Eltyubyuite $Ca_{12}Fe^{3+}_{10}Si_4O_{32}Cl_6$

Crystal Data: Isometric. *Point Group*: $\bar{4}$ 3*m*. As tetrahedral crystals exhibiting {211}, to 10 μm, as inclusions in rondorfite or larnite grains; commonly as rims on wadalite.

Physical Properties: *Cleavage*: n.d. *Fracture*: n.d. *Tenacity*: n.d. *Hardness* = n.d.
D(meas.) = n.d. D(calc.) = 3.349

Optical Properties: n.d. *Color*: Yellow to light brown; brown in transmitted light. *Streak*: n.d.
Luster: n.d.
Optical Class: n.d. *n*(calc.) = 1.85

Cell Data: *Space Group*: $I\bar{4}$ 3*d*. *a* = 12.20(3) - 12.2150(2) [analysis 1- analysis 2] Z = 2

X-ray Powder Pattern: Calculated.
2.728 (100), 2.490 (62), 3.050 (49), 1.630 (40), 4.981 (30), 1.692 (28), 2.601 (14)

Chemistry:

	(1)	(2)
CaO	36.84	35.95
MgO	0.08	0.05
MnO		0.08
Fe_2O_3	40.37	44.09
Al_2O_3	3.45	n.d.
SiO_2	9.57	11.11
TiO_2	0.48	0.29
Cl	9.60	10.30
–O=Cl	2.13	2.32
Total	98.26	99.54

(1) Upper Chegem Caldera, Northern Caucasus, Kabardino-Balkaria, Russia; average of 9 electron microprobe analyses; corresponding to $Ca_{12.22}Mg_{0.04}Ti_{0.11}Fe^{3+}_{9.41}Al_{1.26}Si_{2.96}O_{31.89}Cl_{5.04}$. (2) Shadil-Khokh volcano, Kel' Plateau, Southern Ossetia, Russia; average of 7 electron microprobe analyses; corresponding to $Ca_{12.044}(Fe^{3+}_{10.373}Si_{3.473}Ti^{4+}_{0.067}Mn^{2+}_{0.021}Mg_{0.021})_{\Sigma=13.956}O_{32}Cl_{5.455}$.

Polymorphism & Series: Fe end-member of a series with wadalite.

Mineral Group: Wadalite group, mayenite supergroup.

Occurrence: From a thermally-altered carbonate-silicate xenolith (20 m long) in ignimbrite that created sanidinite facies metamorphism (Upper Chegem Caldera).

Association: Larnite, rondorfite, wadalite, hydroxylellestadite, edgrewite-hydroxyledgrewite, chegemite-fluorchegemite, cuspidine, lakargiite, perovskite, kerimasite, srebrodolskite, dovyrenite (Upper Chegem Caldera); rusinovite, cuspidine, rondorfite, hydrocalumite, magnetite, magnesioferrite, srebrodolskite, harmunite, larnite, wadalite, fluorellestadite (Southern Ossetia).

Distribution: From the Xenolith No.1, the Upper Chegem Caldera, Northern Caucasus, Kabardino-Balkaria and the Kel' Plateau, Shadil-Khokh volcano, southern flank of the Greater Caucasian Mountain Range, Southern Ossetia, Russia. From Eifel, Germany.

Name: For the historically famous Balkarian village *Eltyubyu*, which is located near the site from which the first specimens were collected.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (#4027/1, 4027/2).

References: (1) Galuskin, E.V., I.O. Galuskina, R. Bailau, K. Prusik, V.M. Gazeev, A.E. Zadov, N.N. Pertsev, L. Jezak, A.G. Gurbanov, and L. Dubrovinsky (2013) Eltyubyuite, $Ca_{12}Fe^{3+}_{10}Si_4O_{32}Cl_6$ - the Fe^{3+} analog of wadalite: a new mineral from the Northern Caucasus, Kabardino-Balkaria, Russia. Eur. J. Mineral., 25, 221-229. (2) Gfeller, F., D. Środek, J. Kusz, M. Dulski, V.

Gazeev, I. Galuskina, E. Galuskin, and T. Armbruster (2015) Mayenite supergroup, part IV: Crystal structure and Raman investigation of Al-free eltyubyuite from the Shadil-Khokh volcano, Kel' Plateau, Southern Ossetia, Russia. Eur. J. Mineral., 27(1), 137-143. (3) (2015) Amer. Mineral., 100, 1323 (abs. refs. 1 and 2).