

containing prehnite are massive, unweathered, and not veined by later material.

The experiments of Coombs *et al.* (1959) show that at water pressures up to 5000 bars prehnite is not stable above 450° C, so that a magmatic origin is very unlikely. The extremely close association with biotite, itself only a minor constituent of the rocks, must be taken into account in considering the origin of the prehnite. The compositions of biotite and prehnite are too dissimilar for one to have been produced from the other, particularly as both minerals appear to be quite fresh and free from any complementary breakdown products. A possible explanation of this occurrence is that the biotite and prehnite formed simultaneously from the surrounding hornblende as a result of low temperature potassium metasomatism.

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*References*

- AKAAD (M. K.), 1956. *Quart. Journ. geol. soc. Lond.*, vol. 112, 263 [M.A. 14-159].  
COOMBS (D. S.), ELLIS (A. J.), FYFE (W. S.), and TAYLOR (A. M.), 1959. *Geochimica Acta*, vol. 17, p. 53 [M.A. 16-487].

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*Hydromagnesite from Hindubagh, Zhob Valley,  
West Pakistan*

THE Hindubagh area constitutes a large igneous complex that includes serpentinites, peridotites, harzburgites, chromitites, &c., and is the important chrome ore producing district of Pakistan. So far there has been no mention of this mineral in the literature on this area.

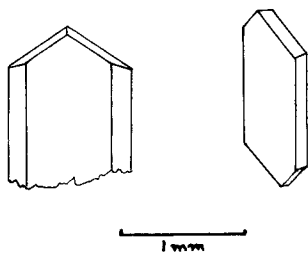


FIG. 1. Two common habits of hydromagnesite from Hindubagh.

The hydromagnesite occurs on the joint surfaces of sheared serpentinite, as pearly white crusts, tufts, and aggregates of radiating, colourless, and tiny crystals (max. 1 mm long); they show polysynthetic twinning with {100} as the twin plane. Due to the small size

of the crystals, the twinning is best appreciated under the microscope. The mineral is biaxial positive with a moderate  $2V$  and has  $\alpha = 1.516$

and  $\gamma = 1.545$  (both  $\pm 0.002$ ). The chemical composition of the mineral is: MgO 44.01, CO<sub>2</sub> 35.70, H<sub>2</sub>O 19.53, sum 99.24.

The mineral is an alteration product and its occurrence on the joint faces of sheared serpentinite shows it to have originated by the action of carbonated waters; the joint openings and the sheared nature of the rock facilitating the movement of the aqueous liquid and in its chemical reaction with the rock.

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### BOOK REVIEWS

SHAW (D. M.), editor. *Studies in analytical geochemistry*. Toronto (Royal Society of Canada Special Publication No. 6), vii+139 pp. Price: 48s.

The book comprises six papers presented at a symposium as part of Section III of the Royal Society of Canada Meeting in 1962. Authors and papers are:

K. K. Turekian: The use of trace-element geochemistry in solving geologic problems.

H. G. Thode: Sulphur isotope geochemistry.

R. N. Clayton: Oxygen isotope geochemistry and thermometry of metamorphic rocks.

M. Fleischer and W. O. Robinson: Some problems of the geochemistry of fluorine.

E. H. T. Whitten: Application of quantitative methods in the geochemical study of granite massifs.

G. V. Middleton: Statistical inference in geochemistry.

The paper by K. K. Turekian explores the value of trace-element distribution and relationships in solving specific geological problems. He concludes (rather sweepingly) that such data rarely give unambiguous results when applied to stratigraphic correlation, delineation of the origin of certain metamorphic and igneous rocks, sedimentation, and geochemical palaeoecology, but may be of greatest use in studies of diagenesis, metasomatism, and anatectic processes.