Fontarnauite $(Na,K)_2(Sr,Ca)(SO_4)[B_5O_8(OH)](H_2O)_2$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As prismatic pseudohexagonal crystals, clusters of crystals to 5 mm, or as branching aggregates.

Physical Properties: *Cleavage*: Perfect on {010}. *Fracture*: Splintery. *Tenacity*: Brittle. Hardness = 2.5-3 D(meas.) = 2.37 D(calc.) = 2.533

Optical Properties: Transparent to translucent. *Color*: Colorless to light brown. *Streak*: White. *Luster*: Pearly.
Optical Class: Biaxial (–). $\alpha = 1.517(2)$ $\beta = 1.539(2)$ $\gamma = 1.543(2)$ 2V(meas.) = 46(1)° 2V(calc.) = 46° *Dispersion*: $r > v$, medium to weak. *Orientation*: $X \wedge a = 95.0°$ (β obtuse); $Y \parallel b$, $Z \wedge c = 81.9°$ (β acute).

Cell Data: *Space Group*: $P2_1/c$. $a = 6.458(2)$ $b = 22.299(7)$ $c = 8.571(2)$ $\beta = 103.047(13)°$ $Z = 4$

X-ray Powder Pattern: Emet basin, near Doğanlar, Kttahya Province, Western Anatolia, Turkey. 11.150 (100), 3.339 (20), 3.199 (10), 3.046 (10), 2.750 (10), 3.395 (8), 2.400 (8)

Chemistry:	(1)	(2)
B_2O_3	[30.77]	37.45
Na_2O	12.65	13.14
K_2O	1.70	
CaO	2.26	
SrO	18.98	22.30
SO_3	17.75	17.23
H_2O	10.01	9.69
Total	102.01	100.00

(1) Emet basin, near Doğanlar, Kttahya Province, Western Anatolia, Turkey; average of 43 electron microprobe analyses supplemented by TG and DTA analysis, FTIR and Raman spectroscopy, H_2O and B_2O_3 calculated; corresponds to $(Na_{1.84}K_{0.16})_{\Sigma=2.00}(Sr_{0.82}Ca_{0.18})_{\Sigma=1.00}S_{1.00}B_5H_5O_{15}$.
(2) $Na_2Sr(SO_4)[B_5O_8(OH)](H_2O)_2$.

Occurrence: An early diagenetic phase in borate-bearing marls and tuffs.

Association: Probertite, glauberite, celestine; or with halite, kaliborite replacing probertite, kalistronite replacing fontarnauite in pseudomorphs after glauberite.

Distribution: From the Kütahya-Emet 2 and 188 (Doğanlar) boreholes, Emet (or Emet-Hisarcık) basin, near Doğanlar, Kttahya Province, Western Anatolia, Turkey.

Name: Honors Dr. Ramon Fontarnau i Griera, in recognition of his efforts to promote the development of scientific facilities focused on mineral characterization.

Type Material: Royal Ontario Museum, Toronto, Canada (M56745).

References: (1) Garcia-Veígas, J., L. Rosell, X. Alcobé, I. Subias, F. Ortí, İ. Gündoğan, and C. Helvaci (2010) Fontarnauite, a new sulphate-borate mineral from the Emet Borate District (Turkey). Revista de la sociedad espanola de mineralogia, Macla, 13, 97-98. (2) Cooper, M.A., F.C. Hawthorne, J. García-Veigas, X. Alcobé, C. Helvaci, E.S. Grew, and N.A. Ball (2015) Fontarnauite, $(Na,K)_2(Sr,Ca)(SO_4)[B_5O_8(OH)](H_2O)_2$, a new sulfate-borate mineral from Doğanlar (Emet), Kütahya province, Western Anatolia, Turkey. Can. Mineral., 53(5), 803-820. (3) (2016) Amer. Mineral., 101, 2779-2780 (abs. refs. 1 & 2).