Folvikite $Sb^{5+}Mn^{3+}(Mg, Mn^{2+})_{10}O_8(BO_3)_4$

Crystal Data: Monoclinic. *Point Group*: 2. As striated prismatic crystals elongated along [010] to 0.3 mm. *Twinning*: Pervasive by 180° rotation about c*.

Physical Properties: *Cleavage:* None. *Tenacity*: Brittle. *Fracture*: Conchoidal. Hardness = 6
D(meas.) = n.d. D(calc.) = 4.14

Optical Properties: Opaque to translucent on thin edges. *Color*: Black to dark reddish brown.
Streak: Reddish brown. *Luster*: Strongly submetallic.
Optical Class: Biaxial. *n*(calc.) = 1.85 2V(meas.) = 68.9(4)° *Orientation*: *Y* = *b*.
Pleochroism: Strong, *X* = dark brown, *Z* = brown, *Y* = honey brown. *Absorption*: *X* > *Z* > *Y*.

Cell Data: *Space Group*: *P*2. $a = 5.3767(10)$ $b = 6.2108(10)$ $c = 10.9389(18)$ $\beta = 94.399(9)°$ Z = 1

X-ray Powder Pattern: Kitteln mine, Nordmark ore field, north of Filipstad, Värmland, Sweden.
5.450 (100), 2.591 (91), 2.725 (82), 4.973 (46), 2.033 (43), 1.552 (37), 3.112 (32)

Chemistry:

	(1)
Sb_2O_5	18.15
MgO	24.11
MnO	[29.73]
Mn_2O_3	[11.62]
Al_2O_3	0.27
Fe_2O_3	0.45
B_2O_3	[15.27]
Total	99.60

(1) Kitteln mine, Nordmark ore field, north of Filipstad, Värmland, Sweden; average of 17 electron microprobe analyses supplemented by FTIR spectroscopy, B_2O_3 calculated for B = 4 apfu, total Mn as MnO = 40.17 apportioned as MnO and Mn_2O_3; corresponds to
$(Sb^{5+}_{1.02}Mn^{3+}_{1.34}Al_{0.05}Fe^{3+}_{0.05}Mg_{5.46}Mn^{2+}_{3.82}\square_{0.26})_{\Sigma=12.00}O_8(BO_3)_4$.

Occurrence: A primary skarn mineral.

Association: Hausmannite, tegengrenite, a Mg-analogue of sonolite or jerrygibbsite, calcite.

Distribution: At the Kitteln mine (was dumped there from, supposedly, Östra Mossgruvan or Brattforsgruvan), Nordmark ore field, north of Filipstad, Värmland, Sweden.

Name: Honors Harald O. *Folvik* (b. 1941), a Norwegian amateur mineralogist with an interest in Långban-type deposits who initially noticed and collected the specimen used for description.

Type Material: Natural History Museum, University of Oslo, Norway (43574) and The Canadian Museum of Nature, Ottawa, Ontario, Canada (CMNMC 87087).

References: (1) Cooper, M.A., G. Raade, N.A. Ball, Y.A. Abdu, F.C. Hawthorne, and R. Rowe (2018) Folvikite, $Sb^{5+}Mn^{3+}(Mg,Mn^{2+})_{10}O_8(BO_3)_4$, a new oxyborate mineral from the Kitteln mine, Nordmark ore district, Värmland, Sweden: Description and crystal structure. Mineral. Mag., 82(4), 821-836. (2) (2021) Amer. Mineral., 106, 160-161 (abs. ref. 1).