Taranakite $(K,Na)_3(Al,Fe^{3+})_5(PO_4)_2(PO_3OH)_6 \cdot 18H_2O$

Crystal Data: Hexagonal. *Point Group:* $\overline{3}\ 2/m$. Pseudohexagonal platy crystals, rarely to 0.5 mm; typically in compact nodular aggregates, pulverulent, powdery, flourlike to claylike, massive.

Physical Properties: *Tenacity:* Unctuous. Hardness = Very soft. D(meas.) = 2.12–2.15 D(calc.) = 2.12

Optical Properties: Transparent. *Color:* White, gray, yellowish white; colorless in transmitted light.
Optical Class: Uniaxial (–). $\omega = 1.506$–1.510 $\epsilon = 1.500$–1.503

Cell Data: *Space Group:* $R\overline{3}c$ (synthetic). $a = 8.7025(11)$ $c = 95.05(1)$ $Z = 6$

X-ray Powder Pattern: Apulian Cave PU 38, Italy.
15.82 (100), 3.82 (40), 3.14 (31), 3.36 (29), 7.47 (28), 3.59 (22), 7.92 (18)

Chemistry:

	(1)	(2)	(3)		(1)	(2)	(3)
P_2O_5	42.32	41.88	42.30	K_2O	7.09	8.43	10.53
Al_2O_3	19.03	17.48	18.99	H_2O	31.10	28.43	28.18
Fe_2O_3	0.42	1.67		insol.		0.37	
Na_2O		1.28		Total	99.96	99.54	100.00

(1) Onino-Iwaya Cave, Japan; by gravimetry and flame photometry; corresponds to $H_{7.09}K_{1.97}(Al,Fe)_{4.98}(PO_4)_8 \cdot 19.7H_2O$. (2) Castellana Cave, Italy. (3) $K_3Al_5(PO_4)_2(PO_3OH)_6 \cdot 18H_2O$.

Occurrence: Formed from phosphatic solutions derived from bird or bat guano reacting with clays or aluminous rocks under perenially damp conditions; the most common phosphate mineral in caves.

Association: Vashegyite, leucophosphite, minyulite, francoanellite, brushite, ardealite, strengite, variscite, vivianite.

Distribution: From the Sugarloaves, near New Plymouth, Taranaki Peninsula, New Zealand. On Réunion Island, Indian Ocean; Island Leones, Patagonia, Argentina; King George Island, Maritime Antarctic. In Australia, in the Russenden Cave, Queensland; the Skipton lava tube caves, 40 km southwest of Ballarat, Victoria; in caves at Mimegarra, Western Australia; and the Jenolan Caves, New South Wales. In the Yangsue Posayen Cave, 20 km south of Guilin, Guangxi Province, China. From the Niah Great Cave, Sarawak, Malaysia. In the Onino-Iwaya Cave, Hiroshima Prefecture, Japan. From the Tour Combes Cave, near Oran, Algeria. In Etienne's Cave, and well-crystallized in Christmas Cave, Transvaal, South Africa. From the Bacho Kuo Cave, Bulgaria. In the Minerva Grotto, Fauzan, Hérault, France. In Italy, in the Castellana Cave, south of Bari, Puglia; on Monte Alburno, near Controne, Salerno. In the USA, in the Pig Hole Cave, Giles Co., Virginia; and the Low Water Bridge Cave, Greene Co., Missouri. Additional localities are known.

Name: For its first recognized occurrence on the Taranaki Peninsula, New Zealand.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 999–1000. (2) Smith, J.P. and W.E. Brown (1959) X-ray studies of aluminum and iron phosphates containing potassium or ammonium. Amer. Mineral., 44, 138–142. (3) Balenzano, F., L. Dell'Anna, and M. Di Pierro (1974) Ricerche mineralogische su alcuni fosfati rinvenuti nelle grotte di Castellana (Bari): strengite alluminifera, vivianite, taranakite, brushite e idrossiapatite. Rend. Soc. Ital. Mineral. Petrol., 30, 543–573 (in Italian). (4) Sakae, T. and T. Sudo (1975) Taranakite from the Onino-Iwaya Limestone Cave at Hiroshima Prefecture, Japan: a new occurrence. Amer. Mineral., 60, 331–334. (5) Fiore, S. and R. Laviano (1991) Brushite, hydroxylapatite, and taranakite from Apulian caves (southern Italy): new mineralogical data. Amer. Mineral., 76, 1722–1727. (6) Dick, S., U. Gossner, A. Weiss, C. Robl, G. Grossman, G. Ohms, and T. Zeiske (1998) Taranakite – the mineral with the longest crystallographic axis. Inorg. Chi. Acta, 269, 47–57.