Occurrences of bavenite in Switzerland.

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BAVENITE was first described from Baveno by Artini[1] in 1901 as monoclinic crystals of prismatic habit in pegmatitic druses in granite and given the formula $3CaO.Al_2O_3.6SiO_2.H_2O$. More recently, the mineral has been described pseudomorphous after beryl from Himalaya mine, Mesa Grande, San Diego County, California, by Schaller and Fairchild[2] (1932) and shown to contain beryllium as an essential constituent. In 1933 X-ray determinations by Ksanda and Merwin[3] indicated a unit cell with dimensions a 9·67, b 11·53, c 4·95Å., and showed the symmetry to be orthorhombic and referable to the space-group V^1, V_h^1, or C_{2v}^1. Revised crystallographic orientation and optical constants were also suggested by these authors.

The material about to be described is from two localities in Switzerland. Of fourteen specimens from a fissure in the rocks below the Muotta Nera, Piz del Laiblau, Val Nalps, Tavetschthal, Graubünden, selected by Mr. F. N. Ashcroft in 1935 and 1936 from a fairly large series stocked by Adolf Caveng of Sedrun, one (B.M. 1937,598) carries the mineral as roughly radiating aggregates of platy fibres of very pale brown colour in bulk. The largest mass measures about one cm. in diameter. Individual crystals from 0·01 to 0·05 mm. in width and rarely exceeding 2 mm. in length are colourless. No trace of the mineral has been found on the remaining thirteen specimens. Adularia, albite, sphene, epidote, quartz, chlorite, clinozoisite, and tremolite comprise the associated mineral assemblage of this fissure.

A further six specimens (B.M. 1939,592, 598, 602, 603, 605, 866) in a series of nineteen selected by Mr. Ashcroft in August 1938 from Caveng's stock have rounded brown masses of radiating crystals of bavenite of similar dimensions to those from Muotta Nera associated

[1] E. Artini, Atti (Rend.) Accad. Lincei, 1901, ser. 5, vol. 10, sem. 2, p. 139.
[2] W. T. Schaller and J. G. Fairchild, Amer. Min., 1932, vol. 17, p. 409. [M.A. 5-230.]
[3] C. J. Ksanda and H. E. Merwin, Amer. Min., 1933, vol. 18, p. 341. [M.A. 5-474.]

with albite, stilbite, apatite, adularia, and chlorite. With the exception of chlorite, which may clothe the bavenite aggregates with a thin green mantle of minute crystals, the beryllium mineral was the last to be deposited. The locality of these specimens is on the slopes of the east side of Val Casaccia, Val Cristallina, Graubünden.

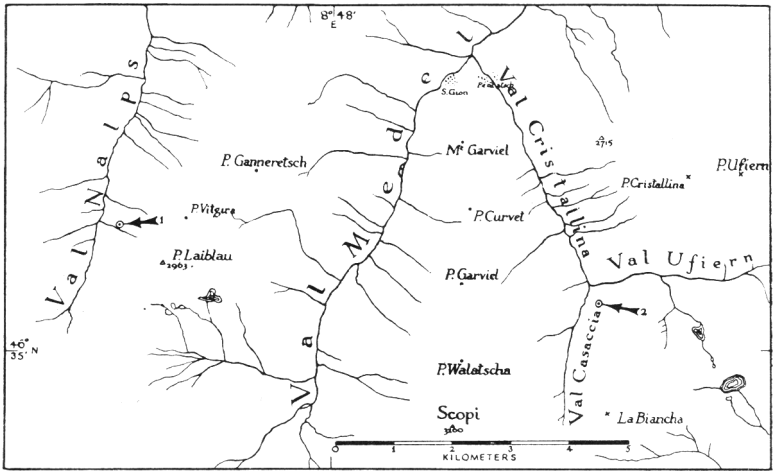

FIG. 1. Sketch-map of bavenite localities in Switzerland. 1, Muotta Nera. 2, Val Casaccia.

Assuming the orientation of Ksanda and Merwin, whereby the mineral is elongated parallel to [001] and the largest face becomes (010) making the cleavage parallel to (100), the Swiss crystals are striated parallel to [001] and no terminal faces have been observed. The refractive indices, α 1·583, β close to α, γ 1·589, and sp. gr. 2·74 are in good agreement with the published data.

The identity of the Swiss material has been demonstrated by comparison of a rotation photograph about the axis of elongation with a similar photograph of the mineral from the type locality. 10° oscillation photographs about each of three mutually perpendicular axes of rotation served to verify the orthorhombic character of the mineral and further gave cell dimensions of a 19·34, b 23·06, and c 4·95Å. The volume of the unit cell is thus four times that given by Ksanda and Merwin, and on the basis of 112 oxygen atoms and hydroxyl groups the unit-cell content is $Ca_{16}Si_{36}Al_8Be_4(O,OH)_{112}$, which may probably be grouped to the formula $4Ca_4(Si_9Al_2Be)O_{24}(OH)_4$.

Carbon are spectra of the type material from Baveno and that from Muotta Nera indicate the presence of similar quantities of beryllium in each. A series of comparison spectra of various silicon beryllium mixtures indicate that in both cases the beryllium exceeds one per cent. of the total. Besides the major constituents, boron occurs in both samples, and its characteristic lines may also be observed in the published spectrum of the Californian material. Magnesium and iron occur in small amounts in the Muotta Nera bavenite and in less amount in that from Baveno. Germanium has been detected in the spectrum of the latter, but not in that of the Swiss material.

The material described above is from a large collection of nearly seven thousand precisely localized specimens of Swiss minerals presented by Mr. F. N. Ashcroft to the British Museum during the period 1921 to 1939.

The writer is indebted to Dr. M. H. Hey who, on the basis of a preliminary optical examination and a microchemical test for beryllium, suggested the identity of the mineral on the Muotta Nera specimen, and to Miss J. M. Sweet for directing his attention to the Val Casaccia material.