Ciprianiite $Ca_4(Th, Ca)_{\Sigma=2}Al(Be_{0.5}\square_{1.5})[B_4Si_4O_{22}](OH)_2$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As crystals tabular on {010} to 0.5 mm. *Twinning*: Frequent on {100}.

Physical Properties: *Cleavage*: Fair to good on {100}. *Tenacity*: Brittle. *Fracture*: Conchoidal. Hardness = n.d. D(meas.) = n.d. D(calc.) = n.d.

Optical Properties: Transparent. *Color*: Brown. *Streak*: White. *Luster*: Vitreous. *Optical Class*: n.d. Properties not determinable.

Cell Data: *Space Group*: *P*2/*a*. a = 19.059(5) b = 4.729(1) c = 10.291(4) β = 111.33(2)° Z = 2

X-ray Powder Pattern: Calculated pattern.
2.846 (100), 3.089 (86), 2.634 (84), 2.653 (80), 3.454 (79), 2.648(79), 2.911 (74)

Chemistry:

	(1)		(1)		(1)
SiO_2	22.94	CaO	24.60	Dy_2O_3	0.049
B_2O_3	13.28	BaO	0.002	Er_2O_3	0.012
BeO	1.95	La_2O_3	1.39	Yb_2O_3	0.006
Li_2O	0.053	Ce_2O_3	5.48	ThO_2	15.80
TiO_2	0.730	Y_2O_3	0.185	UO_2	0.872
Al_2O_3	2.33	Pr_2O_3	0.863	H_2O	0.465
Fe_2O_3	2.87	Nd_2O_3	3.03	F	0.89
Cr_2O_3	0.015	Sm_2O_3	0.332	- O = F	0.370
Mn_2O_3	0.371	Eu_2O_3	0.051	Total	98.50
MgO	0.180	Gd_2O_3	0.139		

(1) Tre Croci, near Vetralla, Viterbo province, Latium, Italy; electron microprobe analysis; B, Be, Li, OH and F by SIMS; corresponds to $Ca_4[REE^{3+}_{0.72}(Th,U)^{4+}_{0.66}Ca_{0.60}Y_{0.02}]_{\Sigma=2}(Al_{0.48}Fe^{3+}_{0.38}Ti^{4+}_{0.10}Mg_{0.05}Mn^{3+}_{0.02})_{\Sigma=1.03}(Be_{0.82}\square_{0.60}Li_{0.04})B_{4.00}Si_{4.00}O_{22}O_5[O^{2-}_{0.97}(OH)_{0.54}F_{0.49}]_{\Sigma=2}$ or $^{X}Ca_4{}^{Y}[REE^{3+}_{0.74}Th^{4+}_{0.66}Ca_{0.60}]_{\Sigma=2}{}^{Z}Al_{1.03}{}^{T}(Be_{0.82}\square_{0.60}Li_{0.04})_{\Sigma=1.46}[B_4Si_4O_{22}]^{W}[O_{0.97}(OH)_{1.03}]_{\Sigma=2}$.

Mineral Group: Hellandite group.

Occurrence: In miarolitic cavities and voids in alkali-syenitic pyroclastic ejecta. Formed by late-stage post-magmatic hydrothermal fluids enriched in Zr, Ti, REEs, and actinide elements.

Association: Sanidine, plagioclase (An 20-80%), feldspathoid, clinopyroxene, clinoamphibole, magnetite, titanite, zircon, danburite, thorite, fluorite, tourmaline, a cancrinite-group mineral.

Distribution: From Tre Croci, near Vetralla, Viterbo province, Latium, Italy.

Name: Honors Curzio *Cipriani*, Professor of Mineralogy and Head of the Museum of Mineralogy, (later of Natural History), University of Florence, Italy, in recognition of his contribution to mineral systematics.

Type Material: Natural History Museum, the University of Florence, Italy (2771/RI).

References: (1) Della Ventura, G., P. Bonazzi, R. Oberti, and L. Ottolini (2002) Ciprianiite and mottanaite-(Ce), two new minerals of the hellandite group from Latium (Italy). Amer. Mineral., 87, 739-744. (2) Oberti, R., A. Langone, M. Boiocchi, E. Bernabè, and F.C. Hawthorne (2019) News from the hellandite group: the redefinition of mottanaite and ciprianiite and the new mineral description of ferri-mottanaite-(Ce), the first Fe^{3+}-dominant hellandite. Eur. J. Mineral., 31, 799-806.