Bjarebyite $(Ba,Sr)(Mn^{2+},Fe^{2+},Mg)_2Al_2(PO_4)_3(OH)_3$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As multiply-faceted, steeply-terminated, spearhead-shaped crystals, to 3 mm, with as many as 14 forms discernable. Also as etched and striated prismatic crystals, and fibrous, massive.

Physical Properties: *Cleavage:* Perfect on {010} and {100}. Hardness = 4
D(meas.) = 3.90–3.95 D(calc.) = 3.92–4.02

Optical Properties: Translucent. *Color:* Emerald-green, with a faint bluish tint; pistachio to dark green. *Streak:* White. *Luster:* Subadamantine.
Optical Class: Biaxial (+). *Pleochroism:* Weak, grayish tan to pale yellow-green; also strong, X = colorless to pale brownish yellow; Y = brownish green; Z = apple-green or olive-green.
Orientation: $Y = b$; $Z \wedge c = 7°–8°$. *Dispersion:* $r \gg v$ to $r < v$. $\alpha = 1.692–1.724$
$\beta = 1.695–1.727$ $\gamma = 1.710–1.749$ 2V(meas.) = ∼35°–38° 2V(calc.) = 40°56′

Cell Data: *Space Group:* $P2_1/m$. $a = 8.930(14)$ $b = 12.073(24)$ $c = 4.917(9)$
$\beta = 100.15(13)°$ Z = 2

X-ray Powder Pattern: Palermo #1 mine, New Hampshire, USA.
3.090 (10), 8.81 (7), 2.681 (7), 1.495 (5), 4.97 (4), 4.47 (4), 2.910 (4)

Chemistry:

	(1)	(2)
P_2O_5		32.96
Al_2O_3	13.43	13.25
Fe_2O_3		3.30
FeO	8.67	5.94
MnO	9.56	15.98
SrO	1.57	
BaO	23.69	23.87
H_2O		4.70
Total		100.00

(1) Palermo #1 mine, New Hampshire, USA; by electron microprobe, partial analysis, total Fe as FeO, total Mn as MnO; corresponds to $(Ba_{1.1}Sr_{0.1})_{\Sigma=1.2}Al_{1.8}(Mn_{0.9}Fe_{0.9}Mg_{0.2})_{\Sigma=2.0}(PO_4)_3(OH)_3$.
(2) Buranga mine, Rwanda; average of two analyses, corresponding to $Ba_{1.00}(Mn_{1.45}Fe_{0.53})_{\Sigma=1.98}(Al_{1.67}Fe^{3+}_{0.28})_{\Sigma=1.95}(PO_4)_{2.97}(OH)_{2.90}$.

Mineral Group: Bjarebyite group.

Occurrence: A rare late stage reaction product of triphylite and amblygonite in complex granite pegmatites.

Association: Palermoite, augelite, childrenite, montebrasite, scorzalite, whitlockite, carbonate-apatite, siderite (Palermo #1 mine, New Hampshire, USA); bertossaite, lazulite-scorzalite, burangaite, trolleite, apatite, quartz (Buranga mine, Rwanda).

Distribution: From the Palermo #1 mine, near North Groton, Grafton Co., New Hampshire, USA. At the Buranga pegmatite, near Gatumba, Rwanda. In the Västanå mine, near Näsum, Skåne, Sweden.

Name: Honors Alfred Gunnar Bjareby (1899–1967), Swedish-American student of New England pegmatite minerals, Boston, Massachusetts, USA, who collected the first specimen.

Type Material: n.d.

References: (1) Moore, P.B., D.H. Lund, and K.L. Keester (1973) Bjarebyite, (Ba, Sr)(Mn, Fe, $Mg)_2Al_2(OH)_3(PO_4)_3$, a new species. Mineral. Record, 4, 282–285. (2) (1974) Amer. Mineral., 59, 873 (abs. ref. 1). (3) Moore, P.B. and T. Araki (1974) Bjarebyite, $Ba(Mn,Fe)_2^{2+}Al_2(OH)_3[PO_4]_3$: Its atomic arrangement. Amer. Mineral., 59, 567–572. (4) von Knorring, O. and A.-M. Fransolet (1975) An occurrence of bjarebyite in the Buranga pegmatite, Rwanda. Schweiz. Mineral. Petrog. Mitt., 55, 9–18. (5) Mandarino, J.A. and B.D. Sturman (1976) Kulanite, a new barium iron aluminum phosphate from the Yukon Territory, Canada. Can. Mineral., 14, 127–131.