

Crystal Data: Hexagonal. *Point Group:* $\bar{3} 2/m$. Crystals steep pyramidal, resembling hexagonal prisms but rarely distinct, to 6 mm; commonly granular, massive to foliated, also bladed. *Twinning:* Fourlings with twin plane {01 $\bar{1}$ 8}, also {01 $\bar{1}$ 5}.

Physical Properties: *Cleavage:* Perfect on {0001}. *Tenacity:* Laminae flexible but not elastic; slightly sectile. Hardness = 1.5–2 VHN = 30–44 (25 g load). D(meas.) = 7.3 D(calc.) = 7.271

Optical Properties: Opaque. *Color:* Pale steel-gray, tarnishes dull or iridescent; in polished section, white. *Streak:* Pale steel-gray. *Luster:* Metallic, splendent on fresh surfaces. *Anisotropism:* Weak.

R₁–R₂: (400) 51.9–56.8, (420) 52.0–56.9, (440) 52.0–57.0, (460) 52.1–57.5, (480) 52.4–58.2, (500) 53.0–59.0, (520) 53.9–59.9, (540) 54.7–60.4, (560) 55.1–60.5, (580) 55.3–60.5, (600) 55.2–60.3, (620) 55.0–60.2, (640) 54.8–60.1, (660) 54.6–60.0, (680) 54.2–59.8, (700) 54.0–59.7

Cell Data: *Space Group:* $R\bar{3}m$. $a = 4.2381$ $c = 29.589$ $Z = 3$

X-ray Powder Pattern: Paonia, Delta Co., Colorado, USA.

3.10 (100), 2.292 (100), 2.111 (75), 1.965 (75), 1.929 (75), 1.638 (75b), 1.348 (75)

Chemistry:	(1)	(2)	(3)	(4)
Bi	59.12	62.23	60.4	59.27
Te	35.94	33.25	34.5	36.19
Se			0.9	
S	4.75	4.50	4.0	4.54
Total	99.81	99.98	99.8	100.00

(1) Ciclova, Romania. (2) Near Bradshaw City, Yavapai Co., Arizona, USA. (3) Žubkov, Slovakia; by electron microprobe. (4) Bi₂Te₂S.

Mineral Group: Tetradymite group.

Occurrence: In hydrothermal gold-quartz veins of medium to high temperature of formation; also in contact metamorphic deposits.

Association: Tellurium, tellurobismuthite, gold, silver, bismuth, hessite, petzite, calaverite, matildite, altaite, pyrite, pyrrhotite, galena, sphalerite, arsenopyrite, chalcopyrite, quartz.

Distribution: In small amounts at numerous localities world-wide; the following are only a sampling. In Slovakia, from Žubkov (Schubkau) [TL], as fine twinned crystals. In Romania, from Băița (Rezbánya), also Ciclova, Moravița (Moravicza), and Oravița (Oravicza). In Norway, from Narverud and Seljord. Rich at Boliden, Västerbotten, Sweden. In the USA, from Trail Creek, Blaine Co., Idaho; in New Mexico, in the Sylvanite district, Hidalgo Co.; and in Virginia, at the Whitehall mines, Spotsylvania Co. In Canada, from many localities, as near Liddle Creek, West Kootenay, and at the White Elephant mine, near Vernon, British Columbia; from Red Lake at Bigstone Bay, Lake of the Woods, Ontario; in Quebec, at the McWatters mine, Rouyn Township, and in the Eureka mine, Abitibi Co. The principal ore mineral, in large crystals, from the Dashuigou tellurium deposit, Sichuan Province, China.

Name: From the Greek for *fourfold* and *twin*, an allusion to the twin crystals.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 161–164. (2) Glatz, A.C. (1967) The Bi₂Te₃–Bi₂S₃ system and the synthesis of the mineral tetradymite. Amer. Mineral., 52, 161–170. (3) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 564.

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