Ciriottiite $Cu(Cu, Ag)_3Pb_{19}(Sb, As)_{22}(As_2)S_{56}$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As tubular crystals, to 150 μm.

Physical Properties: *Cleavage*: n.d. *Fracture*: n.d. *Tenacity*: Brittle.
Hardness = 3-3.5 VHN = 190-219, 203 (10 g load). D(meas.) = n.d. D(calc.) = 5.918

Optical Properties: Opaque. *Color*: Black; light gray in reflected light. *Streak*: Black.
Luster: Metallic.
Optical Class: n.d. *Anisotropism*: Distinct, brownish to greenish tints.
R_1-R_2: (471.1) 37.8-33.2, (548.3) 35.3-31.8, (586.6) 34.7-31.0, (652.3) 32.5-27.9

Cell Data: Space Group: $P2_1/n$. a = 8.178(2) b = 28.223(6) c = 42.542(5) β = 93.55(2)° Z = 4

X-ray Powder Pattern: Calculated pattern.
3.641 (100), 3.238 (82), 2.043 (78), 3.208 (57), 2.936 (54), 2.928 (37), 2.800 (36)

Chemistry:

	(1)	(2)
Cu	2.33	2.95
Ag	0.53	
Hg	0.98	
Tl	0.78	
Pb	44.06	45.63
As	4.66	5.21
Sb	23.90	25.40
Bi	1.75	
S	20.37	20.81
Total	99.38	100.00

(1) Espérance superiore tunnel, Piedmont, Italy; average of 5 electron microprobe analyses; corresponds to $Cu_{3.23}Ag_{0.43}Hg_{0.43}Pb_{18.74}Tl_{0.34}Sb_{17.30}As_{5.48}Bi_{0.74}S_{56}$. (2) $Cu(Cu_3)Pb_{19}(Sb_{18}As_4)(As_2)S_{56}$.

Mineral Group: Owyheeite group.

Occurrence: In a vug in a quartz vein in a complex hydrothermal sulfide deposit.

Association: Arsenopyrite, a kobellite-like mineral.

Distribution: From the Espérance superiore tunnel, Tavagnasco Pb-Bi-Zn-As-Fe-Cu district, ~50 km north of Turin, Piedmont, Italy.

Name: Honors Marco Ernesto Ciriotti (b. 1945), Italian member of the IMA CNMNC since 2013, and president of the Italian Micromineralogical Association, for his longstanding contributions to mineral systematics.

Type Material: Natural History Museum, University of Florence, Italy (3161/I).

References: (1) Bindi, L., C. Biagioni, B. Martini, and A. Salvetti (2016) Ciriottiite, $Cu(Cu,Ag)_3Pb_{19}(Sb,As)_{22}(As_2)S_{56}$, the Cu-analogue of sterryite from the Tavagnasco Mining District, Piedmont, Italy. Minerals, 6(1), 8. (2) (2020) Amer. Mineral., 105, 1111 (abs. ref. 1).