Ferro-ferri-nybøite $NaNa_2(Fe^{2+}_3Fe^{3+}_2)(Si_7Al)O_{22}(OH)_2$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. Crystals are stubby prismatic, elongated along [001] and displaying {100} and {110}, to 3 cm.

Physical Properties: *Cleavage*: Perfect on {110}, (planes intersecting at ~ 56°).
Fracture: Splintery. *Tenacity*: Brittle. Hardness = ~ 6 D(meas.) = n.d. D(calc.) = 3.424

Optical Properties: Translucent. *Color*: Jet-black. *Streak*: Grayish green to black.
Luster: Vitreous.
Optical Class: Biaxial. *Pleochroism:* Strong, shades of dark greenish blue to black.

Cell Data: *Space Group*: *C*2/*m*. a = 9.9190(5) b = 18.0885(8) c = 5.3440(3)
β = 103.813(1)° Z = 2

X-ray Powder Pattern: Poudrette quarry, Mont Saint-Hilaire, Québec, Canada.
8.520 (100), 3.162 (55), 2.834 (24), 1.671 (19), 2.732 (10), 2.552 (10), 2.344 (9)

Chemistry:	(1)		(1)
SiO_2	45.80	MgO	0.23
Al_2O_3	3.11	CaO	0.99
TiO_2	0.50	Na_2O	8.01
Fe_2O_3	11.18	K_2O	1.30
FeO	23.45	F	0.81
MnO	2.28	H_2O	[1.47]
ZnO	0.12	$-O = F_2$	0.34
		Total	98.91

(1) Poudrette quarry, Mont Saint-Hilaire, Québec, Canada; average of 10 electron microprobe analyses supplemented by Mossbauer spectroscopy, H_2O calculated from stoichiometry; corresponding to $(Na_{0.66}K_{0.27})_{\Sigma=0.93}(Na_{1.83}Ca_{0.17})_{\Sigma=2.00}(Mg_{0.06}Fe^{2+}_{3.15}Mn_{0.31}Zn_{0.01}Fe^{3+}_{1.38}Ti_{0.06}Al_{0.03})_{\Sigma=5.00}(Si_{7.35}Al_{0.65})_{\Sigma=8.00}O_{22}(OH_{1.58}F_{0.42})_{\Sigma=2.00}$.

Mineral Group: Amphibole supergroup, sodium amphibole subgroup.

Occurrence: The earliest mineral in an igneous microbreccia in an alkaline syenite-gabbro complex.

Association: An astrophyllite-group mineral, a eudialyte-group mineral, albite, nepheline.

Distribution: From Poudrette quarry, Mont Saint-Hilaire, La Vallée-du-Richelieu RCM, Montérégie (formerly Rouville County), Québec, Canada.

Name: Signifies an amphibole in the compositional range of nybøite with a dominance of Fe^{2+} and Fe^{3+} substituting for Mg and Al respectively.

Type Material: Royal Ontario Museum, Toronto, Ontario, Canada (M55980).

References: (1) Lussier, A.J., F.C. Hawthorne, Y.A. Abdu, N.A. Ball, K.T. Tait, M.E. Back, A.H. Steede, R. Taylor, and A.M. McDonald (2014) Ferro-ferri-nybøite, $NaNa_2(Fe^{2+}_3Fe^{3+}_2)(Si_7Al)O_{22}(OH)_2$, a new clinoamphibole from Mont Saint-Hilaire, Québec, Canada: description and crystal structure. Can. Mineral., 52(6), 1019-1026. (2) (2016) Amer. Mineral., 101, 1492 (abs. ref. 1). (3) Hawthorne, F.C., R. Oberti, G.E. Harlow, W.V. Maresch, R.F. Martin, J.C. Schumacher, and M.D. Welch (2012) Nomenclature of the amphibole supergroup. Amer. Mineral., 97, 2031-2048.