Geophysical Research Abstracts
Vol. 14, EGU2012-5305-3, 2012
EGU General Assembly 2012

Tamarugite from Diana Cave (SW Romania) -first true karst occurrence

C.M. Pușcaș (1,2), B.P. Onac (1), H.S. Effenberger (3), and I. Povară (4)

(1) University of South Florida, Geology, Tampa, United States (cpuscas@mail.usf.edu), (2) Babeș-Bolyai University, Geology, Cluj-Napoca, Romania, (3) Institute of Mineralogy and Crystallography, University of Vienna, Vienna, Austria, (4) Emil Racoviță Institute of Speleology of Romanian Academy, Bucharest, Romania

Diana Cave is located within the town limits of Băile Herculane (SW Romania) and develops as a 14 m long, westward oriented, unique passage guided by the Diana fault [1]. At the far end of the cave, the thermo-mineral Diana Spring wells forth. In the early 1970s a mine gallery that intersected the cave was created to drain the water into a pumping station and the original cave passage was somewhat altered and reinforced with concrete. Today the concrete and the silty limestone cave walls are heavily corroded by H_2SO_4 outgassing from the hot water (ca. 50ºC) and display abundant gypsum crusts, soggy aggregates of native S, and a variety of more exotic sulfates. Among them, a mineral that has been previously identified in caves only in connection to volcanic activity, either as thermal springs or fumaroles [2]: tamarugite [$NaAl(SO_4)_26H_2O$]. It was [3] that first mentioned the occurrence of this Na and Al sulfate in Diana Cave, our research aiming to give a detailed description of this mineral, its paragenesis, and mechanisms of precipitation. Recently, tamarugite has also been identified in a sulfuric acid cave from Greece [4].

Along with powder X-ray diffractions coupled with Rietveld refinement, scanning electron microscope, and electron probe micro-analysis, $\delta^{18}O$ and $\delta^{34}S$ compositions of the sulfate mineral as well as precipitates from the water were analyzed to identify and better constrain the genesis of this rare sulfate. Regrettably, the crystal size of our specimens is inappropriate for identification by means of single crystal X-ray diffraction. Physical and chemical parameters of Diana Spring were as well measured on several occasions.

Geochemical analysis suggests that the minute, white tamarugite flakes precipitated in Diana Cave as a result of the interactions between the thermo-mineral water or water vapor and the original limestone bedrock and concrete that blankets the mine gallery.

[1] Povară, I., Diaconu, G., Goran, C. (1972). Observations préliminaires sur les grottes influencées par les eaux thermo-minérales de la zone Băile-Herculane. *Trav. Inst. Speol. "Emile Racovitza"*, XI, 355-365.

[2] Rodgers, K.A., Hamlin, K.A., Browne, P.R.L., Campbell, K.A., Martin, R. (2000). The steam condensate alteration mineralogy of Ruatapu cave, Orakei Korako geothermal field, Taupo Volcanic Zone, New Zealand. *Mineralogical magazine*, 64(1), 125-142.

[3] Onac, B.P., Sumrall, J., Tăma?¸ T., Povară, I., Kerns, J., Dârmiceanu, V., Vere?¸ D., Lascu, C. (2009). The relationship between cave minerals and H_2S-rich thermal waters along the Cerna Valley (SW Romania). *Acta Carsologica*, 38(1), 27–39.

[4] Lazaridis G, Melfos, V, Papadopoulou L (2011). The first cave occurrence of orpiment (As_2S_3) from the sulfuric acid caves of Aghia Paraskevi (Kassandra Peninsula, N. Greece). *International Journal of Speleology*, 40(2): 133-139.