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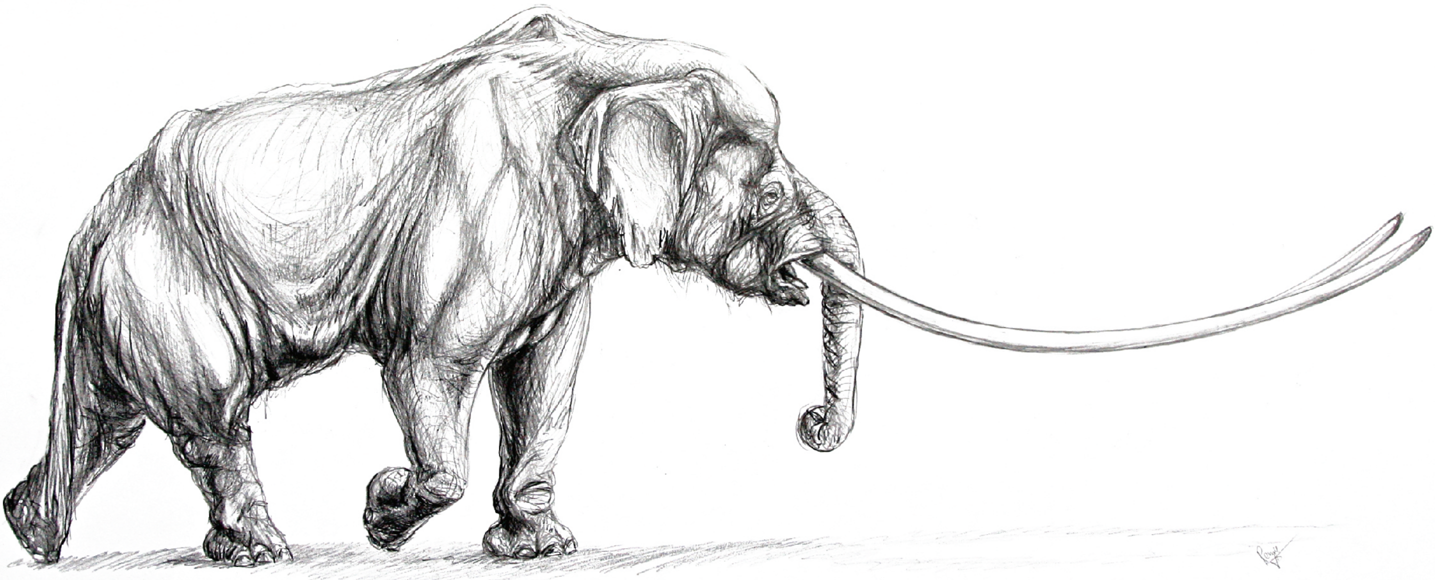

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ABSTRACT BOOK

Editors:
Dimitris S. KOSTOPOULOS, Evangelos VLACHOS, and Evangelia TSOUKALA

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An evaluation of direct seasonal mammoth mobility reconstruction from spatially-resolved Sr isotopic and trace elements ratios in molar enamel

Nina KOWALIK ✉, Wolfgang MÜLLER, Robert ANCZKIEWICZ, Piotr WOJTAL, and Jarosław WILCZYŃSKI

Strontium isotopic ($^{87}Sr/^{86}Sr$) and trace element ratios, especially in tooth enamel, are increasingly being used to reconstruct past mammalian mobility and/or relative palaeodiet. What is more, dental enamel represents – due to its incremental mineralization - an archive of time-resolved palaeoenvironmental conditions, which can be extracted using spatially-resolved analytical techniques such as laser-ablation MC-ICPMS, micromilling or SIMS.

In our pilot study we utilized a woolly mammoth (*Mammuthus primigenius* Blum.) molar excavated at the Gravettian (Upper Paleolithic) site Kraków Spadzista in Southern Poland, which is well known for its large accumulation of mammoth skeletal elements (Wilczyński et al. 2012). The main goals of this ongoing work are firstly to evaluate intra- and intertooth (isotope) geochemical variability and secondly to compare these time-resolved Sr isotopic signatures from molars with their decade(s)-long mineralization intervals to the biologically available Sr isotopic signatures of the studied area. The studied molar, probably an upper molar (M^3), was cut longitudinally and the exposed section of the dental plates was polished prior to analysis. Trace element and Sr isotopic ratios were measured in-situ by laser ablation (multi collector) inductively coupled plasma mass spectrometry (LA-(MC)-ICPMS) (Müller and Anczkiewicz, 2012; Müller et al., 2009) along continuous profiles along the innermost enamel layer near enamel dentine junction, which is a novel way to extract time-resolved mobility signals from continuously mineralizing enamel.

We measured X/Ca ratios of several elements (e.g. Mg, Sr, Ba and Zn) that naturally occur in dental enamel and others that are potentially incorporated during burial (U, REE) and thus serve as indicators of diagenetic alteration. Our data generally show very good preservation of the studied molar indicated by negligible U and REE uptake (some alteration was observed only in the basal area which also shows textural/colour changes). Dietary indicators (Sr/Ca and Ba/Ca) suggest uniform, plant-based diet.

The initial $^{87}Sr/^{86}Sr$ profile along a molar plate shows considerable regular variation with values ranging between 0.7108 – 0.7125. Such high $^{87}Sr/^{86}Sr$ values do not correlate with the local Kraków Spadzista Street site soil characterized by less radiogenic isotopic ratios obtained from teeth of small rodents. Along the profile, we observe fairly regular Sr isotope peaks spaced 5 mm (in the basal area) to 10 mm (in the centre of the plate) apart that correlate with subtly higher (up to 0.1 ppm) of U concentrations. At present it is not clear, whether this correlation is due to small alterations during burial or the fluctuations reflect seasonal changes. In order to verify the latter hypothesis we used mean mineralization times of *Mammuthus columbi* dental plates (Dirks et al. 2011) to estimate the time of growth of the studied molar. Preliminarily, the calculated duration between the observed $^{87}Sr/^{86}Sr$ peaks suggests that the observed variation is consistent with seasonal migration.

For the first time, this methodology represents a direct means to assess the palaeoecology of mammoth mobility, such as whether similar feeding areas were used each year or whether different animals have similar or contrasting isotopic mobility signals stored in their enamel; all corresponding data will be presented.

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✉ ndkowali@cyf-kr.edu.pl

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