Monteneroite $Cu^{2+}Mn^{2+}{}_2(AsO_4)_2 \cdot 8H_2O$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. Crystals exhibit {010}, {110}, {30$\bar{1}$ }, and {101} as thick blades to ~2.5 mm, elongated along [001] and flattened on {010}.

Physical Properties: *Cleavage*: Perfect on {010}, fair on {001}. *Tenacity*: Somewhat sectile. *Fracture*: Irregular, stepped. Hardness = ~2 D(meas.) = 2.97(2) D(calc.) = 2.988
Dissolves rapidly in dilute HCl.

Optical Properties: Transparent. *Color*: Light green. *Streak*: White. *Luster*: Vitreous. *Optical Class*: Biaxial (+). $\alpha = 1.604(2)$ $\beta = 1.637(2)$ $\gamma = 1.688(2)$ 2V(meas.) = 80(1)° 2V(calc.) = 79.8° *Dispersion*: Slight, $r < v$. *Orientation*: $X = b$; $Z \wedge c = 52°$ in obtuse β.

Cell Data: *Space Group: C*2/*m*. $a = 10.367(1)$ $b = 13.713(2)$ $c = 4.8420(8)$ $\beta = 105.992(8)°$ $Z = 2$

X-Ray Diffraction Pattern: Monte Nero mine, Rocchetta di Vara, La Spezia, Liguria, Italy.
6.86 (100), 3.032 (94), 2.751 (88), 3.287 (75), 4.507 (50), 2.372 (44), 8.08 (38)

Chemistry:

	(1)	(2)
CuO	11.97	13.36
MnO	25.57	23.83
As_2O_5	39.30	38.60
H_2O	[24.56]	24.21
Total	101.40	100.00

(1) Monte Nero mine, Rocchetta di Vara, La Spezia, Liguria, Italy; average electron microprobe analysis supplemented by Raman spectroscopy, H_2O calculated from structure; corresponds to $(Cu^{2+}{}_{0.88}Mn^{2+}{}_{0.11})_{\Sigma=0.99}Mn^{2+}{}_{2.00}(As_{1.00}O_4)_2 \cdot 8H_2O$. (2) $CuMn_2(AsO_4)_2 \cdot 8H_2O$.

Mineral Group: Vivianite structure type defined by the dominance of different cations in the *M*1 and *M*2 sites.

Occurrence: A secondary mineral in thin stratiform manganese ores located near the base of a chert sequence. Crystallized from As-, Cu- and Mn-rich fluids that circulated through fractures during the final stage of tectono-metamorphism.

Association: Braunite, copper, cuprite, rhodochrosite, strashimirite.

Distribution: From the Monte Nero mine, Rocchetta di Vara, La Spezia, Liguria, Italy.

Name: For its type locality, the abandoned *Monte Nero* mine.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (67509).

References: (1) Kampf, A.R., J. Plášil, B.P. Nash, M.E. Ciriotti, F. Castellaro, and L. Chiappino (2020) Monteneroite, $Cu^{2+}Mn^{2+}{}_2(AsO_4)_2 \cdot 8H_2O$, a new vivianite-structure mineral with ordered cations from the Monte Nero mine, Liguria, Italy. Mineral. Mag., 84, 881-887.