

Serendibite

Ca<sub>2</sub>(Mg, Al)<sub>6</sub>(Si, Al, B)<sub>6</sub>O<sub>20</sub>

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**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . Rarely in small tabular crystals; as anhedral grains, to 2 cm, and aggregates. *Twining:* Polysynthetic on {011}, common.

**Physical Properties:** *Cleavage:* Good on {010}, {001}; (010)  $\wedge$  (001)  $\sim 66^\circ$ . *Hardness* = 6.5–7 *D*(meas.) = 3.42–3.52 *D*(calc.) = 3.47

**Optical Properties:** Transparent. *Color:* Grayish blue-green to deep blue, green, or brown; in transmitted light, nearly colorless to pale yellow-green or blue. *Luster:* Vitreous.

*Optical Class:* Biaxial (+) or (-). *Pleochroism:* Strong; *X* = pale yellow, yellow-green to blue-green; *Y* = almost colorless, pale yellow, blue, blue-green; *Z* = light to dark blue.

*Orientation:* *Z*  $\wedge$  *c* =  $26^\circ$ – $40^\circ$ . *Dispersion:* *r* > *v*, strong to extremely strong; may produce abnormal interference colors.  $\alpha = 1.700$ – $1.738$   $\beta = 1.703$ – $1.741$   $\gamma = 1.706$ – $1.743$  *2V*(meas.) =  $78^\circ$ – $90^\circ$

**Cell Data:** *Space Group:*  $P\bar{1}$ . *a* = 10.019 *b* = 10.393 *c* = 8.630  $\alpha = 106.36^\circ$   $\beta = 96.06^\circ$   $\gamma = 124.36^\circ$  *Z* = 2

**X-ray Powder Pattern:** Melville Peninsula, Canada.

2.846 (100), 2.595 (80), 2.461 (80), 2.038 (70), 2.032 (70), 2.018 (50), 3.320 (40)

<b>Chemistry:</b>		(1)	(2)	(1)	(2)	(1)	(2)
SiO <sub>2</sub>	25.33	22.54	MnO	0.13	F		0.02
TiO <sub>2</sub>		0.09	MgO	14.91	H <sub>2</sub> O <sup>+</sup>	0.69	
B <sub>2</sub> O <sub>3</sub>	[4.17]	7.80	CaO	14.56	P <sub>2</sub> O <sub>5</sub>	0.48	
Al <sub>2</sub> O <sub>3</sub>	34.96	34.18	Na <sub>2</sub> O	0.51	Total	[100.00]	[100.08]
FeO	4.17	5.88	K <sub>2</sub> O	0.22			

(1) Gangapitiya, Sri Lanka; B<sub>2</sub>O<sub>3</sub> by difference; corresponds to (Ca<sub>1.89</sub>Na<sub>0.12</sub>K<sub>0.02</sub>) $_{\Sigma=2.03}$ (Al<sub>2.92</sub>Mg<sub>2.69</sub>Fe<sub>0.42</sub><sup>2+</sup>) $_{\Sigma=6.03}$ (Si<sub>3.04</sub>Al<sub>1.57</sub>B<sub>1.39</sub>) $_{\Sigma=6.00}$ O<sub>20</sub>. (2) Tayozhnoye deposit, Russia; by electron microprobe, B by ion microprobe, Fe<sup>2+</sup>:Fe<sup>3+</sup> calculated from stoichiometry, original total given as 100.07%; corresponds to (Ca<sub>1.99</sub>Na<sub>0.01</sub>) $_{\Sigma=2.00}$ (Al<sub>3.00</sub>Mg<sub>2.40</sub>Fe<sub>0.34</sub><sup>3+</sup>Fe<sub>0.24</sub><sup>2+</sup>Ti<sub>0.01</sub>Mn<sub>0.01</sub>) $_{\Sigma=6.00}$ (Si<sub>2.66</sub>Al<sub>1.75</sub>B<sub>1.59</sub>) $_{\Sigma=6.00}$ O<sub>20</sub>.

**Mineral Group:** Aenigmatite group.

**Occurrence:** In skarns, affected by boron metasomatism, along the contact between carbonate rocks and granite, tonalite, or granulite.

**Association:** Diopside, spinel, phlogopite, scapolite, calcite, tremolite, apatite, grandidierite, sinhalite, hyalophane, uvite, pargasite, clinozoisite, forsterite, warwickite, graphite.

**Distribution:** At Gangapitiya, near Ambakotte, Sri Lanka. In the USA, from near Johnsbury, Warren Co., Amity, near Warwick, Orange Co., and Russell, St. Lawrence Co., New York; and in the New City quarry, three km south of Riverside, Riverside Co., California, USA. On the Melville Peninsula, Northwest Territories, Canada. In Russia, in the Tayozhnoye iron deposit, 550 km south of Yakutsk, Yakutia. From the Handeni district, Tanzania. At Ianapera and Ihosy, Madagascar.

**Name:** From the old Arabic name, *Serendib*, for Sri Lanka (Ceylon).

**Type Material:** n.d.

**References:** (1) Prior, G.T. and A.K. Coomárswámy (1903) Serendibite, a new borosilicate from Ceylon. *Mineral. Mag.*, 13, 224–227. (2) Machin, M.P. and P. Süsse (1974) Serendibite: a new member of the aenigmatite structure group. *Neues Jahrb. Mineral., Monatsh.*, 435–441. (3) Hutcheon, I., A.E. Gunter, and A.N. Lecheminant (1977) Serendibite from Penrhyn group marble, Melville Peninsula, District of Franklin. *Can. Mineral.*, 15, 108–112. (4) Deer, W.A., R.A. Howie, and J. Zussman (1978) *Rock-forming minerals*, (2nd edition), v. 2A, single-chain silicates, 659–661. (5) Grew, E.S., N.N. Pertsev, V.A. Boronikhin, S.Y. Borisovskiy, M.G. Yates, and N. Marquez (1991) Serendibite in the Tayozhnoye deposit of the Aldan Shield, eastern Siberia, U.S.S.R. *Amer. Mineral.*, 76, 1061–1080.

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