Gysinite-(Nd) $Pb(Nd,La)(CO_3)_2(OH)\cdot H_2O$

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. As pseudo-octahedral crystals, to 1 mm, exhibiting {111} and {110}, isolated or in rounded aggregates of interpenetrant crystals; in thin films. *Twinning:* Possible penetration twins on {100} about an undetermined axis.

Physical Properties: *Tenacity:* Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = 5.12–5.18

Optical Properties: Translucent. *Color:* Pale pink to reddish pink. *Streak:* White to pale pink. *Luster:* Vitreous to greasy.
Optical Class: Biaxial (–). *Orientation:* $X = c$; $Y = a$; $Z = b$. *Dispersion:* $r < v$, perceptible. $\alpha = 1.745(5)$ $\beta = 1.805(5)$ $\gamma = 1.840(5)$ 2V(meas.) = 70° 2V(calc.) = 72.4°

Cell Data: *Space Group: Pmcn.* $a = 5.0028(8)$ $b = 8.555(1)$ $c = 7.2392(8)$ Z = 2

X-ray Powder Pattern: [Shinkolobwe,] Congo.
4.326 (100), 3.676 (100), 2.074 (60), 5.54 (50), 2.950 (50), 2.336 (50), 2.021 (50)

Chemistry:

	(1)	(2)
CO_2	20.1	
La_2O_3	5.8	15.01
Pr_2O_3		7.76
Nd_2O_3	38.9	17.84
Sm_2O_3		3.33
Eu_2O_3		1.49
Gd_2O_3		1.93
PbO	29.1	31.69
H_2O	[6.1]	
Total	[100.0]	

(1) [Shinkolobwe,] Congo; by electron microprobe, averages of 21 analyses, H_2O by difference; corresponds to $Pb_{0.59}(Nd_{1.04}La_{0.15})_{\Sigma=1.19}(CO_3)_{2.05}(OH)_{0.63}\cdot 1.2H_2O$. (2) Sa Duchessa mine, Sardinia, Italy; by electron microprobe, average of six analyses, C 5.46% and H 0.52% by elemental microanalysis, $(OH)^{1-}$ and H_2O confirmed by IR spectroscopy; corresponds to $Pb_{0.66}(Nd_{0.50}La_{0.44}Pr_{0.22}Sm_{0.09}Gd_{0.05}Eu_{0.04})_{\Sigma=1.34}(CO_3)_{2.13}(OH)_{1.06}\cdot 0.68H_2O$.

Occurrence: A rare secondary mineral in the oxidized portions of rare-earth-bearing lead deposits, the rare-earths perhaps supplied from altered uraninite.

Association: Schuilingite-(Nd), malachite, cerussite, wulfenite, kasolite, gold, bornite, garnet, "talc-chlorite" (Shinkolobwe, Congo); chrysocolla, agardite-(Y), philipsburgite, theisite (Sa Duchessa mine, Sardinia, Italy).

Distribution: Originally found on a museum specimen labelled as coming from Shinkolobwe; however the associated minerals indicate the specimen is more likely from the Kasompi mine, both in Katanga Province, Congo (Shaba Province, Zaire). At the Sa Duchessa mine, Oridda district, Sardinia, Italy. In the Glücksrad mine, Oberschulenberg, Harz Mountains, Germany.

Name: Honors Marcel Gysin (1891–1974), Professor of Mineralogy, University of Geneva, Geneva, Switzerland.

Type Material: Geneva Natural History Museum, Geneva, Switzerland, 410/85, 435/60.

References: (1) Sarp, H. and J. Bertrand (1985) Gysinite, $Pb(Nd,La)(CO_3)_2(OH)\cdot H_2O$, a new lead, rare-earth carbonate from Shinkolobwe, Shaba, Zaïre and its relationship to ancylite. Amer. Mineral., 70, 1314–1317. (2) Chabot, B. and H. Sarp (1985) Structure refinement of gysinite $La_{0.16}Nd_{1.18}Pb_{0.66}(CO_3)_2(OH)_{1.34}\cdot 0.66H_2O$. Zeits. Krist., 171, 155–158. (3) Olmi, F. and C. Sabelli (1991) Gysinite-(Nd), a mineral new to Italy, from Sa Duchessa, Sardinia. Neues Jahrb. Mineral., Monatsh., 185–191.