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Editorial

VIth International Conference on Mammoths and their Relatives, part 3

The mammoths, *Mammuthus primigenius* (Blumenbach, 1799), are iconic animals of the Pleistocene glacial stages, which once inhabited vast regions of Eurasia and North America. Members of a once very diverse order —the Proboscidea Illiger, 1811— the mammoths were among the last survivors of the Northern Hemisphere Pleistocene megafauna. Their abundance with regard to other mammalian fossils and their often superb state of conservation as frozen carcasses have boosted the mammoth studies during the last decades. The series of conferences under the title 'International Conference on Mammoths and their Relatives' (ICMR), organised every three years in diverse places around the globe, is an expression of this rapidly increasing research interest in fossil proboscideans. The most recent VIth ICMR took place on May 5–12, 2014 in Grevená and Siátista, two towns in NW Greece, situated in an area well known for its exceptional proboscidean finds (e.g. Tsoukala and Lister, 1998; Tsoukala, 2000; Tsoukala and Mol, 2016). More than 180 international researchers working on Proboscidea participated in the conference with 152 oral and poster presentations that dealt with all aspects of proboscidean morphology, evolution, palaeoecology and fossil record (Kostopoulos et al., 2014).

After the successful publishing of two *Quaternary International* volumes featuring in total 35 research papers presented during the VIth ICMR (Tsoukala and Mol, 2015; Athanassiou et al., 2016), a third collection of studies, deriving from the same conference, is presented in the present special issue. These new contributions deal with diverse subjects of the fossil proboscidean research, as well as with the study of other fossil mammals that lived closely together with these gigantic animals.

The papers on fossil Proboscidea are arranged geochronologically, covering a range from the Late Miocene to the latest Pleistocene / early Holocene, and include studies in morphology, taphonomy, ontogeny, palaeopathology, palaeoecology, archaeozoology, and geochemistry. The first paper intended to be included in this volume, Konidaris et al. (2017), was inadvertently published recently in an unrelated special issue of this journal, but it is reprinted here for the sake of completeness. Konidaris et al. (2017) described rare dental and postcranial material of the giant deinothere *Deinotherium proavum*, deriving from recent and old excavations at the classical Turolian (Late Miocene) localities of Pikermi (Fig. 1) and Halmyropótamos. The deinotheres represent a side branch of Proboscidea characterised by morphological peculiarities, notably by its tapir-like cheek teeth and the presence of large, downturned mandibular tusks. The species *D. proavum* is one of the largest known proboscidean species, but it is also distinguishable from its contemporary elephantoid proboscideans based on postcranial characters. The authors compared their material with available deinothere specimens from Eurasian localities and provided several morphological characters of postcranial elements that they considered diagnostic for this taxon.

The next two contributions in the present volume deal with considerably more recent, but still old, Pliocene localities of the Eastern Mediterranean region, which have yielded primitive elephant remains (family Elephantidae). Rabinovich and Lister revisit the long-existing proboscidean fossils from Bethlehem, a karstic collapse site, after a new preparation of available specimens and application of modern imaging techniques. The studied material includes dental, mandibular and postcranial specimens, the former two exhibiting ancestral morphological characters that place it among the most primitive elephantids out of the African continent. The finds are better attributable to an early form of mammoth, although the presence of a primitive *Elephas* is also probable.

In an account on a recently discovered Late Pliocene locality in central Turkey, Albayrak describes a complete mandible and a tusk that quite probably belong to the same individual. The mandible and its dentition in particular exhibit ancestral features, such as a low plate number and lamellar frequency, similar to other known primitive elephantids from Eurasia. The material is not referred to a genus, though the tusk shows affinities to *Elephas*. Both these early localities offer important additions to the rather scarce material of the Pliocene elephants of Eurasia and will certainly contribute to our understanding of the biogeography and evolution of these early forms.

