Vertumnite $Ca_8Al_4(Al_4Si_5)O_{12}(OH)_{36}\cdot 10H_2O$

Crystal Data: Monoclinic, pseudohexagonal. *Point Group:* $2/m$. As flattened hexagonal prisms, to 4 mm. *Twinning:* Cyclic, contact plane ∥ {001}, common.

Physical Properties: *Fracture:* Conchoidal. *Tenacity:* Very brittle. Hardness = 5
D(meas.) = 2.15(4) D(calc.) = 2.15

Optical Properties: Transparent. *Color:* Colorless. *Luster:* Vitreous.
Optical Class: Biaxial (–); rarely uniaxial (–). *Orientation:* $X = c$; $Z \wedge b = 16°$. $\alpha = 1.531(1)$ $\beta = 1.535(1)$ $\gamma = 1.541(2)$ 2V(meas.) = 62(5)°

Cell Data: *Space Group:* $P2_1/m$, $P6_3/m$ pseudocell. $a = 5.744(5)$ $b = 5.766(5)$ $c = 25.12(1)$ $\gamma = 119.72(5)°$ Z = 1

X-ray Powder Pattern: Campomorto, Italy.
4.187 (100), 12.51 (70), 6.275 (65), 2.873 (17), 4.275 (16), 2.436 (11), 2.077 (10)

Chemistry:

	(1)	(2)
SiO_2	18.01	18.08
Al_2O_3	25.26	24.55
CaO	25.88	27.00
SrO	0.81	
BaO	0.18	
Na_2O	0.07	
K_2O	0.02	
H_2O^+	23.74	
H_2O^-	5.96	
H_2O		30.37
P_2O_5		
Total	99.93	100.00

(1) Campomorto, Italy; by electron microprobe, H_2O determined by weight loss above and below 120 °C on a separate sample; corresponds to $(Ca_{7.80}Sr_{0.12}Ba_{0.04}Na_{0.04})_{\Sigma=8.00}Al_{8.36}Si_{5.08}O_{12.64}(OH)_{36.12}\cdot 9.80H_2O$. (3) $Ca_8Al_8Si_5O_{12}(OH)_{36}\cdot 10H_2O$.

Occurrence: As late-forming crystals inside a small cavity in phonolite.

Association: Tobermorite, ettringite.

Distribution: Found in a quarry at Campomorto, Montalto di Castro, Lazio, Italy.

Name: For *Vertumnus*, the god worshipped by the ancient Etruscan people who inhabited the region where the mineral was found.

Type Material: Municipal Museum of Natural History, Milan, Italy; National School of Mines, Paris, France.

References: (1) Passaglia, E. and E. Galli (1977) Vertumnite, a new natural silicate. Tschermaks Mineral. Petrog. Mitt., 24, 57–66. (2) (1977) Amer. Mineral., 62, 1061 (abs. ref. 1). (3) Galli, E. and E. Passaglia (1978) Vertumnite: its crystal structure and relationship with natural and synthetic phases. Tschermaks Mineral. Petrog. Mitt., 25, 33–46. (4) Rinaldi, R., M. Sacerdoti, and E. Passaglia (1990) Strätlingite: crystal structure, chemistry, and a reexamination of its polytype vertumnite. Eur. J. Mineral., 2, 841–849.