Billwiseite $Sb^{3+}_5(Nb,Ta)_3WO_{18}$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As blocky crystals displaying {100}, {011} and {410}, to 0.50 mm. *Twinning:* Common on (100).

Physical Properties: *Cleavage*: {100} indistinct. *Fracture*: Hackly. *Tenacity*: Brittle. Hardness = 5 D(meas.) = n.d. D(calc.) = 6.330

Optical Properties: Transparent. *Color*: Pale yellow with a hint of green, colorless in transmitted light. *Streak*: Colorless to very pale yellow. *Luster*: Vitreous.
Optical Class: Biaxial. *n*(calc.) = 2.3 2V(meas.) = 76(2)° *Orientation*: $X \parallel b$, $Y \wedge c = 72.8°$ (in β acute).

Cell Data: *Space Group*: *C*2/*c*. $a = 5.5482(5)$ $b = 4.9143(5)$ $c = 5.5482(5)$ $\beta = 90.425(2)°$ Z = 4

X-ray Powder Pattern: Stak Nala, Karakoram Mountains, 70 km east of Gilgit, Pakistan. 3.147 (100), 3.500 (53), 1.662 (53), 3.017 (48), 1.906 (47), 1.735 (30), 1.762 (25)

Chemistry:

	(1)
Nb_2O_5	12.03
Ta_2O_5	19.31
Sb_2O_3	48.34
TiO_2	0.99
WO_3	19.96
Total	100.63

(1) Stak Nala, Karakoram Mountains, 70 km east of Gilgit, Pakistan; average of 8 electron microprobe analyses, absence of OH and H_2O confirmed by IR spectroscopy, valence state of Sb determined by crystal structure analysis; corresponding to $Sb^{3+}_{4.87}(Nb_{1.33}Ta_{1.28}Ti_{0.18}W_{1.26})_{\Sigma=4.05}O_{18}$.

Occurrence: In a complex zoned granitic pegmatite of the LCT (Li–Cs–Ta) type.

Association: Lepidolite, B-rich muscovite.

Distribution: At Stak Nala, Karakoram Mountains, 70 km east of Gilgit, Pakistan.

Name: Honors William Stewart Wise (b. 1933), Professor of Geology Emeritus, University of California at Santa Barbara, USA, for his contributions to mineralogy and his inspiration and mentoring of mineralogy students.

Type Material: Department of Natural History, Royal Ontario Museum, Toronto, Canada (M55951).

References: (1) Hawthorne, F.C., M.A. Cooper, N.A. Ball, Y.A. Abdu, P. Černý, F. Cámara and B.M. Laurs (2012) Billwiseite, ideally $Sb^{3+}_5(Nb,Ta)_3WO_{18}$, a new oxide mineral species from the Stak Nala pegmatite, Nanga Parbat-Haramosh Massif, Pakistan: description and crystal structure. Can. Mineral., 50, 805-814. (2) (2014) Amer. Mineral., 99, 1512 (abs. ref. 1).