A much more advanced, intermediate species within the mammoth lineage, *Mammuthus trogontherii* is known in East Asia already in the Early Pleistocene, before being established as a common faunal element in the Middle Pleistocene of Europe. Recent fieldwork in Northern China has revealed several new localities that bear this species (Wei et al., 2010). One of these localities, Shanshenmiaozui, has yielded juvenile remains, which are attributable to the same species. Chen and Tong describe tarsal and metatarsal elements that are referred to four individuals of three different age classes. The available material constitutes the first sample attributed to juvenile *M. trogontherii*, and gives the opportunity to study the species' ontogeny through the morphological changes observed among the three age classes. The material is compared to juvenile specimens of other elephantid species (the southern and the woolly mammoth, as well as the straight-tusked elephant), though the available comparative material is very scanty for true comparisons among species, as the intraspecific variation cannot be taken into account.

China's great abundance in fossil Proboscidea offers the material for the following study, dealing with the palaeoecology of

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Fig. 1. Post-conference visit to the classical locality of Pikermi, Greece (PV-1 site, Turolian, Late Miocene). Photograph credit: Hans Wildschut.

proboscidean taxa. The country's southern regions exhibited a great taxonomic diversity during the Pleistocene, including species of three families, Gomphotheriidae, Stegodontidae and Elephantidae, which are key faunal elements of the region's three characteristic Pleistocene faunal complexes: the Early Pleistocene *Gigantopithecus–Sinomastodon* fauna, the Middle Pleistocene *Ailuropoda–Stegodon* fauna and the Late Pleistocene *Homo–Elephas* fauna. Zhang et al. use the Dental Microwear Texture Analysis method to study dental material of *Sinomastodon*, *Stegodon* and *Elephas* and infer the dietary specialisations of each one of these genera. According to the authors, the brachyodont *Sinomastodon* and *Stegodon* were browsers, whereas the hypsodont *Elephas* was a mixed feeder. These results imply the possibility of dietary competition between the browsing populations of *Sinomastodon* and *Stegodon*, which may have ultimately resulted to the extinction of the former, dentally less advanced, genus. Moreover, the resource partitioning observed between *Stegodon* and *Elephas* may have been a key factor that allowed the co-existence of these genera during the Late Pleistocene, despite the dental advantage of the *Elephas* species.

The woolly mammoth section of the present volume opens with a continent-wide study, which traces the changing patterns of the mammoth distribution over Eurasia during the last 50 kyrs, i.e. within the limits of ^{14}C dating methods. The authors, Puzachenko et al., based on the presence of mammoths in radiometrically-dated local faunas, conclude that the widest distribution of the species during this period of time occurred close to the Last Glacial Maximum, but was not isochronous throughout Eurasia shifting from the latest Pleistocene towards the Holocene, when moving from Western Europe to NE Siberia. The role of regional climate was found to be of prime importance, as the mammoth's biogeographic range expanded to the north or to the south, according to the climatic fluctuations towards warmer or colder climatic conditions, respectively.

Extraordinarily well preserved frozen woolly mammoth carcasses have offered rare opportunities for multidisciplinary studies, which offer associated data concerning the species' morphology, biology, physiology, life history, palaeoecology, etc., through the combined study of their soft and hard tissues. Two recently discovered carcasses, excavated in the northernmost territories of Siberia, are the subjects of two studies by Grigoriev et al. and Maschenko et al. respectively. The first carcass, found on Maly Lyakhovsky Island, is identified as an aged, partially preserved female, which lived almost 33 kyrs ago. The specimen lacks most of its caudodorsal part, but it is otherwise so well preserved that it even allowed the retrieval of haematological, histological and microbiological data. Computed tomographic analysis of the tusks provided life history data, mainly evidence of growth rate variation, which is interpreted as calving cycles.

The second frozen mammoth carcass presented in this volume was recently discovered in the Upper Pleistocene permafrost of the Yenisey River valley, Taymyr Peninsula, and is known as the Zhenya mammoth. Although concise, the study covers not only the soft and hard tissue morphology and histology, but also the