Parwelite $(Mn^{2+},Mg)_5Sb^{5+}As^{5+}SiO_{12}$

Crystal Data: Monoclinic. *Point Group:* m. Crystals rounded, stubby prismatic, to 1 cm, showing an elongated diamond-shaped cross section.

Physical Properties: *Cleavage:* Fair to poor on {010}. *Fracture:* Subconchoidal. *Tenacity:* Brittle. Hardness = 5.5 D(meas.) = 4.62 D(calc.) = 4.64

Optical Properties: Transparent to translucent. *Color:* Yellowish brown, orange, tan, with a slight olive tinge. *Streak:* Pale brownish orange. *Luster:* Subadamantine, oily. *Optical Class:* Biaxial (+). *Dispersion:* $r > v$, strong. $\alpha = 1.85(1)$ $\beta = 1.85(1)$ $\gamma = 1.88(1)$ 2V(meas.) = 27(3)°

Cell Data: *Space Group:* Aa. $a = 10.048(2)$ $b = 19.418(5)$ $c = 9.735(5)$ $\beta = 95.83(1)°$ Z = 8

X-ray Powder Pattern: Långban, Sweden.
2.734 (10), 2.915 (9.5), 4.84 (5), 3.411 (5), 9.65 (4), 2.422 (4), 1.7112 (3)

Chemistry:

	(1)
SiO_2	7.01
Sb_2O_3	20.01
As_2O_3	22.02
FeO	0.05
MnO	44.30
PbO	0.40
MgO	4.50
CaO	1.50
Total	99.79

(1) Långban, Sweden; by electron microprobe and wet chemical analysis; corresponds to $(Mn^{2+}_{4.15}Mg_{0.75}Ca_{0.18})_{\Sigma=5.08}Sb^{5+}_{0.92}As^{5+}_{1.00}Si_{1.00}O_{12}$.

Occurrence: In a high-temperature skarn assemblage, in recrystallized manganoan carbonate ores.

Association: Långbanite, spessartine, hausmannite, berzeliite, caryinite.

Distribution: At Långban, Värmland, Sweden.

Name: For Dr. Alexander Parwel, Swedish chemist, Swedish National History Museum, Stockholm, Sweden, who has performed many analyses of Långban minerals, including this one.

Type Material: Swedish Museum of Natural History, Stockholm, Sweden, NRMS 26758; National Museum of Natural History, Washington, D.C., USA, 120065.

References: (1) Moore, P.B. (1968) Parwelite, $(Mn,Mg)_5Sb(Si,As)_2O_{10-11}$, a new mineral from Långban. Arkiv Mineral. Geol., 4, 467–472. (2) (1970) Amer. Mineral., 55, 323 (abs. ref. 1). (3) Moore, P.B. and T. Araki (1977) Parwelite, $Mn^{II}_{10}Sb^{V}_2As^{V}_2Si_2O_{24}$, a complex anion-deficient derivative structure. Inorganic Chem., 16, 1839–1847.