

Mineralogy of the Tata travertine

Stable isotope studies have been used to characterize the genesis of travertines since the 1950s.²¹ Systematic mineralogical and stable isotope analyses on Hungarian travertine occurrences have not been carried out yet. The first mineralogical and stable isotope geochemical studies were made by Rózsavölgyi, Mihályi-Lányi and Opauszky on the Tata freshwater limestone.²²

On the base of XRD analyses the samples collected along the vertical section of the Porhanyó-Quarry are composed of pure, magnesium-free calcite (94-98%). Insoluble residues of samples collected from units 1-4 contain a few siliciclastic grains (0.53%) whereas unit 5 contains more quartz grains (2.29%). The palaeosoil of the culture-layer (2nd unit) contains a small amount (4%) of dolomite. Quartz, feldspar and rare muscovite represent the scarce extraclast. XRD measurements on insoluble residues indicate the presence of quartz, plagioclase, K-feldspar, muscovite, illite, chlorite, montmorillonite. Additional traces of kaolinite, amfibole, magnetite, maghemite, hematite, goethite, gyps and pyrite were detected. XRD analyses on the palaeosoil horizon indicated the presence of quartz, calcite, dolomite, muscovite, chlorite, plagioclase and K-feldspar as well as traces of montmorillonite, illite and traces of amfibole, hematite, pyrite and gypsum. The fluvial eolian sand units (5th and 6th units) show extremely high values of detrital minerals.

Chronology of the Tata travertine

Age determinations performed so far on the Tata limestone were based on radiogenic (¹⁴C, Th/U, ESR) methods, paleontology, archaeology and paleomagnetic measurements. The ¹⁴C measurements was performed by de Vries and de Waard²³ in the culture-layer yielding 33,6 ± 1,1 ky and 55 ± 2,5 ky above the culture-layer. Th/U age determinations on travertine localities at Tata, Dunaalmás, Vértesszőlős and Buda-Vár-hegy travertines²⁴ resulted in an estimated age of 100 ky.²⁵ On the basis of palaeontological data, the formation of travertine complex took place at the end of the last interglacial, and the fauna belongs to the Subalyuk biozone.²⁶ Archaeological studies²⁷ suggested Middle palaeolithic (~100 ky) age for the travertine, while the indefinite radiometric methods resulted in ages ranging between 33.6 to 10 Ky.

²¹ CRAIG 1953, 53-92.

²² RÓZSAVÖLGYI 1964, 31-36.; MIHÁLYI-LÁNYI 1964, 37-42.; OPAUSZKY et al. 1964, 19-29.

²³ VRIES-WAARD 1964, 35-36.

²⁴ PÉCSI 1973, 109-119.; HENNING et al. 1983.; SCHEUER-SCHWEITZER 1988, 131.; OSMOND 1990, 545.; OAKLEY 1990, 543-544.; CHERDINTSEV-KAZACHEWSKI 1990, 547.; SCHWARZ-LATHAM 1990, 549-552.

²⁵ SCHWARZ-SKOFLEK 1982, 590-591.

²⁶ KRETZOI 1964, 105-126.; JÁNOSSY 1979, 207.

²⁷ VÉRTES et al. 1964.; DOBOSI 2003, 205-214.