Carraraite $Ca_3Ge(SO_4)(CO_3)(OH)_6 \cdot 12H_2O$

Crystal Data: Hexagonal. *Point Group:* $6/m$. Hexagonal crystals, tabular on {0001}, to prismatic, elongated along $[10\bar{1}0]$, to 0.6 mm.

Physical Properties: Hardness = [2.5] (by analogy to the ettringite group).
D(meas.) = n.d. D(calc.) = 1.979

Optical Properties: Transparent to translucent. *Color:* Milky white. *Luster:* Vitreous.
Optical Class: Uniaxial (–) $\omega = 1.509(1)$ $\epsilon = 1.479(1)$

Cell Data: *Space Group:* $P6_3/m$. $a = 11.056(3)$ $c = 10.629(6)$ $Z = 2$

X-ray Powder Pattern: Gioia quarry, Italy.
9.57 (vs), 5.53 (s), 3.83 (s), 3.56 (ms), 2.74 (ms), 3.44 (m), 2.53 (m)

Chemistry:

	(1)	(2)
SO_3	16.19	12.00
CO_2		6.60
GeO_2	18.15	15.68
CaO	35.70	25.22
H_2O		40.50
Total		100.00

(1) Gioia quarry, Italy; by electron microprobe, corresponds to $Ca_3Ge(SO_4)_{1.08}(CO_3)_{0.92}(OH)_6 \cdot 12H_2O$. (2) $Ca_3Ge(SO_4)(CO_3)(OH)_6 \cdot 12H_2O$ as confirmed by crystal-structure analysis.

Mineral Group: Ettringite group.

Occurrence: A rare secondary mineral formed by late-stage hydrothermal alteration of earlier sulfides and sulfosalts.

Association: Nordstrandite, dawsonite.

Distribution: From the Gioia quarry, Colonnata Valley, northeast of Carrara, Tuscany, Italy.

Name: For its occurrence in the Carrara district, Italy.

Type Material: Natural History Museum, University of Pisa, Pisa, Italy.

References: (1) Merlino, S. and P. Orlandi (2001) Carraraite and zaccagnaite, two new minerals from the Carrara marble quarries: their chemical compositions, physical properties, and structural features. Amer. Mineral., 86, 1293–1301.