

Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals are usually acicular, fibrous, and lath-shaped, elongated $\parallel$ [001] and flattened on {010}, may be diamond-shaped, to 4 cm; as crystalline aggregates, typically in the form of fans and rosettes, fine-grained, massive.

Physical Properties: *Cleavage:* {010}, perfect. Hardness = 2–2.5 $D(\text{meas.}) = 2.195$ (synthetic). $D(\text{calc.}) = 2.133$

Optical Properties: Transparent. *Color:* Colorless, white, may be blue; in transmitted light, colorless. *Luster:* Nearly vitreous to pearly on cleavages.

Optical Class: Biaxial (+). *Orientation:* $Y = b$; $Z \wedge c = 27^\circ\text{--}29^\circ$. *Dispersion:* $r < v$, weak. $\alpha = 1.508\text{--}1.512$ $\beta = 1.514\text{--}1.520$ $\gamma = 1.541\text{--}1.543$ $2V(\text{meas.}) = 71(3)^\circ$ $2V(\text{calc.}) = 73^\circ$

Cell Data: *Space Group:* $C2/c$. $a = 4.667(1)$ $b = 27.926(8)$ $c = 10.067(3)$
 $\beta = 105.01(2)^\circ$ $Z = 4$

X-ray Powder Pattern: Synthetic.

6.96 (100), 2.94 (27), 8.04 (18), 2.81 (13), 2.41 (12), 3.02 (10), 2.13 (10)

Chemistry:

	(1)	(2)	(3)
P_2O_5	34.59	34.52	34.88
MgO	29.97	25.12	29.71
CaO		5.71	
H_2O	35.38	34.27	35.41
Total	99.94	99.62	100.00

(1) Mejillones, Chile. (2) Ødegården, Sweden. (3) $\text{Mg}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$.

Occurrence: Formed from the chemical alteration of guano deposits (Mejillones, Chile; Imperial Canyon lava tubes, Kenya), and an elephant tusk (Edgerton, Minnesota, USA). As a rare alteration product of primary phosphate-bearing minerals (Wodgina, Australia; Bendada pegmatite, Portugal).

Association: Hannayite, schertelite, lithiophilite, sicklerite, purpurite, collinsite, apatite, dolomite, calcite.

Distribution: Found on Mejillones Island, Chile. In Western Australia, found in the Pilbara district, at Wodgina. From Marlborough, New Zealand. In the USA, found near Edgerton, Pipestone Co., Minnesota. At the Ødegården apatite mines, Bamble, Norway. In the Bendada pegmatite, near Guarda, Portugal. Fine large crystals found in the Zheleznyi iron mine, Kovdor massif, Kola Peninsula, Russia. In Kenya, occurs in the Imperial Canyon lava tubes, Northern Chyulu Hills.

Name: In honor of Pierre Adolphe Bobierre (1823–1881), French agricultural chemist, who first described the mineral.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 753–754. (2) Frazier, A.W., J.R. Lehr, and J.P. Smith (1963) The magnesium phosphates hannayite, schertelite and bobierite. *Amer. Mineral.*, 48, 635–641. (3) Kaupstin, Y.L. (1971) Mineralogy of carbonatites. Nauka Publishers, Moscow, 174. (4) Mason, B. and P.J. Dunn (1974) An unusual occurrence of bobierite at Wodgina, Western Australia. *Mineral. Record*, 5, 265. (5) Takagi, S., M. Mathew, and W.E. Brown (1986) Crystal structures of bobierite and synthetic $\text{Mg}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$. *Amer. Mineral.*, 71, 1229–1233.