

Crystal Data: Monoclinic. *Point Group:* 2/m. Crystals are acicular along [010] to 1 cm.

Physical Properties: *Cleavage:* None. *Tenacity:* Brittle. *Fracture:* Uneven. VHN = 175 (50 g load). Hardness = n.d. D(meas.) = n.d. D(calc.) = 5.77

Optical Properties: Opaque. *Color:* Black. *Streak:* Black to dark brown, rare red internal reflections in reflected light. *Luster:* Metallic.

Optical Class: Weakly anisotropic and birefractant. Nonpleochroic.

R_{air}-R_{oil}: (470) 35.7-20.10, (546) 34.5-18.70, (589) 34.0-17.63, (650) 32.7-16.45

Cell Data: *Space Group:* C2/m. *a* = 49.49(1) *b* = 4.1259(8) *c* = 21.828(4) *β* = 99.62(3)° *Z* = 4

X-ray Powder Pattern: Buca della Vena mine, Apuan Alps, northern Tuscany, Italy. 3.480 (100), 2.956 (47), 3.458 (40), 4.14 (27), 3.261 (26), 3.249 (24), 2.780 (22)

Chemistry:	(1)
Pb	49.07
Sb	30.36
Cu	0.16
S	18.73
Cl	0.98
<u>O</u>	<u>[0.21]</u>
Total	99.51

(1) Buca della Vena mine, Apuan Alps, northern Tuscany, Italy; average electron microprobe analysis, oxygen calculated from the structure; corresponds to Pb_{9.30}Sb_{9.80}Cu_{0.10}S_{22.94}Cl_{1.06}O_{0.5}.

Mineral Group: Zinkenite group.

Occurrence: Result of complex sulfide deposition by hydrothermal brines, at relatively high temperatures and fO₂/fS₂ conditions controlled by the pyrite-hematite-magnetite buffer.

Association: Sphalerite, cinnabar, galena, tetrahedrite, chalcostibite, gersdorffite, baryte, boulangerite, robinsonite, scainiite, zinkenite, tintinaite, sorbyite.

Distribution: From the Buca della Vena mine, Apuan Alps, northern Tuscany, Italy.

Name: Honors Italian vulcanologist and mineralogist, Professor Leopoldo *Pilla* (1805-1848).

Type Material: Natural History Museum, University of Pisa, Italy (15524 and 15525).

References: (1) Orlandi, P., Y. Moëlo, A. Meerschaut, and P. Palvadeau (2001) Leadantimony sulfosalts from Tuscany (Italy). III. Pillaite, Pb₉Sb₁₀S₂₃ClO_{0.5}, a new Pb-Sb oxy-chloro-sulfosalts, from Buca della Vena mine. *Eur. J. Mineral.*, 13, 605-610. (2) (2002) *Amer. Mineral.*, 87, 181-182 (abs. ref. 1). (3) Meerschaut, A., P. Palvadeau, Y. Moëlo, and P. Orlandi (2001) Lead-antimony sulfosalts from Tuscany (Italy). IV. Crystal structure of pillaite, Pb₉Sb₁₀S₂₃ClO_{0.5}, an expanded monoclinic derivative of hexagonal Bi(Bi₂S₃)₉I₃, from the zinkenite group. *Eur. J. Mineral.*, 13, 779-790.