Tarbuttite $Zn_2(PO_4)(OH)$

Crystal Data: Triclinic, pseudocubic. *Point Group:* $\overline{1}$. Crystals typically equant to short prismatic, complex, with many forms, to 2 cm; in sheaflike or saddle-shaped aggregates; as crusts.

Physical Properties: *Cleavage:* On {001}, perfect. *Fracture:* Uneven. Hardness = 3.5–4 D(meas.) = 4.19 D(calc.) = 4.21

Optical Properties: Transparent to translucent. *Color:* Colorless, pale yellow, may be brown, red, or green; colorless in transmitted light. *Streak:* White. *Luster:* Vitreous, pearly on cleavages.
Optical Class: Biaxial (–). *Orientation:* X (7°,58°); Y (159°,25°); Z (−86°,80°) [using (ϕ,ρ)]. *Dispersion:* Strong. $\alpha = 1.659$–1.660 $\beta = 1.683$–1.705 $\gamma = 1.702$–1.713 2V(meas.) = 50°

Cell Data: *Space Group:* $P\overline{1}$. $a = 5.499$ $b = 5.654$ $c = 6.465$ $\alpha = 102°51'$ $\beta = 102°46'$ $\gamma = 86°50'$ Z = 2

X-ray Powder Pattern: Kabwe, Zambia. (ICDD 36-410).
6.17 (100), 2.058 (30), 2.782 (25), 3.697 (20), 2.882 (19), 2.980 (12), 2.971 (12)

Chemistry:

	(1)	(2)	(3)
SO_3		0.01	
P_2O_5	29.2	30.3	29.24
SiO_2		0.06	
FeO		0.02	
MnO		0.01	
ZnO	66.6	66.9	67.05
MgO		0.03	
CaO		0.04	
H_2O	3.8	[2.6]	3.71
Total	99.6	[100.0]	100.00

(1) Kabwe, Zambia; corresponds to $Zn_{1.98}(PO_4)_{0.99}(OH)_{1.02}$. (2) Reaphook Hill, Australia; by electron microprobe, average of ten analyses; corresponds to $Zn_{1.96}(PO_4)_{0.96}(OH)_{0.70}$. (3) $Zn_2(PO_4)(OH)$.

Occurrence: An uncommon secondary mineral in the oxidized zone of zinc-bearing deposits.

Association: Hopeite, hemimorphite, smithsonite, parahopeite, hydrozincite, scholzite, cerussite, pyromorphite, descloizite, vanadinite, "limonite".

Distribution: From Kabwe (Broken Hill), Zambia. In the Lueca vanadium mines, Angola. From the Kef Semmah mine, near Sétif, Algeria. In Australia, on Reaphook Hill, near Blinman, Flinders Ranges, South Australia; at Broken Hill, New South Wales. In the Hudson Bay mine, Salmo, British Columbia, Canada. At an undefined locality in Guangdong Province, China.

Name: Honoring Percy Coventry Tarbutt, Director of the Broken Hill Exploration Company, who early provided material for characterization.

Type Material: n.d.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 869–871. (2) Cocco, G., L. Fanfani, and P.F. Zanazzi (1966) The crystal structure of tarbuttite. Zeits. Krist., 123, 321–329. (3) Hill, R.J. and A.R. Milnes (1974) Phosphate minerals from Reaphook Hill, Flinders Ranges, South Australia. Mineral. Mag., 39, 684–695.