

# Antlerite, from Takitimu Mountains, New Zealand

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THE basic copper sulphate, antlerite, was found as a mineral of secondary origin in crush-breccias in the northern Takitimu Mountains. Qualitative chemical tests and optical determinations have been made. There is no indication that any workable body of ore exists.

## OCCURRENCE

During the course of a recent geological survey of the northern part of the Takitimu Mountains in western Southland, New Zealand, the junior author found bluish-green efflorescences on epidotized crush-breccias in greywackes and argillites of the Te Anau Series, that are probably pre-Permian in age, at the summit of a prominence a little more than one mile north-east of Clare Peak, Takitimo Survey District.

## CHEMICAL AND OPTICAL PROPERTIES

The mineral is not readily soluble in water but dissolves easily in cold dilute nitric acid, and this solution gave strong qualitative chemical tests for copper and  $\text{SO}_4$ ; water was found in the dry sample. Refractive indices were determined by the immersion method and the optic axial angle was found by standard universal stage technique. These data together with the mineral's pleochroic scheme are listed below and at the same time compared with appropriate data determined by other observers.

	Posnjak and Tunell (1929) Larsen and Berman (1934)	Takitimu mineral
$\alpha$	1 726	1 724 $\pm$ 0 005
$\beta$	1 738	1 740
$\gamma$	1 789	1 790
$\gamma-\alpha$	0 063	0 066
$2V$	53°	55-60°
X	yellowish-green	yellowish-green
Y	bluish-green	bluish-green
Z	green	green

Two distinct cleavages were noted, the better of these being parallel to the plane containing Y and Z vibration directions of the refractive index ellipsoid, and normal to the optic axial plane; a second but less well developed cleavage is parallel to the optic axial plane and is presumably Palache's (1939a, p. 294) cleavage (100)

These data are quite comparable with those recorded for antlerite but at the same time similar to those of the mineral brochantite. However, the refractive index  $\beta$  is quite distinct in the two cases,

viz., 1.778 for brochantite (Palache, 1939b, p. 478) and 1.737 for antlerite, and further there is a small but distinct difference between the sizes of the optic axial angles in these two minerals.

#### ORIGIN

Since the epidotized crush-breccia contains scattered patches of a cupriferous sulphide that exhibits considerable alteration to limonite it seems reasonably certain that the antlerite has been derived therefrom. Although antlerite is, in the main, a rare mineral, it forms the main body of ore at Chuquicamata, Chile, one of the world's largest copper deposits, where it has been derived by deep oxidation of chalcocite-bearing ores.

There is no indication that the mineral is any more than a mineralogical curiosity in the Takitimu locality.

#### REFERENCES

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