Afmite $Al_3(OH)_4(H_2O)_3(PO_4)(PO_3OH)\cdot H_2O$

Crystal Data: Triclinic. *Point Group*: $\bar{1}$. Diamond-shaped crystals, tabular on {001} and elongated on [010], form cockscomb aggregates. Crystals display {001}, {100}, {110}, and {010}. *Twinning:* As ubiquitous polysynthetic twins on {001}or by rotation on [010] with composition planes {010} and $\{1\bar{1}\ 0\}$, forming star-like sixlings, which are slightly concave/convex (dish-like).

Physical Properties: *Cleavage*: Perfect on {001}, good on {010} and $(1\bar{1}\ 0\}$. *Fracture*: Irregular. *Tenacity*: Flexible. *Hardness* = ~ 1.5 D(meas.) = 2.39(3) D(calc.) = 2.394

Optical Properties: Transparent. *Color*: Colorless to white; on weathered surfaces, white to cream to yellowish. *Streak*: White. *Luster*: Pearly; dull on weathered surfaces. *Optical Class*: Biaxial(+). α = 1.554(1) β = 1.558(1) γ = 1.566(1) 2V(meas.) = 70(5)° 2V(calc.) = 71° *Orientation*: $Y \approx a$; b is at roughly equal angles (~ 55°) to X and Z.

Cell Data: *Space Group*: $P\bar{1}$. a = 7.386(3) b = 7.716(3) c = 11.345(4) α = 99.773(5)° β = 91.141(6)° γ = 115.58(5)° Z = 2

X-ray Powder Pattern: Fumade, Castelnau-de-Brassac, Tarn, France.
11.089 (100), 3.540 (81), 5.484 (79), 2.918 (60), 3.089 (33), 4.022 (30), 6.826 (23)

Chemistry:

	(1)	(2)
Al_2O_3	40.20	36.41
P_2O_5	38.84	35.17
H_2O	25.64	[28.42]
Total	103.68	100.00

(1) Fumade, Castelnau-de-Brassac, Tarn, France; average of 4 electron microprobe analyses, PO_3OH, OH and H_2O confirmed by IR and Raman spectroscopy, H_2O by CHN.
(2) Fumade, Castelnau-de-Brassac, Tarn, France; normalized electron microprobe analyses supplemented by IR and Raman spectroscopy, H_2O calculated from structure analysis.

Occurrence: A secondary mineral formed by remobilization and crystallization during low-temperature hydrothermal activity and/or weathering and ground water activity.

Association: Matulaite, variscite (France); kobokoboite (Democratic Republic of Congo).

Distribution: From Fumade, Castelnau-de-Brassac, Tarn, France. From the Bachman mine, Hellertown, Pennsylvania, USA. From the Kobokobo pegmatite, Democratic Republic of Congo.

Name: Honors the Association Française de Microminéralogie (*AFM*), an amateur association devoted to the collection and study of micro-minerals.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA. (#55425).

References: (1) Kampf, A.R., S.J. Mills, G.R. Rossman, I.M. Steele, J.J. Pluth, and G. Favreau (2011) Afmite, $Al_3(OH)_4(H_2O)_3(PO_4)(PO_3OH)\cdot H_2O$, a new mineral from Fumade, Tarn, France: description and crystal structure. Eur. J. Mineral., 23, 269-277. (2) (2011) Amer. Mineral., 96, 1654-1655 (abs. ref. 1).