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Late Pliocene – Early Pleistocene paleoenvironmental reconstruction based on stable isotope compositions of *Stephanorhinus* sp. and *Mammut* sp. teeth

Péter Szabó (1,2,3), János Kovács (2,4), László Kocsis (3), Mihály Gasparik (5), Torsten Vennemann (3), Attila Demény (6), Attila Virág (7,8)

(1) Doctoral School of Chemistry, University of Pécs, Pécs, Hungary (sz.piiit01@gmail.com), (2) Environmental Analytical and Geoanalytical Research Group, Szentágothai Research Centre, University of Pécs, Pécs, Hungary, (3) Institute of Earth Sciences, University of Lausanne, Lausanne, Switzerland (Laszlo.Kocsis@unil.ch, Torsten.Vennemann@unil.ch), (4) Department of Geology and Meteorology, University of Pécs, Pécs, Hungary (jones@gamma.ttk.pte.hu), (5) Department of Geology and Paleontology, Hungarian Natural History Museum, Budapest, Hungary, (gasparik@nhmus.hu), (6) Institute for Geological and Geochemical Research, Research Centre for Astronomy and Earth Sciences, Hungarian Academy of Sciences, Budapest, Hungary (demeny@geochem.hu), (7) Department of Paleontology, Eötvös Loránd University, Budapest, Hungary, (8) MTA-MTM-ELTE Research Group for Paleontology, Budapest, Hungary (myodes.glareolus@gmail.com)

Stable isotope measurements of skeletal apatite from herbivorous mammals are often used to provide information on the terrestrial paleoenvironment and paleoclimate. In this study fossil teeth of *Stephanorhinus* Kretzoi 1942 (rhinoceros) and *Mammut* Blumenbach 1799 (mastodon), amongst others, were investigated from the Carpathian Basin. According to the biostratigraphy, the age of the samples has a range from Late Pliocene to Early Pleistocene. Reconstructing paleoclimate and paleoenvironment of this era is important as it can be an analogue for the future climate. Oxygen and carbon isotopic compositions were measured from the tooth enamel, because it is believed to be the most resistant to diagenetic alteration (e.g., Kohn & Cerling, 2002). The carbon isotopic composition in the carbonate fraction of apatite can be related to the diet of the animal (Kohn & Cerling, 2002). Hence, it can reflect the photosynthetic pathway (C3 or C4) of the plants consumed by these herbivores. The δ^{18}O values were determined in the phosphate fraction of apatite. In the case of large mammals that are obligate drinkers, the δ^{18}O values closely track those of the environmental water (Bryant & Froelich, 1995). Knowing the δ^{18}O values of environmental water and relating it to local precipitation, the mean annual temperature (MAT) of the site can be calculated (Dansgaard, 1964).

The δ^{13}C values range from -10 to -15 ‰ (VPDB). The result clearly shows that these animals consumed C3 plants. Most of the δ^{13}C values indicate mixed grassland-open woodland rather than a closed canopy forest. Although there is variation in the δ^{18}O values (mean 14.2 $\pm$ 1.0 ‰ VSMOW, n=17), most of the samples would support a MAT range of 8-12 °C. This is in good agreement with other proxies for the localities and time period (Kovács et al., 2013).

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