

Leucophosphate and barbosalite from north-east Brazil

SEVERAL phosphate minerals are known in the pegmatites of north-eastern Brazil, and more particularly from the Boqueirão pegmatite mine, situated near Parelhas town of the Rio Grande do Norte state. A new study of the minerals from this mine has added two more rare species to the list given by Murdoch (1958).

Leucophosphate. Minute quantities of well developed but very fine spherulitic masses of pink coloured crystals are seen in a matrix of dark ferri-sicklerite and probable triplite mass. Only two such aggregates were obtained, and they were carefully separated for mineralogical study.

No crystal forms are discernible; optical determinations gave with difficulty a value of 1.720 ± 0.003 for β , and optical character as bi-axial positive. A spectrographic analysis gave: major Fe and traces Mg and Mn. An X-ray powder diagram gave the following intense lines well comparable with leucophosphate, $(K, NH_4)(Al, Fe)_2(PO_4)_2 \cdot OH \cdot 2H_2O$ (Lindberg, 1957; Simmons, 1964): d 6.80 Å, vs; 6.03, s; 3.04, s; 4.70, m; 2.904, m; 2.820, m; 7.44, w. Further studies could not be made because of scarcity of material.

From the occurrence and association it is concluded that leucophosphate here is secondary in origin, resultant of a possible hydro-thermal alteration of the iron phosphates present in the pegmatites. This is the seventh occurrence of leucophosphate in nature (Simmons, *op. cit.*).

Barbosalite. Patchy, dark green film-like masses of fine aggregates are found in the ferri-sicklerite and lithiophilite mass in one sample. The mineral is limited in quantity and frequency. It is intimately associated with ferri-sicklerite from which careful separation was made.

Optically it is seen as dirty green mass with clayey habit. The index of refraction in certain grains was higher than 1.795, with a diffuse optic picture, probably biaxial. A spectrographic analysis gave the following elements: majors Fe, traces Mn and Mg. An X-ray powder diagram gave the following intense lines, which are perfectly comparable with barbosalite, $Fe^{2+}Fe^{3+}_2(PO_4)_2(OH)_2$ (Lindberg and Pecora, 1958): d 3.360, vs; 3.320, s; 4.825, ms; 3.235, m; 3.172, m.

Related minerals such as lazulike and scorzalite are not recorded from this pegmatite, though their presence has been noted in other pegmatites of this province (Bhaskara Rao and Cunha e Silva, 1963). Barbosalite here is an alteration product of ferri-sicklerite.

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Bismuth minerals from Borborema region, Brazil

THE Borborema metallogenetic province in north-eastern Brazil, extending over parts of Paraíba and Rio Grande do Norte states, is well known due to its mineral riches. This note sums up studies made on the bismuth minerals found there.

Mineralization of bismuth is observed both in the pegmatites that cut the mica schists of the Serido formation, and in the skarnites and tactites of the Middle Parelhas formation, both of them belonging to the Ceará series of the Algonkian period. The minerals include native bismuth, bismuthinite, bismutite, bismutotantalite, bismoclite, arseno-bismite, and some doubtful species.

Native bismuth is found as masses in pegmatites and as an accessory in tactites, recovered in the latter during the concentration of scheelite in Brejui Mine near Currais Novos, Rio Grande do Norte state. Masses weighing up to 13 Kg have been found in the Boqueirão pegmatite near Parelhas in the same state. The characteristic association of this mineral in tactites is with molybdenite and scheelite, while in pegmatites it is noted with quartz. It is seen to alter or with a sulphide capping in tactites. The mineral is pure with no special features.

Bismuthinite is found both in the pegmatites and tactites, with a whitish to dark metallic grey colour and a distinct tabular habit. Samples from the Boqueirão pegmatite have shown needles of aphezite (black tourmaline) as inclusions along the cleavages. Its association in Brejui mine is with molybdenite. Some samples that have doubtful characters have been X-rayed and the presence of some other sulphide