Irwin Kennedy Mystery Crystal

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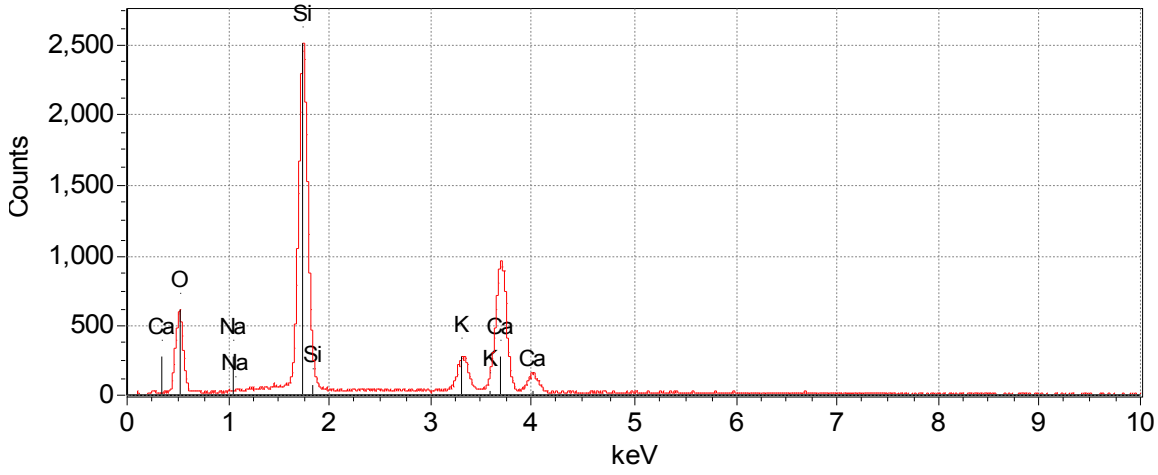
Memo, attached to www.turnstone.ca/rom134ap --- 06 June 2012

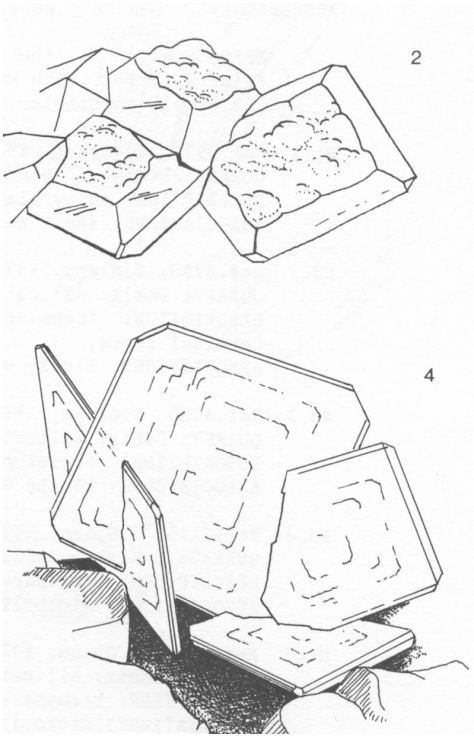
Provenance: I.K. purchased three samples of a tabular colourless mineral from Arturo, a tavern keeper in San Luis Potosi state, central Mexico. The locality is Mina Cobresas at La Paz, on the east flank of the Sierra de Catorce, west of the city of Matehuala, which is in the northern tip of the state, 70 km northeast of Charcas and 170 km N.N.E. of the city of San Luis Potosi (Guia Roji, 1984).

Photo of samples: here are photographs of the smaller two samples acquired by I.K. Note the habit and lustre of the samples, which have (by simple heft) a low specific gravity, less than quartz. The crystals have some attached material ("matrix") which appears to be a mixture of clay minerals and iron oxyhydroxides.

Energy-dispersive x-ray spectrum acquired with short count, in variable-pressure mode, courtesy of Dr. Giovanni di Prisco, using an ASPEX PSEM eXplorer scanning electron microscope, at Terra Mineralogical Services Inc., Peterborough, Ontario. The small tabular sample (photo, upper right) was examined, uncoated, and appears homogeneous in backscattered electron imaging. Note the surprise that this proves to be a silicate (Si, O), not a sulphate nor a carbonate! Potassium and calcium (Ca>>K) are the only other elements detected here, though small amounts (≤0.1 wt.%) of other elements such as fluorine and sodium cannot be ruled out. The absence of iron (K_α peak located at ~6.5 keV) is noteworthy.



The tabular crystals resemble mm-scale apophyllites shown at the right, found in marble xenoliths at the Poudrette quarry, Mont St-Hilaire, Quebec (Fisher and Glenn, 1989), associated with albite, amphibole and pectolite.



Apophyllite (Dana, 1932, pp.642-643) can occur in square to pyramidal prisms, and in flattened forms. The basal c faces are often rough and show a pearly lustre, while other faces are vitreous. This mineral is tetragonal, specific gravity 2.3-2.4. The two I.K.samples (62.30 and 5.65 g respectively) match Dana's comments on lustre, and the c faces are rough with incipient development of crystal forms. No appreciable fluorescence was excited by a small LW/SW UV lamp.

Conclusion: the lustre, crystal habit and major-element chemistry are consistent with a member of the apophyllite family. Given the minimal presence of fluorine and a little information on Mexican occurrences, the preferred identification is **hydroxyapophyllite, $KCa_4Si_8O_{20}(OH,F).8H_2O$.** Also known as apophyllite-KOH, as reported from the Ore Knob mine in N.Carolina. Colourless fluorapophyllite is known at Falla de Cubo, Torres mine, Guanajuato (Moore, 2001). Hydroxy-apophyllite is reported in basalt amygdales and in contact-metamorphosed limestones at localities in Chihuahua, Guanajuato and Hidalgo (Panczner, 1987, pp.235-236). At Guanajuato, white to pink cm-scale crystals occur at the Valenciana, La Luz and El Refugio mines. Good Canadian crystals have been recovered from the now-closed Golden Giant mine (Hemlo, Ontario) and Murdochville, Quebec (I. Kennedy, *pers.commun.*, 2012).

References:

Dana,ES (1932) A Textbook of Mineralogy. John Wiley and Sons, Inc., New York, 4th edition, revised by Ford,WE, 851pp.

Fisher,RW and Glenn,GH (1989) Micro Minerals of Mont Saint-Hilaire, Quebec. Published privately by the authors: R.W. Fisher, 17 Gavin Drive, St. Catharines, Ontario L2M 2X8 and G.H. Glenn, 8459 Parkway Drive, Niagara Falls, Ontario L2G 6W8. Reprinted January 1993, 166pp., sponsored by the Canadian Micro Mineral Association.

Guia Roji, S.A. de C.V. (1984) San Luis Potosi. Road map, 1:800,000 scale (in Sp.).

Moore,T (2001) Tucson Show 2001. Mineral.Record 32, 245-257.

Panczner,WD (1987) Minerals of Mexico. Van Nostrand Reinhold Co., 459pp.