# Långbanite $(Mn^{2+},Ca)_4(Mn^{3+},Fe^{3+})_9Sb^{5+}Si_2O_{24}$



**Crystal Data:** Hexagonal or monoclinic. *Point Group:* $3m$ or $2/m$. As short to long prismatic crystals, to 1 cm, vertically striated ∥ $\{11\bar{2}0\}$.

**Physical Properties:** *Cleavage:* Good cleavage or parting on {0001}. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 6.5 D(meas.) = 4.92–4.94 D(calc.) = 4.97

**Optical Properties:** Opaque. *Color:* Iron-black. *Streak:* Dark reddish brown. *Luster:* Metallic, brilliant.
*Optical Class:* Uniaxial (–). $\omega = 2.36$ (Li). $\epsilon = 2.31$

**Cell Data:** *Space Group:* $P31m$. a = 11.563(2) c = 11.100(2) Z = 3, or *Space Group:* $C2/m$. a = 11.561(5) b = 20.05(1) c = 11.075(9) $\beta$ = 90.03(5)° Z = 6

**X-ray Powder Pattern:** Långban, Sweden. (ICDD 14-195).
2.55 (100), 2.745 (90), 2.80 (80), 1.54 (80), 1.67 (70), 1.43 (50), 1.99 (40)

**Chemistry:**

| | (1) | (2) |
|---|---|---|
| $SiO_2$ | 10.88 | 9.14 |
| $Fe_2O_3$ | | 8.56 |
| $Mn_2O_3$ | | 44.21 |
| $Y_2O_3$ | | 0.06 |
| $Sb_2O_5$ | 15.42 | 14.36 |
| FeO | 10.32 | |
| MnO | 64.00 | 21.96 |
| CaO | | 1.11 |
| Total | 100.62 | 99.40 |

(1) Långban, Sweden. (2) Do.; by electron microprobe, average of eight analyses; corresponding to $(Mn^{2+}_{3.73}Ca_{0.26}Y_{0.01})_{\Sigma=4.00}(Mn^{3+}_{7.23}Fe^{3+}_{1.38}Mn^{2+}_{0.27}Sb_{0.15})_{\Sigma=9.03}Sb_{1.00}Si_{1.97}O_{24}$.

**Occurrence:** In crystalline limestones and manganese-rich skarns in metamorphosed manganese deposits.

**Association:** Manganoan aegirine, richterite, braunite, magnetite, hausmannite, rhodonite, hedyphane.

**Distribution:** From Långban, Värmland, and the Sjö mine, near Grythyttan, Örebro, Sweden. In the Gozaisho mine, Fukushima Prefecture, Japan.

**Name:** For the place of its original discovery, Långban, Sweden.

**References:** (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 543–544, 1039–1040. (2) Giuseppetti, G., F. Mazzi, and C. Tadini (1991) The crystal structure of monoclinic langbanite: $(Mn,Ca,Fe,Mg)^{2+}_4(Mn,Fe)^{3+}_9Sb^{5+}[O_{16}(SiO_4)_2]$. Neues Jahrb. Mineral., Monatsh., 193–211. (3) Moore, P.B., P.K. Sen Gupta, and Y. Le Page (1991) The remarkable långbanite structure type: crystal structure, chemical crystallography, and relation to some other cation close-packed structures. Amer. Mineral., 76, 1408–1425.