Sylvanite $(Au, Ag)_2Te_4$

Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals, to 1 cm, short prismatic [001] or [010], thick tabular on {100} and {010}; may be skeletal, bladed, imperfectly columnar, granular. *Twinning:* Common on {100} as contact, lamellar, or penetration twins, resembling cuneiform characters.

Physical Properties: *Cleavage:* Perfect on {010}. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 1.5–2 VHN = 154–172 (100 g load). D(meas.) = 8.16 D(calc.) = 8.161

Optical Properties: Opaque. *Color:* Steel-gray to silver-white inclining to yellow; in polished section, creamy white. *Streak:* Steel-gray to silver-white. *Luster:* Metallic, brilliant. *Pleochroism:* Strong; cream-white to leather-brown. *Anisotropism:* Very strong; in grayish brown, grayish white, and yellowish and bluish tints.

R_1–R_2: (400) 43.2–53.6, (420) 45.4–55.9, (440) 47.7–57.9, (460) 49.7–59.6, (480) 50.9–60.8, (500) 51.8–61.8, (520) 52.3–62.6, (540) 52.5–62.9, (560) 52.5–63.0, (580) 52.5–63.0, (600) 52.6–62.9, (620) 52.8–62.7, (640) 53.0–62.4, (660) 53.3–62.2, (680) 53.6–62.2, (700) 54.1–62.4

Cell Data: *Space Group:* $P2/c$. $a = 8.95(1)$ $b = 4.478(5)$ $c = 14.62(2)$ $\beta = 145.35(5)^\circ$ Z = 2

X-ray Powder Pattern: Fiji Islands.
3.05 (100), 2.15 (50), 2.25 (30), 1.989 (30), 2.98 (20), 1.797 (20), 1.523 (20)

Chemistry:

	(1)	(2)	(3)
Au	25.45	29.85	24.19
Ag	13.94	9.18	13.22
Cu		0.15	

	(1)	(2)	(3)
Ni		0.10	
Te	60.61	60.45	62.59
Total	100.00	99.73	100.00

(1) Cripple Creek, Colorado, USA. (2) Kalgoorlie, Australia. (3) $(Au, Ag)_2Te_4$ with Au:Ag = 1:1.

Occurrence: Most commonly in low-temperature hydrothermal veins; also in medium- and high-temperature deposits, typically among the last minerals formed.

Association: Gold, calaverite, krennerite, altaite, hessite, petzite, acanthite, pyrite, galena, sphalerite, chalcopyrite, quartz, "chalcedony", fluorite.

Distribution: A mineral present in minor amounts in many Au–Ag deposits, but only rarely in rich specimens or of economic importance. In Romania, from Baia-de-Arieş (Offenbánya) [TL], Săcărîmb (Nagyág) [TL], and Facebánya. At Glava, Värmland, Sweden. In the Bereznyakov gold deposit and the Yaman-Kasy Cu–Zn–pyrite deposits, Southern Ural Mountains, Russia. In Canada, from the Dome mine, Porcupine, Ontario. In the USA, in California, at the Melones and Stanislaus mines, Carson Hill district, Calaveras Co.; in Colorado, in abundance at Cripple Creek, Teller Co., and important in the Magnolia, Gold Hill, and Sunshine districts, Boulder Co., and elsewhere; in the Cornucopia district, Baker Co., Oregon; from the Mayflower mine, Tobacco Root Mountains, Madison Co., and the at Gies mine, Judith Mountains, Fergus Co., Montana. From the San Francisco mine, 145 km north of Hermosillo, Sonora, Mexico. At the El Indio mine, east of La Serena, Coquimbo, Chile. From Kalgoorlie, Western Australia. In the Bulawan deposit, Negros Occidental, Phillipines. At the Arakara goldfields, Guyana. From the Emperor mine, Vatukoulu, and in the Tuvatu Au–Ag–Te deposit, Viti Levu, Fiji Islands.

Name: From TranSYLVANia, Romania where it was first found, and in allusion to the element tellurium (*sylvanium*, a name early proposed for the element), which the mineral contains.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 338–341. (2) Van Tendeloo, G., P. Gregoriades, and S. Amelinckx (1983) Electron microscopic studies of modulated structures in $(Au, Ag)Te_2$: Part II. Sylvanite $AgAuTe_2$. J. Solid State Chem., 50, 335–361. (3) Pertlik, F. (1984) Kristallchemie natürlicher Telluride. I: Verfeinerung der Kristallstruktur des Sylvanites, $AuAgTe_4$. Tschermaks Mineral. Petrog. Mitt., 33, 203–212 (in German with English abs.). (4) Berry, L.G. and R.M. Thompson (1962) X-ray powder data for the ore minerals. Geol. Soc. Amer. Mem. 85, 148. (5) Ramdohr, P. (1969) The ore minerals and their intergrowths, (3rd edition), 424–426. (6) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 547.