References.

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