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An occurrence of cymrite in black shale, north-west Nelson, South Island, New Zealand

CYMRITE, $BaAlSi_3O_8(OH)$, a rare barium tectosilicate, was first reported by Smith *et al.* (1949) as colourless crystals associated with a manganese ore body at the Benallt Mine, Caernarvonshire, Wales. Later, Brosgé (1960) recorded it in samples from a pyritized zone in the south-central Brooks Range, Alaska. A further occurrence of cymrite from the Brooks Range, Alaska, was reported by Runnells (1964) from a copper-bearing deposit.

During the course of our investigation of black shales and cherts from an area near Aorangi gold mine, north-west Nelson, South Island, cymrite was identified by X-ray diffraction and optical examination from specimens collected in Waterfall Creek (40° 42′ 57″ S., 172° 26′ 15″ E.). We believe this is the first report of cymrite in New Zealand. Furthermore, we have noted that there appears to be a close similarity in the mode of occurrence of the Aorangi Mine cymrite to that described by Brosgé (1960). The mineral is confined to a pale-coloured band, about 5 mm thick, which is concordant with the bedding. The band contains a narrow layer rich in pyrite, together with quartz, illite, calcite, and mica, and occurs within a condensed graptolite-bearing sequence of black shale and chert mapped as Aorangi Mine Formation (Bishop, 1968), ranging in age from Tremadocian to Upper Arenigian (Lower Ordovician). A full description of the geology of the Aorangi Mine area is in preparation by R. A. Cooper (N.Z. Geological Survey).

Dr. G. A. Challis, Petrology Section, N.Z. Geological Survey, has kindly examined optically the thin sections of the specimens. The largest grain observed is 0·15 mm across, but most of the cymrite crystals are considerably smaller. The grains show the characteristic close-spaced basal cleavage reported and figured by Smith *et al.* (1949). Refractive index measurements gave ϵ 1·616 and ω 1·622 (both $\pm$0·002). However,

the mineral shows a slightly lower birefringence than those reported by Smith *et al.* (1949) and Runnells (1964).

X-ray fluorescence examination confirmed the presence of an appreciable amount of barium in the sample.

The fact that cymrite has been recorded in rather similar geological environments in two adjacent areas in Alaska as well as in New Zealand suggests that it may well be more widespread in analogous rocks.

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Quantitative analysis by means of the laser microanalyser LMA-1

DIFFERENT methods of microanalysis have been used recently in the investigation of the chemical composition and the internal homogeneity of mineral grains in rocks and ores. These methods of analysis are popular now because they make it possible to measure the contents of almost all chemical elements in separate (individual) small grains of minerals already identified by examination in transparent or reflected light. In addition, the mineral grains are not destroyed when analysed. Electron-probe microanalysis and also emission spectral microanalysis with the laser-probe are the best-known methods in this field.

But the use of electron-probe microanalysis is limited in the investigation of trace elements in minerals because the limits of detectability for most elements in this method lie between tenths and hundredths of weight per cent. For 'laser-probe'