

Crystal Data: Monoclinic. *Point Group:* 2/m. Needlelike crystals, to 1 cm, rarely as tiny rings; fibrous, compact masses. Crystals are seldom terminated; striations || [001] strong.

Physical Properties: *Cleavage:* Distinct on {100}. *Tenacity:* Brittle; flexible in thin crystals. Hardness = 2.5–3 VHN = n.d. D(meas.) = ~6.2 D(calc.) = 6.21

Optical Properties: Opaque. *Color:* Dull, lead-gray. *Streak:* Brownish. *Luster:* Metallic, may be silky. *Pleochroism:* Weak. *Anisotropism:* Distinct.

R₁–R₂: (400) 40.5–44.0, (420) 40.0–43.7, (440) 39.5–43.5, (460) 39.0–43.2, (480) 38.6–43.0, (500) 38.2–42.7, (520) 37.9–42.4, (540) 37.6–42.0, (560) 37.2–41.6, (580) 36.8–41.1, (600) 36.3–40.3, (620) 35.8–39.6, (640) 35.4–38.8, (660) 35.0–38.0, (680) 34.6–37.3, (700) 34.1–36.6

Cell Data: *Space Group:* P2₁/a. a = 21.612(7) b = 23.543(8) c = 8.084(3)
β = 100.71(2)° Z = 8

X-ray Powder Pattern: Cleveland mine, Stevens Co., Washington, USA. (ICDD 42-1407). 3.725 (100), 2.823 (42), 3.216 (41), 3.023 (32), 2.812 (31), 3.910 (23), 3.009 (21)

Chemistry:	(1)	(2)	(3)
Pb	55.28	54.25	55.42
Fe	0.39		
Sb	25.40	23.65	25.69
Bi		3.05	
Se		1.16	
S	18.19	17.81	18.89
insol.	0.62		
Total	99.88	99.82	100.00

(1) Cleveland mine, Stevens Co., Washington, USA; corresponding to Pb_{5.17}Fe_{0.14}Sb_{4.04}S_{11.00}.

(2) Boliden, Sweden; by electron microprobe, corresponding to Pb_{5.05}(Sb_{3.75}Bi_{0.28})_{Σ=4.03}

(S_{10.72}Se_{0.28})_{Σ=11.00}. (3) Pb₅Sb₄S₁₁.

Occurrence: In hydrothermal veins formed at low to medium temperatures.

Association: Lead sulfosalts, galena, stibnite, sphalerite, pyrite, arsenopyrite, siderite, quartz.

Distribution: Widespread; only a few localities can be given. In France, at Molières, Gard [TL], and from Saint-Pons, Alpes-de-Haute-Provence. In rings from Bottino, Tuscany, Italy. In crystals from Sala, Västmanland; Nasafjell, Lappland; and Boliden, Västerbotten, Sweden. At Wolfsberg, Harz Mountains, at Ober-Lahr, near Altenkirchen, Rhineland-Palatinate, and Waldsassen, Bavaria, Germany. From Trepča, Serbia. At Příbram, Czech Republic. In the USA, in the Coeur d'Alene district, Shoshone Co., and [??where??in] the Wood River district, Blaine Co., Idaho; in the Iron Mountain mine, Superior, Mineral Co., Montana; and at Augusta Mountain, Gunnison Co., Colorado. In Mexico, at the Noche Buena mine, Mazapil, Zacatecas. From Madoc, Ontario, Canada, as rings.

Name: Honors Charles Louis Boulanger (1810–1849), French mining engineer, who called attention to the species.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 420–422. (2) Mumme, W. (1989) The crystal structure of Pb_{5.05}(Sb_{3.75}Bi_{0.28})S_{10.72}Se_{0.28}: boulangerite of near ideal composition. Neues Jahrb. Mineral., Monatsh., 498–512. (3) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, ??.

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