

**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . As equant crystals to 0.1 mm, grouped in thin masses to a few cm.

**Physical Properties:** *Cleavage:* None. *Fracture:* Uneven. *Tenacity:* Brittle. *Hardness* = n.d. *D(meas.)* = n.d. *D(calc.)* = 3.56

**Optical Properties:** Translucent. *Color:* Brown-red. *Streak:* Pale yellow. *Luster:* Vitreous to resinous.

*Optical Class:* Biaxial (+).  $\alpha = 1.749(1)$   $\beta = 1.750(1)$   $\gamma = 1.760(1)$   $2V(\text{meas.}) = 26(2)^\circ$   
 $2V(\text{calc.}) = 35^\circ$  *Pleochroism:* Weak; X = brownish yellow, Y = dark yellow, Z = yellow.

**Cell Data:** *Space Group:*  $P\bar{1}$ .  $a = 9.7354(4)$   $b = 9.9572(3)$   $c = 9.0657(3)$   $\alpha = 92.691(2)^\circ$   
 $\beta = 117.057(4)^\circ$   $\gamma = 105.323(3)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Valletta mine dumps, Maira Valley, Cuneo province, Piedmont, Italy. 2.825 (100), 2.708 (92), 3.055 (69), 3.012 (65), 2.381 (58), 2.985 (55), 3.042 (43)

Chemistry:	(1)	(2)
Na <sub>2</sub> O	4.06	3.78
CaO	0.05	
MnO	41.76	43.31
Mn <sub>2</sub> O <sub>3</sub>	[3.07]	
MgO	0.96	
Al <sub>2</sub> O <sub>3</sub>	0.04	
CuO	0.02	
SiO <sub>2</sub>	39.73	36.68
As <sub>2</sub> O <sub>5</sub>	6.87	14.03
V <sub>2</sub> O <sub>5</sub>	[1.43]	
SO <sub>3</sub>	0.01	
F	0.04	
-O = F <sub>2</sub>	0.02	
H <sub>2</sub> O	[2.20]	2.20
Total	97.44	100.00

(1) Valletta mine dumps, Maira Valley, Piedmont, Italy; average of 5 electron microprobe analyses supplemented by Raman spectroscopy, H<sub>2</sub>O from stoichiometry, Mn<sup>2+</sup>/Mn<sup>3+</sup> calculated so that Mn<sup>3+</sup>/Mn<sub>total</sub> = 0.066, V<sup>3+</sup> calculated as 6 - (Si+As) and excess V assigned to the octahedral sites as V<sup>3+</sup>; corresponding to Na<sub>1.06</sub>(Mn<sup>2+</sup><sub>4.46</sub>Mn<sup>3+</sup><sub>0.32</sub>Mg<sub>0.19</sub>Al<sub>0.01</sub>Ca<sub>0.01</sub>)<sub>Σ=4.99</sub>[(Si<sub>5.36</sub>As<sub>0.48</sub>V<sub>0.15</sub>)<sub>Σ=5.99</sub>O<sub>17</sub>(OH)][(OH)<sub>0.98</sub>F<sub>0.02</sub>]<sub>Σ=1.00</sub>. (2) NaMn<sup>2+</sup><sub>5</sub>[Si<sub>5</sub>AsO<sub>17</sub>(OH)](OH).

**Occurrence:** In mineralized quartz veins cutting quartzite.

**Association:** Tiragalloite, gamagarite, hematite, manganberzeliite, palenzonaite, quartz, saneroite, tokyoite.

**Distribution:** From the Valletta mine dumps, Maira Valley, Cuneo province, Piedmont, Italy.

**Name:** Honors Dr. Roberto Bracco (b. 1959), a systematic mineral collector and author with a special interest in manganese minerals.

**Type Material:** Museum of Natural Science, Torino, Italy (M/15939).

**References:** (1) Cámara, F., E. Bittarello, M.E. Ciriotti, F. Nestola, F. Radica and M. Marchesini (2015) As-bearing new mineral species from Valletta mine, Maira Valley, Piedmont, Italy: II. Braccoite, NaMn<sup>2+</sup><sub>5</sub>[Si<sub>5</sub>AsO<sub>17</sub>(OH)](OH), description and crystal structure. *Mineral. Mag.*, 79(1), 171-189. (2) (2016) *Amer. Mineral.*, 101, 1015 (abs. ref. 1).