Mangani-pargasite $NaCa_2(Mg_4Mn^{3+})(Si_6Al_2)O_{22}(OH)_2$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As subhedral individuals, to ~1 mm, that are poikilitic in hausmannite.

Physical Properties: *Cleavage*: Perfect on {110}. *Tenacity*: Brittle. *Fracture*: n.d. Hardness = 5-6 (by analogy with pargasite). D(meas.) = n.d. D(calc.) = 3.127

Optical Properties: Transparent. *Color*: Red to brownish red. *Streak*: n.d. *Luster*: Vitreous. *Optical Class*: Biaxial (+). $\alpha = 1.635(5)$ $\beta = 1.645(5)$ $\gamma = 1.660(5)$ 2V(meas.) = 85(5)° 2V(calc.) = 79.1° *Pleochroism*: Weak, *X* = pale reddish brown, *Y* = pale reddish brown, *Z* = pale brownish red. *Dispersion*: Weak, *r* > *v*. *Orientation*: *Y* || *b*, *Z* ^ *c* = 25(3)°. *Absorption*: *X* ≈ *Y* > *Z*.

Cell Data: *Space Group: C*2/*m*. $a = 9.9448(5)$ $b = 18.0171(9)$ $c = 5.2829(3)$ $\beta = 105.445(3)°$ Z = 2

X-Ray Diffraction Pattern: Långban Fe-Mn-(Ba-As-Pb-Sb) deposit, Värmland, Sweden. 3.141 (100), 3.279 (49), 1.448 (46), 2.817 (44), 8.420 (29), 1.904 (29), 1.650 (22)

Chemistry:

	(1)
SiO_2	44.26
TiO_2	0.01
Al_2O_3	11.21
Mn_2O_3	3.56
Fe_2O_3	0.89
MgO	19.88
CaO	12.54
PbO	1.73
Na_2O	3.33
K_2O	0.18
H_2O	[2.09]
Total	99.68

(1) Långban Fe-Mn-(Ba-As-Pb-Sb) deposit, Värmland, Sweden; average electron microprobe and FTIR spectroscopic analyses, H_2O calculated; corresponds to $^{A}(Na_{0.90}Pb_{0.07}K_{0.03})_{\Sigma=1.00}$ $^{B}(Ca_{1.93}Mn^{2+}_{0.07})_{\Sigma=2.00}{}^{C}(Mg_{4.25}Mn^{3+}_{0.39}Al_{0.26}Fe^{3+}_{0.10})_{\Sigma=5.00}{}^{T}(Si_{6.35}Al_{1.65})_{\Sigma=8.00}O_{22}{}^{W}(OH)_2$.

Mineral Group: Amphibole supergroup, calcium amphibole subgroup.

Occurrence: In a regionally metamorphosed, submarine, volcanogenic Fe-Mn oxide deposit in silicate-impregnated, calcitic carbonate rock.

Association: Hausmannite, arsenate-substituted apatite, hedyphane, kentrolite, forsterite, manganoan phlogopite, calcite.

Distribution: On the dump of the Långban Fe-Mn-(Ba-As-Pb-Sb) deposit, Värmland, Sweden.

Name: Prefix identifies a *pargasite* analog with Mn^{3+} dominant among the trivalent *C* cations.

Type Material: Swedish Museum of Natural History, Stockholm, Sweden (NRM20100001).

References: (1) Hålenius, U., F. Bosi, and E. Jonsson (2020) Mangani-pargasite, $NaCa_2(Mg_4Mn^{3+})(Si_6Al_2)O_{22}(OH)_2$, a new mineral species of the amphibole supergroup. Periodico di Mineralogia, 89, 125-131. (2) Jonsson, E. and U. Hålenius (2010) Mn^{3+}-bearing pargasite from the Långban Fe-Mn oxide mineralisation, Bergslagen, Sweden. GFF, 132(3-4), 167-172. (3) Hålenius, U. and F. Bosi (2012) Cation ordering in Pb^{2+}-bearing, Mn^{3+}-rich pargasite from Långban, Sweden. Amer. Mineral., 97, 1635-1640.