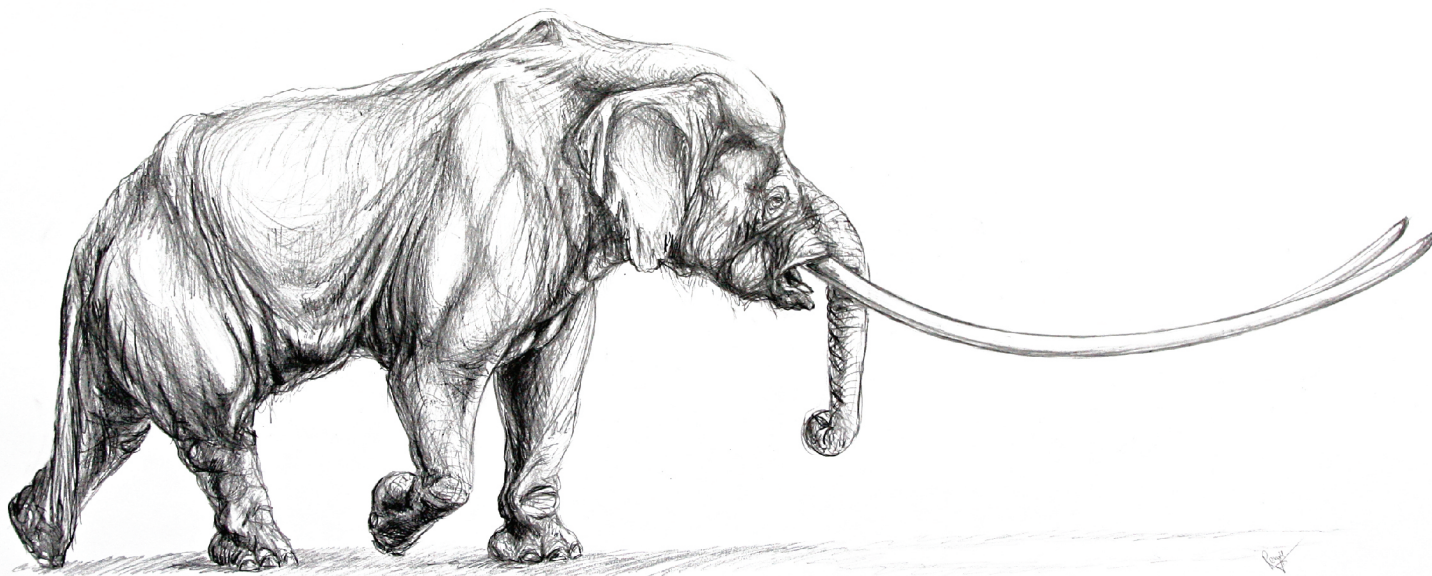




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## **ABSTRACT BOOK**

**Editors:**

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## Palaeodietary reconstruction of fossil proboscideans from Hungary and Romania

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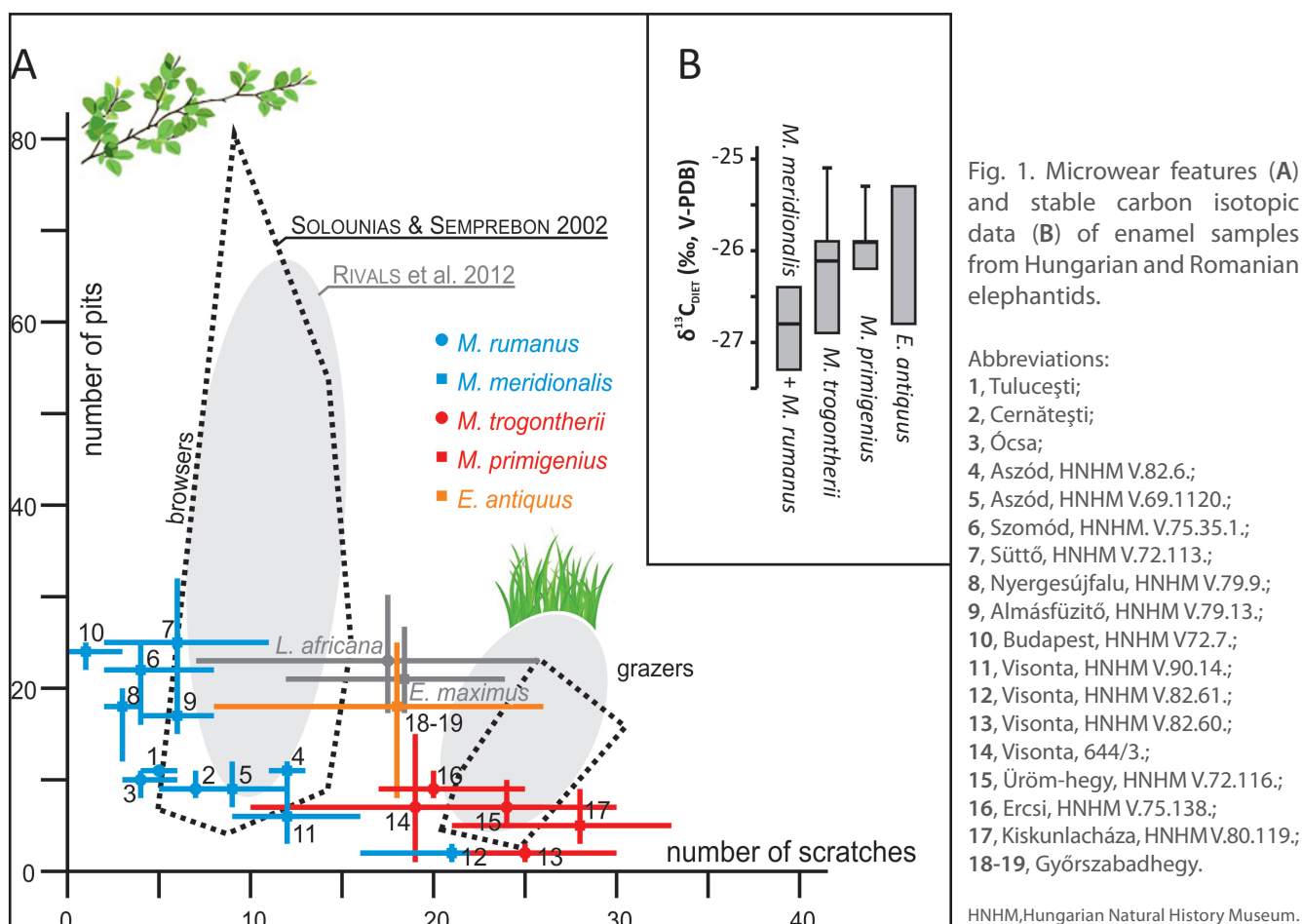
According to Maglio (1973) the emergence of elephantids from Miocene gomphotheres reflects an adaptive shift in their method of chewing, which helped to process a newly available food source, grass. Since the latter is more abrasive than leaves, it provided a selective force on the evolution of tooth crown height. Although this assumption is widely accepted, it is not yet properly confirmed and only few studies dealt with the alimentary habits of the successive species so far (e.g. Rivals et al., 2012).

