Ingersonite $Ca_3Mn^{2+}Sb^{5+}{}_4O_{14}$

Crystal Data: Hexagonal, pseudocubic. *Point Group*: 32. As crystals with imperfect hexagonal cross sections or as laths, to 0.4 mm; in massive aggregates.

Physical Properties: *Cleavage*: {0001}, perfect; imperfect rhombohedral cleavage.
Fracture: Uneven. Hardness = n.d. VHN = 974-1097 (100 g load). D(meas.) = n.d. D(calc.) = 5.42

Optical Properties: Transparent to translucent. *Color*: Brownish yellow; medium to light yellow in transmitted light; light gray with yellow and white internal reflections in reflected light.
Streak: Brownish yellow. *Luster*: Vitreous.
Optical Class: Uniaxial (-).
R_1-R_2: (400) 11.16-11.40, (420) 10.94-11.13, (440) 10.74-10.88, (460) 10.52-10.66, (480) 10.34-10.48, (500) 10.18-10.32, (520) 10.05-10.19, (540) 9.96-10.09, (560) 9.91-10.04, (580) 9.89-10.01, (600) 9.89-10.02, (620) 9.90-10.03, (640) 9.90-10.03, (660) 9.91-10.03, (680) 9.91-10.03, (700) 9.91-10.03

Cell Data: *Space Group*: $P3_121$. a = 7.282(2) c = 17.604(4) Z = 3

X-ray Powder Pattern: Långban, Sweden.
2.965 (100), 1.549 (60), 1.820 (50), 1.810 (50), 2.565 (40), 1.543 (40), 0.9894 (30)

Chemistry:

	(1)	(2)	(3)	(4)
Sb_2O_5	74.7	72.6	72.03	73.01
FeO	0.2	0.3	0.08	
MnO	9.4	9.1	8.45	8.01
MgO	0.0	0.3	0.21	
CaO	15.9	19.9	18.50	18.98
F			0.32	
$- O = F_2$			0.14	.
Total	100.2	102.2	99.94	100.00

(1-2) Långban, Sweden; by electron microprobe, F present between 1.4% and 3%, total not corrected for $– O = F_2$; (2) corresponds to $Ca_{3.01}Mn_{0.99}(Sb_{3.80}Mn_{0.09}Mg_{0.06}Fe_{0.04})_{\Sigma=3.99}O_{13.70}F_x$. (3) Do.; average electron microprobe analysis; corresponds to $[Ca_{2.93}Mn^{2+}{}_{1.06}Fe^{2+}{}_{0.01}][Sb^{5+}{}_{3.95}Mg_{0.05}]F_{0.15}O_{13.85}$.
(4) $Ca_3MnSb_4O_{14}$.

Occurrence: In dump material from a metamorphosed Fe-Mn orebody.

Association: Filipstadite, jacobsite, calcite, clinohumite (?).

Distribution: At Långban, Värmland, Sweden.

Name: Honors Dr. Fred Earl *Ingerson* (1906-1993), geochemist with the U.S. Geological Survey and Emeritus Professor, University of Texas, Austin, Texas, USA.

Type Material: The Natural History Museum, London, England, 1986,410, E.1177; National Museum of Natural History, Washington, D.C., USA, 163012.

References: (1) Dunn, P.J., D.R. Peacor, A.J. Criddle, and C.J. Stanley (1988) Ingersonite, a new calcium-manganese antimonate related to pyrochlore, from Långban, Sweden. Amer. Mineral., 73, 405-412. (2) Bonazzi, P. and L. Bindi (2007) The crystal structure of ingersonite, $Ca_3Mn^{2+}Sb^{5+}{}_4O_{14}$, and its relationships with pyrochlore. Amer. Mineral., 92, 947-953.