

Apophyllite from Traprain Law, East Lothian.

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INTRODUCTION and mode of occurrence.—During a visit in 1929 to the well-known phonolitic laccolith of Traprain Law, East Lothian, beautiful crystals of apophyllite were discovered in drusy cavities. It was found possible to collect numerous specimens which are now in the Hunterian Museum, University of Glasgow (M 5970). There is no previous record from the locality and the following is a brief description of the rock and its associates.

Along with the apophyllite occur well-formed icositetrahedra of analcime.¹ A thin section reveals that the apophyllite is of later crystallization than the analcime. The latter mineral lines the walls of the cavities, with which the apophyllite is seldom in contact. Radiating fibres of pectolite are occasionally seen on the surface of the analcime. The discovery of the pectolite is due to Mr. D. M. Cookson of Cambridge University. Mr. Cookson, to whom the present authors were referred by Mr. D. Balsillie, very kindly forwarded specimens.

The phonolite bordering the druse is considerably decomposed. The first episode in the infilling of the cavity, preceding the formation of the analcime and the apophyllite, was a crystallization of albite and aegirine-augite. These minerals, though somewhat altered, are fresher than the feldspar (soda-orthoclase) and pyroxene (aegirine-augite) in the body of the rock. Chloritic aggregates are found included in, or on the surface of, the apophyllite crystals.

Physical and optical properties.—The faces represented are c (001), a (100), and p (111); c is the best developed, giving the crystals a tabular form. The edge ac is commonly 0.75 cm. in length but may

¹ Analcime as a primary constituent of the phonolite has been recorded by E. B. Bailey, *The geology of East Lothian*, Mem. Geol. Surv. Scotland, 1910, p. 129; and by A. G. MacGregor and F. R. Ennos, *The Traprain Law phonolite*, Geol. Mag., 1922, vol. 59, pp. 517-519.

be twice this amount. The basal cleavage is perfect, and there is an imperfect prismatic cleavage distinct enough to determine the edges of crystal fragments. The colour varies from pale pink to colourless, the basal face exhibiting the characteristic pearly lustre. The refractive index is slightly above 1.53, while the specific gravity is 2.38. The birefringence is low. The majority of the crystals are uniaxial, but occasional pseudo-biaxial figures occur; in all cases a positive sign was recorded. In basal section the rings of the interference-figure are only white and black, no matter how thick the section. In other sections the well-known abnormal interference-colours were observed.

Other Scottish localities.—A comprehensive list of Scottish localities for apophyllite is given by Heddle.¹ The majority of these are in the Tertiary basalt lavas of Skye. Of special interest in the present connexion are occurrences at Talisker, where the mineral is associated with pectolite (and scolecite), and at Rudha nan Clach, Loch Bracadale, where cavities neighbouring those with apophyllite contain (among other minerals) analcime. In Mull, at the south end of the Wilderness, north of Loch Scridain, apophyllite occurs on analcime (and is penetrated by scolecite). Association of apophyllite and pectolite is also seen in quartz-dolerite sills in Auchinstarry quarry, Kilsyth, Stirlingshire, and in Ratho quarry, Midlothian. An additional occurrence to those given by Heddle is in the analcime-syenite of the Howford Bridge sill, Ayrshire.²

¹ M. F. Heddle, *Mineralogy of Scotland*. Edinburgh, 1901, vol. 2, pp. 81-82.

² G. W. Tyrrell, Some dolerite-sills containing analcime-syenite in central Ayrshire. *Quart. Journ. Geol. Soc. London*, 1928, vol. 84. The apophyllite is not mentioned by the author, but is referred to in the discussion by Dr. H. H. Thomas (p. 568).