Biraite-(Ce) $Ce_2Fe^{2+}(CO_3)(Si_2O_7)$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As prismatic crystals, to 0.1 mm.

Physical Properties: *Cleavage*: n.d. *Fracture*: n.d. *Tenacity*: Brittle. *Hardness* = 5 VHN = 777 (n.d. load). D(meas.) = n.d. D(calc.) = 4.76

Optical Properties: Translucent. *Color*: Brown, light brownish to colorless in transmitted light. *Streak*: White. *Luster*: Vitreous.
Optical Class: Biaxial (-). α = 1.785(1) β = 1.810(2) γ = 1.820(1) 2V(meas.) = 66(1)° 2V(calc.) = 64° *Pleochroism*: *None*. *Dispersion*: Weak, $r < v$.

Cell Data: *Space Group*: $P2_1/c$. a = 6.505(7) b = 6.744(2) c = 18.561(4) β = 108.75(2)° Z = 4

X-ray Powder Pattern: Biraia cabonatite dike, Northern Irkutsk district, Siberia, Russia. 2.92 (100), 3.30 (50), 2.65 (50), 2.23 (50), 4.41 (40), 3.61 (40), 3.14 (40)

Chemistry:

	(1)		(1)
SiO_2	21.07	Ce_2O_3	29.58
TiO_2	0.17	Nd_2O_3	7.53
FeO	7.68	Pr_2O_3	2.71
MnO	1.39	Sm_2O_3	0.70
MgO	1.81	F	0.58
CaO	0.66	CO_2	7.71
Na_2O	0.10	H_2O^-	1.71
BaO	0.24	-O = F	0.24
La_2O_3	16.52	Total	99.92

(1) Biraia cabonatite dike, Northern Irkutsk district, Siberia, Russia; average of 8 electron microprobe analyses supplemented by IR spectroscopy; corresponds to $[(Ce_{1.01}La_{0.57}Nd_{0.25}Pr_{0.09}Sm_{0.02})_{\Sigma=1.94}Ca_{0.07}Na_{0.02}Ba_{0.01}]_{\Sigma=2.04}(Fe_{0.60}Mg_{0.25}Mn_{0.11}Ti_{0.01})_{\Sigma=0.97}(CO_3)_{0.99}[Si_{1.97}(O_{6.87}F_{0.17})_{\Sigma=7.04}]$.

Occurrence: In a vein that cuts fenite fragments in a carbonatite.

Association: Cordylite-(Ce), cordylite-(La), aragonite, dolomite, ancylite-(Ce), ancylite-(La), hydroxylbastnäsite-(Ce), daqingshanite-(Ce), daqingshanite-(La), tremolite, winchite, ferriallanite-(Ce), törnebohmite-(Ce), cerite, chevkinite-(Ce), belkovite, humite, fergusonite-(Ce), fergusonite-(Nd), pyrochlore, barite, monazite-(Ce).

Distribution: From the Biraia cabonatite dike, 145-150 km east of Bodaibo, Northern Irkutsk district, Siberia, Russia.

Name: For the locality that produced the first specimens, the *Biraia* cabonatite dike and the dominant rare earth element, *Ce*sium.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (#91375).

References: (1) Konev, A., M. Pasero, D. Pushcharovsky, S. Merlino, A. Kashaev, L. Suvorova, Z. Ushchapovskaya, N. Nartova, Y. Lebedeva, and N. Chukanov (2005) Biraite-(Ce), $Ce_2Fe^{2+}(CO_3)(Si_2O_7)$, a new mineral from Siberia with a novel structure type. Eur. J. Mineral., 17, 715-721. (2) (2006) Amer. Mineral., 91, 1201-1202 (abs. ref. 1).