Dannemorite $Mn_2(Fe^{2+},Mg)_5Si_8O_{22}(OH)_2$

Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals prismatic, fibrous, to 1 cm; columnar or asbestiform.

Physical Properties: *Cleavage:* Perfect on {110}, with intersections at ∼55° and ∼125°. *Tenacity:* [Brittle.] Hardness = [5–6] D(meas.) = 3.50 D(calc.) = [3.35]

Optical Properties: Transparent to translucent. *Color:* Yellowish brown, greenish gray, colorless. *Luster:* Silky to vitreous.
Optical Class: Biaxial (–). *Pleochroism:* X = red-violet; Y = pale violet; Z = blue. *Orientation:* $Y = b$; $Z \wedge c = 15°$. *Dispersion:* $r < v$. $\alpha = 1.666$ $\beta = 1.682$ $\gamma = 1.698$ 2V(meas.) = 88°

Cell Data: *Space Group:* $C2/m$. a = 9.561 (ICDD 23-302). $b = 18.28$ $c = 5.348$ $\beta = 102.09°$ Z = 2

X-ray Powder Pattern: Väster Silfberg, Sweden. (ICDD 23-302).
8.40 (100), 3.08 (60), 3.28 (20), 2.764 (18), 4.70 (12), 2.637 (10), 2.201 (10)

Chemistry:

	(1)	(2)
SiO_2	50.74	51.6
TiO_2	0.06	0.13
Al_2O_3	0.88	0.65
Fe_2O_3	1.80	
FeO	24.13	23.9
MnO	7.38	8.1
MgO	10.57	11.1
CaO	2.00	0.83
Na_2O	0.22	1.1
K_2O	0.08	0.09
F	0.07	
H_2O^+	1.94	
Total	99.87	97.5

(1) Uttersvik, Sweden; corresponds to $(Fe^{2+}_{3.10}Mg_{2.42}Mn_{0.96}Ca_{0.33}Fe^{3+}_{0.21}Na_{0.07}Ti_{0.01}K_{0.01})_{\Sigma=7.11}(Si_{7.80}Al_{0.16})_{\Sigma=7.96}O_{22}[(OH)_{1.99}F_{0.03}]_{\Sigma=2.02}$. (2) Haute-Maurienne, France; by electron microprobe.

Polymorphism & Series: Forms a series with tirodite.

Mineral Group: Amphibole (Fe–Mn–Mg) group: $Mg/(Mg + Fe^{2+}) < 0.5$; $(Ca + Na)_B < 1.34$; $Li < 1.0$; $Mn \geq 0.5$.

Occurrence: An uncommon mineral in metamorphosed iron-poor manganiferous rocks.

Association: Calcite, quartz, garnet.

Distribution: From Dannemora, Uppland; Uttersvik and Nävekvarn, Södermanland; in the Brunsjö mine, near Grythyttan, Örebro; and at Väster Silfberg, Värmland, Sweden. At Haute-Maurienne, Isère, France. From Guarulhos, São Paulo, Brazil. At Paddy's River mine, Australian Capital Territory, and from Broken Hill, New South Wales, Australia.

Name: For the original locality, Dannemora, Sweden.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 386, 391, 395. (2) Deer, W.A., R.A. Howie, and J. Zussman (1963) Rock-forming minerals, v. 2, chain silicates, 239. (3) Mottana, A. (1986) Blueschist-facies metamorphism of manganiferous cherts: a review of the alpine occurrences. In: B.W. Evans and E.H. Brown, Eds., Blueschists and eclogites, Geol. Soc. Amer. Memoir 164, 267–299.