

**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . As compact masses, to 1 cm.

**Physical Properties:** *Cleavage:* Imperfect. *Fracture:* Conchoidal. *Tenacity:* Brittle.  
Hardness = n.d. VHN = 146-195 (15 g load). D(meas.) = n.d. D(calc.) = 5.008 (sample 1)  
D(calc.) = 5.137 (sample 2)

**Optical Properties:** Opaque. *Color:* Black, white with red regions along fractures in reflected light. *Streak:* Black. *Luster:* Metallic. *Pleochroism:* Weak, very pale yellow to very pale blue. *Anisotropism:* Distinct, blue-green to brown. *Optical Class:* n.d.

$R_1$ - $R_2$ : (470) 36.4-39.5, (546) 34.2-36.7, (589) 33.0-35.4, (650) 31.2-33.4

**Cell Data:** *Space Group:*  $P\bar{1}$ .  $a = 8.150(2)$   $b = 8.716(2)$   $c = 21.579(4)$   $\alpha = 85.18(1)^\circ$   
 $\beta = 96.94(1)^\circ$   $\gamma = 88.60(1)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Monte Arsiccio mine, near Sant'Anna di Stazzema, Tuscany, Italy.  
2.170 (vs), 3.608 (s), 2.824 (s), 2.790 (ms), 1.888 (ms), 3.554 (m), 3.417 (m)

Chemistry:	(1)	(2)
Tl	16.81	15.05
Pb	10.65	13.04
Sb	41.75	45.49
As	6.59	3.07
<u>S</u>	<u>23.43</u>	<u>22.77</u>
Total	99.24	99.42

(1) Monte Arsiccio mine, near Sant'Anna di Stazzema, Tuscany, Italy; average of 8 electron microprobe analyses; corresponding to  $\text{Tl}_{1.89}\text{Pb}_{1.18}\text{Sb}_{7.90}\text{As}_{2.03}\text{S}_{16.83}$ . (2) Monte Arsiccio mine, near Sant'Anna di Stazzema, Tuscany, Italy; average of 8 electron microprobe analyses; corresponding to  $\text{Tl}_{1.74}\text{Pb}_{1.48}\text{Sb}_{8.81}\text{As}_{0.97}\text{S}_{16.75}$ .

**Occurrence:** In a metamorphosed barite-pyrite-magnetite-hematite deposit.

**Association:** Barite, boscardinite, calcite, cymrite, dolomite, pyrite, realgar, routhierite, sphalerite, stibnite.

**Distribution:** From the Sant'Olga level of the Monte Arsiccio mine, near Sant'Anna di Stazzema, Apuan Alps, Tuscany, Italy.

**Name:** Emphasizes the close structural similarity to *chabournéite*.

**Type Material:** Natural History Museum, University of Pisa, Pisa, Italy (19413).

**References:** (1) Orlandi, P., C. Biagioni, Y. Moëlo, E. Bonaccorsi, and W.H. Paar (2013) Lead-antimony sulfosalts from Tuscany (Italy). XIII. Protochabournéite,  $\sim\text{Tl}_2\text{Pb}(\text{Sb}_{9.8}\text{As}_{1.2})_{\Sigma=10}\text{S}_{17}$ , from the Monte Arsiccio Mine: Occurrence, crystal structure and relationship with chabournéite. Can. Mineral., 51(3), 475-494. (2) (2015) Amer. Mineral., 100, 1652 (abs. ref. 1).