Tegengrenite $(Mn^{3+}_{0.5}Sb^{5+}_{0.5})Mg_2O_4$

Crystal Data: Hexagonal. *Point Group*: 3. As pseudo-octahedra to 150 μm. *Twinning*: Eight domains per crystal.

Physical Properties: *Cleavage*: None. *Tenacity*: Brittle. *Fracture*: Conchoidal. Hardness = n.d. D(meas.) = n.d. D(calc.) = 4.58

Optical Properties: Translucent. *Color*: Deep red, gray in reflected light sometimes with orange-red internal reflections. *Streak*: n.d. *Luster*: Sub-adamantine.
Optical Class: Nearly isotropic. *Anisotropism*: Observed. *n*(calc.) = 1.92(2)
R: (470) 10.4, (546) 10.0, (589) 9.9, (650) 9.8

Cell Data: *Space Group*: *R*3. *a* = 16.0285(9) *c* = 14.8144(8) Z = 42

X-ray Powder Pattern: Jakobsberg, Filipstad district, Värmland, Sweden.
2.608 (100), 3.052 (33), 1.665 (30), 1.527 (29), 2.162 (28), 1.531 (26), 4.98 (20)

Chemistry:

	(1)	(2)
MgO	23.23	21.83
MnO	27.30	25.76
ZnO	1.58	2.66
Al_2O_3	0.35	0.76
Mn_2O_3	7.23	8.12
Fe_2O_3	0.17	0.78
SiO_2	2.98	1.70
TiO_2	1.04	1.40
Sb_2O_5	37.03	36.13
Total	100.91	99.14

(1) Filipstad district, Värmland, Sweden; electron microprobe analysis, Mn^{2+} and Mn^{3+} distributed for neutrality; corresponds to $(Sb^{5+}_{0.50}Mn^{3+}_{0.19}Si_{0.12}Ti_{0.03}Al_{0.01})_{\Sigma=0.85}(Mg_{1.26}Mn^{2+}_{0.85}Zn_{0.04})_{\Sigma=2.15}O_4$.
(2) Do., electron microprobe analysis; corresponds to $(Sb^{5+}_{0.50}Mn^{3+}_{0.23}Si_{0.06}Ti_{0.04}Al_{0.03}Fe_{0.02})_{\Sigma=0.88}(Mg_{1.22}Mn^{2+}_{0.82}Zn_{0.07})_{\Sigma=2.11}O_4$.

Mineral Group: Spinel supergroup, oxyspinel group.

Occurrence: In a Långban-type Fe-Mn deposit.

Association: Hausmannite, calcite, brucite, dolomite, clinohumite, kinoshitalite, native copper, barytocalcite, bindheimite, cerussite.

Distribution: From Jakobsberg, Filipstad district, Värmland, Sweden.

Name: Honors Felix *Tegengren* (1884-1980), Finlandic-Swedish economic geologist.

Type Material: Swedish Museum of Natural History, Stockholm (980408).

References: (1) Holtstam, D. and A.-K. Larsson (2000) Tegengrenite, a new, rhombohedral spinel-related Sb mineral from the Jakobsberg Fe-Mn deposit, Värmland, Sweden. Amer. Mineral., 85, 1315-1320. (2) Bonazzi, P. and L. Bindi (2015) Determination of the tegengrenite superstructure: another case of tetrahedral Mn^{3+} in spinel-type minerals? Mineral. Mag., 79(2), 425-436.
(3) Bosi, F., C. Biagioni, and M. Pasero (2019) Nomenclature and classification of the spinel supergroup. Eur. J. Mineral., 31, 183-192.