Ferrarisite $Ca_5(AsO_4)_2(AsO_3OH)_2 \cdot 9H_2O$

Crystal Data: Triclinic. *Point Group:* $\overline{1}$. Crystals, flattened on {110}, slightly elongated along [$\overline{1}$10], with pseudohexagonal outline, to 300 μm.

Physical Properties: *Cleavage:* On {001}, perfect. Hardness = n.d. D(meas.) = 2.63 D(calc.) = 2.594 Dehydrates in dry air.

Optical Properties: Transparent. *Color:* Colorless, white on dehydration. *Optical Class:* Biaxial (+). *Orientation:* X $\wedge$ c = 17°; Z $\perp$ {110}. *Dispersion:* Strong. $\alpha = 1.562(2)$ $\beta = 1.572(2)$ $\gamma = 1.585(2)$ 2V(meas.) = ∼90° 2V(calc.) = 83°

Cell Data: *Space Group:* $P\overline{1}$. $a = 8.294(4)$ $b = 6.722(3)$ $c = 11.198(5)$ $\alpha = 106.16(4)°$ $\beta = 92.94(4)°$ $\gamma = 99.20(4)°$ Z = 1

X-ray Powder Pattern: Sainte-Marie-aux-Mines, France.
10.81 (10), 2.831 (9), 3.170 (8), 4.07 (4), 3.573 (4), 6.34 (3), 5.36 (3)

Chemistry:

	(1)	(2)
As_2O_5	49.3	49.95
MgO	0.52	
CaO	30.6	30.47
H_2O	19.4	19.58
Total	99.8	100.00

(1) Sainte-Marie-aux-Mines, France; by AA, MgO considered as admixed picropharmacolite, H_2O average of two determinations, one by the Penfield method 18.1%, another by TGA 20.7%; corresponds to $Ca_{5.00}(AsO_4)_2(AsO_3OH)_2 \cdot 9.85H_2O$. (2) $Ca_5(AsO_4)_2(AsO_3OH)_2 \cdot 9H_2O$.

Polymorphism & Series: Dimorphous with guérinite.

Occurrence: A post-mine low-temperature reaction product of carbonate gangue with arsenical solutions derived from arsenic (Sainte-Marie-aux-Mines, France).

Association: Picropharmacolite, pharmacolite, sainfeldite, rauenthalite, phaunouxite, calcite, löllingite (Sainte-Marie-aux-Mines, France).

Distribution: From the Gabe-Gottes mine, Rauenthal, near Sainte-Marie-aux-Mines, Haut-Rhin, and at Duranus, Alpes-Maritimes, France. In Germany, in the Anton mine, Heubachtal, near Schiltach, Wittichen, Black Forest, in the Bauhaus district, Richelsdorf Mountains, Hesse, and at Ramsbeck, North Rhein-Westphalia.

Name: To honor Professor Giovanni Ferraris (1937–), Institute of Mineralogy, Crystallography and Geochemistry, University of Turin, Turin, Italy, who worked on crystal structures of several arsenate minerals from Sainte-Marie-aux-Mines, France.

Type Material: National School of Mines, Paris, France; Institute of Mineralogy and Crystallography, University of Stuttgart, Stuttgart, Germany; National Museum of Natural History, Washington, D.C., USA, 146899.

References: (1) Bari, H., F. Permingeat, R. Pierrot, and K. Walenta (1980) La ferrarisite $Ca_5H_2(AsO_4)_4.9H_2O$, une nouvelle espèce minérale dimorphe de la guérinite. Bull. Minéral., 103, 533–540 (in French with English abs.). (2) Catti, M., G. Chiari, and G. Ferraris (1980) The structure of ferrarisite, $Ca_5(HAsO_4)_2(AsO_4)_2.9H_2O$: disorder, hydrogen bonding, and polymorphism with guerinite. Bull. Minéral., 103, 541–546. (3) (1981) Amer. Mineral., 66, 637 (abs. refs. 1 and 2).