Sillénite $Bi_{12}SiO_{20}$

Crystal Data: Cubic. *Point Group:* 23. Crystals are cubes, up to 5 mm; fine-grained granular to massive.

Physical Properties: *Tenacity:* Waxy in part. Hardness = Soft. VHN = 345–386 (50 g load). D(meas.) = 9.16 D(calc.) = 9.18

Optical Properties: Translucent. *Color:* Olive-green, gray-green, yellow-green, yellow, reddish brown; in transmitted light, deep golden brown to yellow. *Streak:* Light yellowish to brownish white. *Luster:* Adamantine.
Optical Class: Isotropic. $n = > 2.50$

Cell Data: *Space Group: I*23. $a = 10.110(2)$ $Z = 2$

X-ray Powder Pattern: Durango, Mexico.
3.216 (10), 1.743 (9), 2.730 (8), 2.939 (7), 1.651 (6), 1.499 (6), 1.216 (5)

Chemistry:

	(1)	(2)
SiO_2	2.22	1.85
Bi_2O_3	97.74	96.48
Total	99.96	98.33

(1) Fuka, Japan; corresponds to $Bi_{11.93}Si_{1.05}O_{20}$. (2) Do.; by electron microprobe, corresponds to $Bi_{12.13}Si_{0.90}O_{20}$.

Occurrence: A secondary mineral formed by the oxidation of bismuth-bearing minerals (Durango, Mexico); in a hydrothermal vein in skarns (Fuka, Japan).

Association: Bismutite (Durango, Mexico); shattuckite, ajoite, duhamelite (Munihuaza, Mexico); calcite (Fuka, Japan).

Distribution: In Mexico, from an unspecified locality in Durango, and at Munihuaza, near Alamos, Sonora. In the Monapo pegmatite, Mocambique district, Mozambique. From Fujikawachi, Oita Prefecture; Fuka, near Bicchu, Okayama Prefecture; and Ishikawa, Fukushima Prefecture, Japan. In the Czech Republic, from near Smrkovec, Slavkovský Les Mountains, about 10 km north-northeast of Mariánské Lázně.

Name: In honor of Dr. Lars Gunnar Sillén (1916–), Swedish chemist of Stockholm, Sweden.

Type Material: Harvard University, Cambridge, Massachusetts, 83256; National Museum of Natural History, Washington, D.C., USA, C1926.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 601. (2) Aurivillius, B. and L.G. Sillén (1945) Polymorphy of bismuth trioxide. Nature, 155, 305–306. (3) Kusachi, I. and C. Henmi (1991) Sillenite from Fuka, Okayama Prefecture, Japan. Mineral. J. (Japan), 15, 343–348. (4) Radaev, S.F., V.I. Simonov, and Y.F. Kargin (1992) Structural features of γ-phase Bi_2O_3 and its place in the sillenite family. Acta Cryst., 48, 604–609.