

Crystal Data: Tetragonal. *Point Group:* $\bar{4} 2m$. In thin crusts intermixed with romarchite; as coatings, spots, or crystals to 100 μm . Crystals are tabular with prominent pinacoid to nearly equant, with pinacoid, shallow bipyramid and prism prominent.

Physical Properties: *Cleavage:* Three sets visible in SEM images. *Tenacity:* Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = 4.904

Optical Properties: Transparent to translucent. *Color:* Colorless, pale tan (crusts), brown (bruised spots on crusts). *Luster:* Adamantine. *Optical Class:* Uniaxial. ω = n.d. ϵ = n.d.

Cell Data: *Space Group:* $P\bar{4} 2_1c$. $a = 7.9269(5)$ $c = 9.0970(6)$ $Z = 4$

X-ray Powder Pattern: Boundary Falls, Canada.

3.540 (100), 2.797 (94), 2.988 (81), 3.303 (60), 5.980 (41), 2.507 (38), 5.612 (34)

Chemistry:	(1)
Sn	83.41
Fe	0.79
Zn	0.57
S	0.04
O	[11.61]
H ₂ O	[4.27]
Total	100.68

(1) Corchia mine, Italy; average electron microprobe analysis, H₂O calculated from ideal formula, O calculated; neglecting S, corresponds to $(\text{Sn}_{2.90}\text{Fe}_{0.06}\text{Zn}_{0.04})_{\Sigma=3.00}\text{O}_2(\text{OH})_{1.96}$.

Occurrence: Interstitial in quartz-calcite gangue of a massive sphalerite-pyrite ore body (Italy). Generally, of anthropogenic origin by preferential leaching and oxidation of tin from tin, bronze, or pewter artifacts in a marine or fluvial environment. Inductively coupled plasma-atomic emission spectroscopic analysis of pewter in the artifact from Boundary Falls, Canada, yielded Sn 82.0, Pb 11.0, Sb 1.1, Cu 0.7, Fe 0.3, Zn 0.1, As 0.05, Mg 0.05, and Ca 0.7 wt. %.

Association: Romarchite (Canada); siderite, pyrite, smithsonite, sphalerite, barite, an unidentified Fe-Ca sulfate (Italy).

Distribution: From the Corchia mine, western Emilia Romagna, Italy. At Boundary Falls, Winnipeg River, Ontario, Canada [TL], where pewter pannikins had been dropped by a voyageur between 1801 and 1821.

Name: As a HYDROus mineral related to *romarchite*.

Type Material: Royal Ontario Museum, Toronto, Canada, M28744.

References: (1) Organ, R.M. and J.A. Mandarino (1971) Romarchite and hydroromarchite, two new stannous minerals. *Can. Mineral.*, 10, 916 (abs.). (2) (1972) *Amer. Mineral.*, 57, 1555 (abs. ref. 1). (3) Ramik, R.A., R.M. Organ, and J.A. Mandarino (2003) On type romarchite and hydroromarchite from Boundary Falls, Ontario, and notes on other occurrences. *Can. Mineral.* 41, 649-657. (4) Garuti, G. and F. Zaccarini (2005) Minerals of Au, Ag and U in volcanic-rock-associated massive sulfide deposits of the northern Apennine ophiolite, Italy. *Can. Mineral.*, 43, 935-950. (5) (2006) *Amer. Mineral.*, 91(1), 221-222 (abs. ref. 4).