

**Crystal Data:** Orthorhombic. *Point Group:*  $mm2$ . As blocky crystals to 40  $\mu\text{m}$ .

**Physical Properties:** *Cleavage:* None. *Fracture:* n.d. *Tenacity:* Brittle.  
Hardness = n.d.  $D(\text{meas.}) = \text{n.d.}$   $D(\text{calc.}) = 6.505$

**Optical Properties:** Transparent to translucent. *Color:* Colorless. *Streak:* n.d. *Luster:* Silky.  
*Optical Class:* n.d.  $n = 2.00$  (calculated.)

**Cell Data:** Space Group:  $Pca2_1$ .  $a = 5.831(1)$   $b = 11.925(2)$   $c = 15.123(1)$   $Z = 4$

**X-ray Powder Pattern:** Calculated pattern.

3.213 (100), 4.019 (32), 6.39 (29), 3.604 (28), 4.95 (19), 3.210 (17), 2.6981 (17)

Chemistry:	(1)	(2)
$\text{Bi}_2\text{O}_3$	85.32	90.48
$\text{Sb}_2\text{O}_3$	0.58	
$\text{PbO}$	2.18	
$\text{SO}_3$	8.46	7.77
$\text{H}_2\text{O}$	[1.77]	1.75
Total	98.31	100.00

(1) Espérance superiore tunnel, Tavagnasco ore district, Piedmont, Italy; average of 3 electron microprobe analyses,  $\text{H}_2\text{O}$  calculated; corresponds to  $(\text{Bi}_{3.74}\text{Pb}_{0.10}\text{Sb}_{0.04})_{\Sigma=3.88}\text{O}_{3.68}(\text{SO}_4)_{1.08}(\text{OH})_2$ .

(2)  $\text{Bi}_4\text{O}_4(\text{SO}_4)(\text{OH})_2$ .

**Occurrence:** Within vugs in hydrothermal veins, in association with secondary Bi-minerals from the alteration of a bismuthinite  $\pm$  Bi-sulfosalt assemblage.

**Association:** Quartz, Bi-oxides and sulfates.

**Distribution:** From the Espérance superiore tunnel, Tavagnasco ore district, Alto Canavese region, 50 km north of Turin, Piedmont, Italy.

**Name:** For the district that produced the first specimens.

**Type Material:** Natural History Museum, University of Florence, Italy (3149/1).

**References:** (1) Bindi, L., C. Biagioni, B. Martini, A. Salvetti, G.D. Fontana, M. Taronna, and M.E. Ciriotti (2016) Tavagnascoite,  $\text{Bi}_4\text{O}_4(\text{SO}_4)(\text{OH})_2$ , a new oxyhydroxy bismuth sulfate related to klebelsbergite. *Mineral. Mag.*, 80(4), 647-657. (2) (2017) *Amer. Mineral.*, 102, 469-470 (abs. ref. 1).