Moraesite $Be_2(PO_4)(OH)\cdot 4H_2O$

Crystal Data: Monoclinic. *Point Group: m.* As radiating tabular acicular crystals, elongated along [001], to 5 mm; dominant forms include {100}, {1$\bar{3}$0}, {130}, {1$\bar{3}$1}, {131}; aggregates may resemble cotton-balls, or in matted coatings and crusts.

Physical Properties: *Cleavage:* Perfect, two directions yielding traces parallel [100] and [001] on {100}. Hardness = n.d. D(meas.) = 1.805 D(calc.) = 1.806

Optical Properties: Translucent. *Color:* White. *Streak:* White. *Luster:* Silky. *Optical Class:* Biaxial (–). *Orientation:* $Z = b$; $Y \wedge c = 11°$. $\alpha = 1.462$ $\beta = 1.482$ $\gamma = 1.490$ 2V(meas.) = 65°

Cell Data: *Space Group: Cc.* $a = 8.553(6)$ $b = 36.957(18)$ $c = 7.155(8)$ $\beta = 97.93(9)°$ Z = 12

X-ray Powder Pattern: Sapucaia mine, Brazil; nearly identical to bearsite. 7.00 (10), 3.278 (9), 4.24 (6), 3.023 (6), 2.819 (6), 6.15 (4), 2.325 (4)

Chemistry:

	(1)	(2)
P_2O_5	34.76	35.12
Al_2O_3	0.00	
Fe_2O_3	0.11	
BeO	25.28	24.76
H_2O	39.80	40.12
insol.	0.30	
Total	100.25	100.00

(1) Sapucaia mine, Brazil; iron impurity as hematite; corresponds to $Be_{2.04}(P_{0.99}O_4)(OH)\cdot 3.98H_2O$. (2) $Be_2(PO_4)(OH)\cdot 4H_2O$.

Occurrence: A rare late-stage hydrothermal mineral in complex zoned granite pegmatites.

Association: Beryl, beryllonite, hydroxylherderite, frondelite, triphylite, apatite, muscovite.

Distribution: In Brazil, from the Sapucaia pegmatite mine, about 50 km east-southeast of Governador Valadares; at the Mulundu and Humaita pegmatites, along the Jequitinhonha River, Itinga, and from the Almerindo pegmatite, Linópolis, Minas Gerais. At the Palermo #1 mine, near North Groton, Grafton Co., New Hampshire; from Greenwood, in the Dunton quarry, Newry, and at Mt. Mica, near Paris, Oxford Co., Maine, USA. In the Viitaniemi pegmatite, near Eräjärvi, Finland. At Arnac-la-Poste, Haute-Vienne, France. From Bojeveskoje, Middle Ural Mountains, Russia. In the Londonderry quarry, 19 km south of Coolgardie, Western Australia.

Name: Honors Dr. Luciano Jacques de Moraes (1896–1968), Brazilian mineralogist and geologist.

Type Material: National Musuem, Rio de Janeiro, Brazil; National School of Mines, Paris, France; National Museum of Natural History, Washington, D.C., USA, 106577.

References: (1) Lindberg, M.L., W.T. Pecora, and A.L. de M. Barbosa (1953) Moraesite, a new hydrous beryllium phosphate from Minas Gerais, Brazil. Amer. Mineral., 38, 1126–1133. (2) Merlino, S. and M. Pasero (1992) Crystal chemistry of beryllophosphates: the crystal structure of moraesite, $Be_2(PO_4)(OH)\cdot 4H_2O$. Zeits. Krist., 201, 253–262.