Lipscombite $(Fe^{2+}, Mn^{2+})Fe_2^{3+}(PO_4)_2(OH)_2$

Crystal Data: Tetragonal. *Point Group:* 422. As very small acicular crystals, in radial aggregates; massive.

Physical Properties: Hardness = n.d. D(meas.) = 3.66(1) D(calc.) = [3.68]

Optical Properties: Translucent to opaque. *Color:* Olive-green to black, yellowish brown.
Luster: Vitreous.
Optical Class: [Uniaxial.]
R_1–R_2: n.d.

Cell Data: *Space Group:* $P4_12_12$. $a = 7.40$ $c = 12.81$ $Z = 4$

X-ray Powder Pattern: Sapucaia mine, Brazil.
3.314 (10), 3.206 (6), 1.656 (4), 1.601 (4), 4.84 (3), 2.302 (3), 2.054 (3)

Chemistry:

	(1)	(2)	(3)
P_2O_5	33.37	33.76	36.26
Fe_2O_3	50.45	57.16	40.79
FeO	3.75	1.72	18.35
MnO	7.91		
H_2O	4.45	6.65	4.60
Total	99.93	99.29	100.00

(1) Sapucaia mine, Brazil; corresponds to $(Mn^{2+}_{0.44}Fe^{2+}_{0.21})_{\Sigma=0.65}Fe^{3+}_{2.49}(PO_4)_{1.85}O_{1.22}(OH)_{0.78}$.
(2) Anloua, Cameroon; corresponds to $Fe^{2+}_{0.09}Fe^{3+}_{2.82}(PO_4)_{1.87}O_{1.03}(OH)_{0.97}$. (3) $Fe^{2+}Fe^{3+}_2(PO_4)_2(OH)_2$.

Mineral Group: Dimorphous with barbosalite.

Occurrence: In a hydrothermally altered phosphate zone of a complex granite pegmatite (Sapucaia mine, Brazil).

Association: Cyrilovite, leucophosphite, phosphosiderite, frondelite (Sapucaia mine, Brazil); heterosite, strengite, cyrilovite, leucophosphite (Hagendorf, Germany).

Distribution: From the Sapucaia pegmatite mine, about 50 km east-southeast of Governador Valadares, Minas Gerais, Brazil. At the El Criollo pegmatite, Cerro Blanco, Tanti district, 45 km west of Córdoba, Córdoba Province, Argentina. In the USA, on Fodderstack Mountain, Montgomery Co., Arkansas; at the Silver Coin mine, near Valmy, Iron Point district, Humboldt Co., and in the Rain mine, Carlin district, Elko Co., Nevada. From the Tsaobismund pegmatite, 60 km south of Karibib, Namibia. At Anloua, near Ngaoundéré, Cameroon. From Hagendorf, Bavaria, Germany. In the Wolf Creek meteorite.

Name: To honor William Nunn Lipscomb (1909–), mineralogist, University of Minnesota, Minneapolis, Minnesota, USA, who determined the crystal structure of the synthetic compound.

Type Material: n.d.

References: (1) Lindberg, M.L. (1962) Manganoan lipscombite from the Sapucaia pegmatite mine, Minas Gerais, Brazil. Amer. Mineral., 47, 353–359. (2) Gheith, M.A, (1953) Lipscombite: a new synthetic "iron lazulite". Amer. Mineral., 38, 612–628. (3) Vencato, I., E. Mattievich, and Y.P. Mascarenhas (1989) Crystal structure of synthetic lipscombite: a redetermination. Amer. Mineral., 74, 456–460. (4) Vochten, R., P. van Acker, and E. De Grave (1983) Mössbauer, electrokinetic and refined lattice parameters study of synthetic manganoan lipscombite. Phys. Chem. Minerals, 9, 263–268.