

Crystal Data: Monoclinic. *Point Group:* $2/m$ or m . Crystals equant, may be elongated along [100], flattened on {010}, with complex domatic form development, to 3.5 cm; in subparallel groups, granular, in veinlets, massive. *Twining:* On {001}, as contact twins.

Physical Properties: *Cleavage:* On {10 $\bar{1}$ }, good; partings on {1 $\bar{3}$ 3}, {10 $\bar{2}$ }, {0 $\bar{1}$ 1}. Hardness = 5 D(meas.) = 3.77(2) D(calc.) = [3.80] Piezoelectric; may fluoresce pale yellow, pale pinkish orange, dark red under SW UV.

Optical Properties: Translucent. *Color:* Milky white, gray, violet-gray, rose-red, olive-green, apple-green; colorless or pale green in transmitted light. *Streak:* White. *Luster:* Resinous, vitreous on cleavages.

Optical Class: Biaxial (-). *Orientation:* $Z = b$; $X \wedge c \simeq 30^\circ$. *Dispersion:* $r < v$, slight. $\alpha = 1.640$ $\beta = 1.660$ $\gamma = 1.675$ $2V(\text{meas.}) = 82^\circ 44'$

Cell Data: *Space Group:* $C2/c$ or Cc . $a = 6.681\text{--}6.701$ $b = 8.950\text{--}8.944$ $c = 7.553\text{--}7.573$
 $\beta = 120^\circ 58'\text{--}121^\circ 14'$ $Z = 4$

X-ray Powder Pattern: Bisbee, Arizona, USA.

3.246 (10), 2.682 (9), 3.073 (8), 2.860 (7), 1.743 (7), 2.625 (6), 2.266 (6)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
P ₂ O ₅	0.10			F	7.45	6.85	8.55
As ₂ O ₅	51.13	51.51	51.70	Cl	trace		
FeO	0.21			H ₂ O	0.43		
MnO	0.05			insol.	0.08		
MgO	18.12	18.84	18.13	—O = F ₂	3.04	2.88	3.60
CaO	25.69	26.11	25.22	Total	100.22	100.43	100.00

(1) Långban, Sweden. (2) Sterling Hill, New Jersey, USA; by electron microprobe.

(3) CaMg(AsO₄)F.

Polymorphism & Series: Forms a series with maxwellite and with durangite.

Occurrence: Typically in metamorphosed manganese or zinc deposits containing arsenic.

Association: Manganoan diopside, manganberzeliite, svabite, allactite, pyroaurite, dixenite, bergslagite, hematite, calcite, barite (Långban, Sweden); spessartine, braunite, barite, quartz (Kajlidongri, India); friedelite, willemite, barite (Sterling Hill, New Jersey, USA).

Distribution: From Långban, Värmland, Sweden. In Switzerland, from the Falotta mine, Oberhalbstein, Graubünden, and on the west flank of Cherbadung [Pizzo Cervandone], Binntal, Valais. On the east flank of Pizzo Cervandone, Alpe Devero, Val d'Aosta, Piedmont, and at Val Strona, Ossola, Italy. From the Urupskoye copper deposit, northern Caucasus Mountains, Russia. At Sailauf, northeast of Aschaffenburg, Bavaria, Germany. From near Nežilovo, Macedonia. At Kajlidongri, Madhya Pradesh, India. From Guettera, Algeria. In the Puttapa zinc deposit, near Beltana, South Australia. In the USA, at Sterling Hill, Ogdensburg, Sussex Co., New Jersey; from the White Tail Deer mine, Bisbee, Cochise Co., Arizona; in the Monticello tin district, Sierra Co., New Mexico.

Name: Honoring Daniel Tilas (1712–1772), Swedish mining engineer and mineral collector of Stockholm, Sweden.

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