Perroudite $Ag_4Hg_5S_5(I, Br)_2Cl_2$

Crystal Data: Orthorhombic. *Point Group*: 222. Fibrous tufted aggregates of crystals, to 0.07 mm, prismatic on [001], flattened on {100}, which may have hollow terminations.
Twinning: Observed as contact twins on {0hl} [sic].

Physical Properties: *Cleavage*: Perfect on {100}. *Fracture*: Irregular. *Tenacity*: Brittle. Hardness = Soft. D(meas.) = n.d. D(calc.) = 6.928

Optical Properties: Transparent. *Color*: Bright red. *Streak*: Reddish orange. *Luster*: Vitreous to adamantine.
Optical Class: Biaxial (+). $\alpha = 2.3$ $\beta = 2.4$ γ = n.d. 2V(meas.) = ~70° *Pleochroism*: Very intense; X = dark brownish red; Y = yellow; Z = brownish yellow. *Orientation*: $X = c$; $Y = b$; $Z = a$. *Dispersion*: $r > v$, very strong.

Cell Data: Space Group: $P2_12_12_1$. $a = 17.43(2)$ $b = 12.24(2)$ $c = 4.35(1)$ Z = 2

X-ray Powder Pattern: Cap Garonne mine, France.
3.012 (100), 2.965 (80), 3.945 (60), 2.638 (35), 3.694 (30), 2.740 (30), 2.446 (30)
X-ray Powder Pattern: Coppin Pool, Australia.
2.982 (100), 2.724 (40), 3.948 (30), 2.629 (20), 2.442 (20), 2.141 (20), 2.071 (20)

Chemistry:

	(1)	(2)	(3)		(1)	(2)	(3)
Hg	53.08	51.95	57.68	Cl	2.89	2.83	3.56
Ag	22.86	23.54	19.43	Br	3.67	0.96	2.11
S	6.67	9.07	8.79	Total	99.49	99.15	98.02
I	10.32	10.80	6.45				

(1) Cap Garonne mine, France; by electron microprobe, average of five analyses on two crystals; corresponds to $Ag_{4.03}Hg_{5.04}S_{3.96}(Cl_{1.55}I_{1.55}Br_{0.87})_{\Sigma=3.97}$. (2) Broken Hill, Australia; by electron microprobe, average of seven analyses; corresponding to $Ag_{4.20}Hg_{5.00}S_{5.45}(I_{1.60}Cl_{1.55}Br_{0.25})_{\Sigma=3.40}$. (3) Coppin Pool, Australia; by electron microprobe, average of 32 analyses on two specimens; corresponds to $Ag_{4.75}Hg_{5.18}S_{6.00}(Cl_{2.40}I_{1.81}Br_{0.98})_{\Sigma=5.19}$.

Occurrence: An alteration of tennantite in sandstones and conglomerates (Cap Garonne mine, France); in a quartz vein carrying oxidized galena (Coppin Pool, Australia).

Association: Mercurian and argentian tennantite, secondary copper minerals (Cap Garonne mine, France); iodargyrite, gold, kaolinite (Broken Hill, Australia); anglesite, cerussite, phosgenite, covellite, pyromorphite, cinnabar (Coppin Pool, Australia).

Distribution: From the Cap Garonne mine, near le Pradet, Var, France [TL]. At the Schöne Aussicht mine, near Dernbach, North Rhine-Westphalia, Germany. In Australia, at Broken Hill, New South Wales; at Coppin Pool, Pilbara district, and from the Anticline prospect, 11 km west-southwest of Ashburton Downs homestead, Capricorn Range, Western Australia. From Tsumeb, Namibia.

Name: Honors Professor Pierre *Perroud* (b. 1943), Voltaire College, Geneva, Switzerland, for his work on Cap Garonne mine minerals.

Type Material: Natural History Museum, Geneva, Switzerland; Government Chemical Laboratories, Perth; Museum Victoria, Melbourne, Australia.

References: (1) Sarp, H., W.D. Birch, P.F. Hlava, A. Pring, D.K.B. Sewell, and E.H. Nickel (1987) Perroudite, a new sulfide-halide of Hg and Ag from Cap-Garonne, Var, France, and from Broken Hill, New South Wales, and Coppin Pool, Western Australia. Amer. Mineral., 72, 1251-1256. (2) Mumme, W.G. and E.H. Nickel (1987) Crystal structure and crystal chemistry of perroudite: a mineral from Coppin Pool, Western Australia. Amer. Mineral., 72, 1257-1262. (3) Keller, P., F. Lissner, and T. Schleid (2005) Single-crystal structure determination of perroudite, $Hg_5Ag_4S_5(I,Br)_2Cl_2$, from Tsumeb (Namibia), and its structural relationship to other sulfide halides of mercury and cinnabar. N. Jb. Mineral. Abh., 181(1), 1-9. (4) (2005) Amer. Mineral., 90(8), 1469 (abs. ref. 3).