## Tinnunculite $C_5H_4N_4O_3 \cdot 2H_2O$

**Crystal Data**: Monoclinic. *Point Group*: 2/*m*. As prismatic or tabular crystals to 0.2 mm and as micro-globular crusts.

**Physical Properties**: *Cleavage*: Distinct on {010}. *Fracture*: n.d. *Tenacity*: Brittle. Hardness = Soft. D(meas.) = n.d. D(calc.) = 1.68

**Optical Properties**: Transparent to translucent. *Color*: Colorless, white, yellowish, reddish, or pale lilac. *Streak*: n.d. *Luster*: Vitreous.
*Optical Class*: Biaxial (-). $\alpha$ = 1.503(3) $\beta$ = 1.712(3) $\gamma$ = 1.74(1) 2V(meas.) = 40(10)° 2V(calc.) = n.d. *Dispersion*: Medium, $r > v$.

**Cell Data**: *Space Group*: $P2_1/c$. $a$ = 7.34(4) $b$ = 6.326(16) $c$ = 17.59(4) $\beta$ = 90(1)° Z = 4

**X-ray Powder Pattern**: Mt. Rasvumchorr, Khibiny complex, Kola Peninsula, Russia.
3.18 (100), 8.82 (84), 3.12 (44), 3.24 (27), 5.63 (24), 4.22 (22), 5.97 (15)

| **Chemistry**: | (1) | (2) |
|---|---|---|
| O | 37.5 | 39.19 |
| C | 28.4 | 29.42 |
| N | 27.0 | 27.44 |
| H | [3.8] | 3.95 |
| Total | 96.7 | 100.00 |

(1) Mt. Rasvumchorr, Khibiny complex, Kola Peninsula, Russia; average of 4 electron microprobe analyses supplemented by IR spectroscopy, H calculated from stoichiometry; corresponds to $C_{4.99}H_8N_{4.07}O_{4.94}$. (2) $C_5H_4N_4O_3 \cdot 2H_2O$.

**Occurrence**: From the crystallization of uric acid in bird excrement in a cold and humid Arctic climate (Kola) or through reaction with hot gases on a burning coal mine slagheap (South Urals).

**Association**: n.d.

**Distribution**: From Mt. Rasvumchorr, Khibiny complex and Mts. Alluaiv and Vavdbed, Lovozero complex, Kola Peninsula, Russia. On the dumps of coal shaft #44, Kopeisk, near Chelyabinsk, South Urals, Russia.

**Name**: For the scientific name for the bird species (*Falco tinnunculus L.*) responsible for the guano essential to the formation of the mineral on a burning slagheap (Kopeisk, South Urals, Russia).

**Type Material**: A.E. Fersman Mineralogical Museum, Russian Academy of Science, Moscow, Russia (4695/1).

**References**: (1) Pekov, I.V., N.V. Chukanov, V.O. Yapaskurt, D.I. Belakovskiy, I.S. Lykova, N.V. Zubkova, E.P. Shcherbakova, S.N. Britvin, and A.D. Chervonniy (2016) Tinnunculite, $C_5H_4N_4O_3 \cdot 2H_2O$: finds at Kola Peninsula, redefinition and validation as a mineral species. Zapiski RMO (Proceedings of the Russian Mineralogical Society), 145(4), 20-35 (in Russian). (2) (2017) Amer. Mineral., 102, 1967-1968 (abs. ref. 1).