Gorceixite $BaAl_3(PO_4)(PO_3OH)(OH)_6$

Crystal Data: Monoclinic or hexagonal. *Point Group*: *m* or $\bar{3}$ *m*. Rare rhombic crystals. May be radial fibrous in spheroidal concretions, to 1 cm; in microcrystalline grains and pebbles.

Physical Properties: *Fracture*: Porcelaneous [sic]. Hardness = 6 D(meas.) = 3.036-3.185 D(calc.) = 3.389

Optical Properties: Transparent. *Color*: Colorless, green, brown, may be mottled; colorless in thin section. *Luster*: Vitreous.
Optical Class: Uniaxial (+); anomalous, with low birefringence. ω = 1.610 ε = 1.620
Orientation: Length positive, parallel extinction.

Cell Data: *Space Group: R*$\bar{3}$ *m*. *a* = 7.0538(3) *c* = 17.2746(6) Z = 3
Space Group: *Cm*. *a* = 12.195-12.225 *b* = 7.040-7.056 *c* = 7.055-7.061 β = 125.10°-125.30° Z = 2
[Different conditions of formation and compositions might cause the symmetry observed.]

X-ray Powder Pattern: Big Fish River, Canada.
3.010 (100), 5.769 (93), 3.529 (56), 2.292 (39), 1.9197 (29), 2.232 (23), 1.7626 (20)

Chemistry:	(1)	(2)	(3)
P_2O_5	28.11	27.02	27.76
Al_2O_3	30.28	28.74	29.92
CaO		0.05	
FeO		0.12	
SrO	0.28	0.25	
BaO	28.9	29.50	29.99
Na_2O		0.17	
H_2O	[9.8]	[11.97]	12.33
F	2.3	0.07	
S	0.28		
- O = F		0.03	.
Total	[100.0]	97.86	100.00

(1) Sydney Basin, Australia; by electron microprobe and X-ray fluorescence, H_2O by difference; corresponds to $(Ba_{0.95}Sr_{0.01})_{\Sigma=0.96}Al_{3.02}(PO_4)_{2.01}[(OH),F]_{5.83}$. (2) Crosscut Creek, Rapid Creek area, Yukon Territory, Canada; electron microprobe analysis, H_2O calculated from stoichiometry. (3) $BaAl_3(PO_4)(PO_3OH)(OH)_6$.

Mineral Group: Alunite supergroup, plumbogummite group.

Occurrence: Probably always a secondary mineral; in novaculites and other sedimentary rocks; in carbonatites; from hydrothermal argillic alteration zones; in topaz greisen; in the fine-grained fraction of soils; commonly as favas in diamantiferous river sands.

Association: Dawsonite, alumohydrocalcite, nordstrandite (Sydney Basin, Australia); lazulite, siderite, "limonite", quartz (Big Fish River, Canada); diamond (river sands, may be coincidental).

Distribution: In Brazil, in Minas Gerais, along the Rio Abaeté, Rio Bagagem, and Rio Douradinho, near Curralinho and Dattas, Diamantina, and in the Araxá carbonatite, containing an estimated 20 million tons; in Goyaz, in the Rio Paranaíba and at Veríssimo; in São Paulo, in the Rio Canoas and at Patrocínio de Sapucahy. At Somabula, Zimbabwe. From the Mrima Hill carbonatite, Kenya. At Issineru, Guiana. In the Bonsa River, near Dompim, Gold Coast. From the Oiyi district, Sierra Leone. In the Buffels River, Spektakel Valley, west of Springbok, Namaqualand, South Africa. From the Big Fish River-Rapid Creek area, Yukon Territory, Canada. In the Zig Zag Mountains, about 10 km northeast of Hot Springs, Garland Co., Arkansas; at the Silver Mine area, Madison Co., Missouri; from Indian Mountain, Cherokee Co., Alabama, USA. In the Hospital quarry, Elgin, Morayshire, Scotland. At the Lengenbach quarry, Binntal, Valais, Switzerland. In Australia, from Glen Alice and elsewhere in the Sydney Basin, New South Wales, and in the Moculta phosphate quarry, northeast of Angaston, South Australia; from the Magnet and Adelaide mines, Dundas, Tasmania. A few other localities are known.

Name: To honor Henrique Gorceix (1842-1919), French mining geologist and mineralogist, Director, School of Mines, Ouro Preto, Brazil.

Type Material: n.d.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 833. (2) Radoslovich, E.W. and P.G. Slade (1980) Pseudo-trigonal symmetry and the structure of gorceixite. Neues Jahrb. Mineral., Monatsh., 157-170. (3) Radoslovich, E.W. (1982) Refinement of gorceixite structure in Cm. Neues Jahrb. Mineral., Monatsh., 446-464. (4) Blanchard, F.N. (1989) New X-ray powder data for gorceixite, $BaAl_3(PO_4)_2(OH)_5{\cdot}H_2O$, an evaluation of d-spacings and intensities, pseudosymmetry and its influence on the figure of merit. Powder Diffraction, 4(4), 227-230. (5) Dzikowski, T.J., L.A. Groat, and J.L. Jambor (2006) The symmetry and crystal structure of gorceixite, $BaAl_3[(PO_3(O,OH)]_2(OH)_6$, a member of the alunite supergroup. Can. Mineral., 44, 951-958. (6) (2006) Amer. Mineral., 91(11), 1951 (abs. ref. 5).