Tangeite $CaCu(VO_4)(OH)$

Crystal Data: Orthorhombic. *Point Group:* 222. Rare crystals are short prismatic, with acute terminations, to 3 mm; typically in scaly crystal rosettes and aggregates; botryoidal to spheroidal, fibrous, as crusts; massive.

Physical Properties: *Cleavage:* {010}, perfect; {001}, good. *Tenacity:* Brittle. Hardness = 3.5 D(meas.) = 3.75 D(calc.) = [3.84]

Optical Properties: Transparent. *Color:* Greenish yellow, gray, siskin-green, dark green, olive-green; pale green in transmitted light. *Luster:* Vitreous, pearly on the cleavage. *Optical Class:* Biaxial (–). *Pleochroism:* $X = Y$ = brown; Z = green. *Orientation:* $X = a$; $Y = b$. *Dispersion:* $r > v$, strong. α = 2.00–2.01 β = 2.01–2.05 γ = 2.02–2.09 2V(meas.) = 83°–90°

Cell Data: *Space Group:* $P2_12_12_1$. $a = 7.45$ $b = 9.26$ $c = 5.91$ Z = 4

X-ray Powder Pattern: Tyuya-Muyun, Kyrgyzstan.
2.88 (100), 2.61 (100), 4.15 (75), 3.14 (60), 1.61 (60), 5.86 (40), 3.73 (40)

Chemistry:

	(1)	(2)		(1)	(2)
U_3O_8	trace		CuO	33.29	33.77
V_2O_5	38.45	38.60	CaO	22.69	23.81
SiO_2	0.20		H_2O	3.90	3.82
Al_2O_3	0.50		Total	99.13	100.00
Fe_2O_3	0.10				

(1) Tyuya-Muyun, Kyrgyzstan. (2) $CaCu(VO_4)(OH)$.

Polymorphism & Series: Forms a series with conichalcite.

Mineral Group: Adelite group.

Occurrence: A rare secondary mineral in vanadium-bearing mineral deposits in sandstone.

Association: Calcite, barite, malachite (Tyuya-Muyun, Kyrgyzstan); rhodonite, quartz, pyrobelonite, chalcocite, neotocite, copper (Molinello mine, Italy); malachite, chrysocolla, tyuyamunite, chalcopyrite, pyrite, "limonite" (Garnet Ridge, Arizona, USA).

Distribution: From the Tyuya-Muyun Cave, Fergana Valley, Alai Range, Kyrgyzstan. Well-crystallized at the Molinello manganese mine, near Chiavari, Val Graveglia, Liguria, Italy. In the USA, from near Uranium, Roc Creek, Paradox Valley, at the Pluto mine, Bull Canyon, Uravan district, Montrose Co., and in the Shirley May mine, Garo district, Park Co., Colorado; from the Richardson district, Moab Valley, Grand Co., and in the Whirlwind mine, Monument Valley, San Juan Co., Utah; in Arizona, from Monument Valley, on Garnet Ridge, Apache Co., and at the Monument No. 1 mine, Navajo Co., and in the Copper Queen mine, New Water Mountains, Yuma Co.; from the Mammoth copper mine, Grindstone Creek, Glenn Co., California. At Menzies Bay, Vancouver Island, British Columbia, Canada. From the west side of Lake Torrens, Stuart Shelf, South Australia. From Luiswishi, Katanga Province, Congo (Shaba Province, Zaire). Large crystals from the Lueca vanadium mines, Angola. A few other minor localities are known, some requiring modern confirmation.

Name: For its initially noted occurrence in the Tange Gorge, Fergana Valley, Alai Range, Kyrgyzstan.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, m6065, m6066, m6068.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 817–818 [calciovolborthite = tangeite, part]. (2) Basso, R., A. Palenzona, and L. Zefiro (1989) Crystal structure refinement of a Sr-bearing term related to copper vanadates and arsenates of adelite and descloizite groups. Neues Jahrb. Mineral., Monatsh., 300–308. (3) Basso, R. and L. Zefiro (1994) Mineral nomenclature: status of calciovolborthite and tangeite. Neues Jahrb. Mineral., Monatsh., 205–208.