The oxygen isotopic composition of phosphate in enamel of homoeothermic obligate drinkers is directly related to the  $\delta^{18}\text{O}$  of body water, which is related to the  $\delta^{18}\text{O}$  of ingested water. The latter can be linked to the isotopic composition of the local meteoric water, which shows significant correlation with mean annual temperature (MAT). The carbon isotopic composition of molars of herbivorous mammals reflects the photosynthetic pathway of the consumed plants (with a 14.1‰ offset according to Cerling et al. 1999), hence indirectly the paleoflora. As a consequence, the isotopic composition of molar enamel can be interpreted as an archive of dietary and climatic information. In addition, since the phosphate and carbonate are cogenetic oxygen-bearing phases in

isotopic equilibrium with the same reservoir (body water) at the same temperature (37°C for mammals), a linear correlation exists between the  $\delta^{18}\text{OPO}_4$  and  $\delta^{18}\text{OCO}_3$  values. Due to this fact, coupled measurements can be used for obtaining information about post-mortem alteration effects (Iacumin et al., 1996). As an independent proxy, the microwear pattern of enamel was examined, which is attributed to the interaction during mastication between tooth and abrasives. The microwear tracks are represented in browsers by more circular wear features (pits) and fewer elongated ones (scratches), whereas the opposite is true for grazers.

The present study is based on samples taken from molar teeth of *Mammuthus meridionalis*, *M. trogontherii*, *M. primigenius*, and *Elephas antiquus* from Hungary and *Mammuthus rumanus* (including the holotype) from Romania. Samples from *Deinotherium*, *Mammut*, *Anancus*, and *Gomphotherium* were analysed for comparative purposes.

Microwear analysis was carried out using Microware 4.0 software on SEM micrographs made from the surface of high-resolution epoxy casts. Although the magnification used here (300×) differs from the 35× magnification used in



regular light-microscopic studies, the field of view (0.4×0.3 mm) and the total number of observed scars (usually 20–40 on each image) was approximately the same, therefore we used the light microscopic data of Solounias & Semprebon (2002) and Rivals et al. (2012) for comparison. Palombo et al. (2005) or Todd et al. (2007) reached similar conclusions regarding the comparability of these methods.

According to our microwear data (Fig. 1A), *M. rumanus* and *M. meridionalis* were browsers, whereas *M. trogontherii* and *M. primigenius* were mixed feeders or more likely grazers. Preliminary results show that the studied non-elephantid proboscideans were mainly browsers with extensive bark consumption. Variation of wear features within a single molar is less than 30% (or usually less than 10% in the case of grazers).

Each isotopic sample here is a bulk of three or more subsamples over the whole height of a single plate, therefore represents the whole period of tooth formation. The oxygen isotopic composition of the carbonate and phosphate from enamel show strong linear correlation ( $r^2=0.75$ ) and plot close and parallel to the expected equilibrium line derived from modern mammals, however with an average of 2‰ higher intercept.

The overall  $\delta^{18}\text{OPO}_4$  range is 10.4‰–15.4‰ (V-SMOW) for elephantids. These data were converted to the isotopic composition of the meteoric waters in the time of the deposition of enamel based on Ayliffe et al. (1992). A linear regression was fitted to the data of four GNIP meteorological stations (Zagreb, Vienna, Bratislava, Debrecen) and the resulting equation ( $T=1.84\times\delta^{18}\text{OH}_2\text{O}+26.4$ ) was used for calculating MAT estimates. Early Pleistocene samples reflect a MAT range of 8–10°C, similar to present value (11°C), whereas our results suggest that the MAT was approximately 5°C lower during the cold periods of the Middle Pleistocene and up to 9–10°C lower during the Late Pleistocene glaciations. Preliminary calculations for the non-elephantid samples resulted in MAT estimates up to 13°C. The data are in good agreement with other climatic proxies from the same period (e.g. Kovács et al., 2013).

The  $\delta^{13}\text{C}$  values range from 13.2‰ to 7.4‰ (V-PDB), which suggest a C3 diet. The average and minimum values of the

successive species were increasing with 1‰ during the Pleistocene (Fig. 1B) which is explicable by drier climate and more open vegetation.

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