

Serpierite**Ca(Cu, Zn)₄(SO₄)₂(OH)₆•3H₂O**

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Crystal Data: Monoclinic, pseudo-orthorhombic. *Point Group:* 2/*m*. Crystals are lathlike, elongated along [010], flattened on {100}, with {10 $\bar{1}$ }, {31 $\bar{1}$ }, {3 $\bar{1}$ 1}, other minor forms, to 5 mm, in tufted aggregates and botryoidal fibrous masses.

Physical Properties: *Cleavage:* Perfect on {100}. *Hardness* = n.d. *D*(meas.) = 3.07
D(calc.) = 3.08

Optical Properties: Transparent. *Color:* Sky-blue; greenish blue in transmitted light.
Luster: Vitreous, pearly on cleavages.
Optical Class: Biaxial (-). *Pleochroism:* *X* = nearly colorless, pale green; *Y* = bluish green; *Z* = deep greenish blue, blue-green. *Orientation:* *Y* = *b*; *X* \wedge *a* = 24°, *Z* \simeq *c*. *Dispersion:* *r* > *v*, strong. α = 1.584(3) β = 1.642(3) γ = 1.647(3) *2V*(meas.) = 35(2)° *2V*(calc.) = 37°

Cell Data: *Space Group:* *C*2/*c*. *a* = 22.186(2) *b* = 6.250(2) *c* = 21.853(2)
 β = 113.36(1)° *Z* = 8

X-ray Powder Pattern: Laurium, Greece; similar to devilline.
10.22 (vs), 5.09 (s), 3.386 (s), 2.708 (ms), 2.650 (ms), 2.440 (ms), 4.744 (m)

Chemistry:	(1)	(2)	(1)	(2)
SO ₃	24.29	24.78	CaO	8.00
CuO	36.12	24.62	H ₂ O	16.75
ZnO	13.95	25.19	Total	100.00

(1) Laurium, Greece; corresponds to Ca_{0.93}(Cu_{2.96}Zn_{1.12}) $_{\Sigma=4.08}$ (SO₄)_{1.98}(OH)_{6.06}•3.03H₂O.

(2) Ca(Cu, Zn)₄(SO₄)₂(OH)₆•3H₂O with Cu:Zn = 1:1.

Polymorphism & Series: Dimorphous with orthoserpierite.

Occurrence: A secondary mineral in the oxidized zone of hydrothermal Cu–Zn-bearing hydrothermal mineral deposits; commonly a post-mine product.

Association: Smithsonite, devilline, posnjakite, ktenasite, linarite, langite, brochantite, wroewolfeite, namuwite, schulenbergitte, hydrozincite, malachite, gypsum.

Distribution: From the Kamariza mine, Laurium, Greece. On Ross Island, Lough Leane, Co. Kerry, Ireland. In England, in the Waterbank mine, Ecton, Staffordshire; from the Potts Gill and other mines, Caldbeck Fells, Cumbria; at the Smalleleugh mine, Nenthead, Northumberland. From the West Blackcraig mine, near Newton Stewart, Kirkcudbrightshire, Scotland. At the Friedrichsseggen mine, near Bad Ems, Rhineland-Palatinate, Germany. Rich masses from the Prince Leopold mine, Kipushi, 28 km southwest of Lubumbashi, Katanga Province, Congo (Shaba Province, Zaire). At Tsumeb, Namibia. In the USA, in Colorado, large crystals from the Bulldog Mountain mine, Creede district, Mineral Co., at the Titusville mine, San Juan Co., and a number of other places; from the Bay Horse mine, Challis, Custer Co., Idaho; in the Linchburg mine, nine km south of Magdalena, Socorro Co., New Mexico. From the Otoño mine, Caborca, Sonora, Mexico. At Broken Hill, New South Wales, Australia. A number of additional minor localities are now known.

Name: Honors Giovanni Battista Serpieri (1832–1897), Italian engineer, who helped to reopen the ancient mines at Laurium, Greece.

Type Material: Natural History Museum, Paris, France, 73.38, 78.226.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 592–593. (2) Faraone, D., C. Sabelli, and P.F. Zanazzi (1967) Su du solfati basici idrati: serpierite e devillite. *Atti Rend. Accad. Lincei*, 43, 369–382 (in Italian with English abs.). (3) Sabelli, C. and P.F. Zanazzi (1968) The structure of serpierite. *Acta Cryst.*, 24, 1214–1221. (4) Krause, W. and H. Täuber (1992) Zum Kenntnisstand der Minerale Serpierit, Orthoserpierit und Devillin. *Aufschluss*, 43(1), 1–25 (in German).

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