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European Early Pleistocene biogeography and ecology based on the mammal record: Case studies and preliminary syntheses

Foreword

The intriguing Early Pleistocene

The European Quaternary has for a long time attracted the interest of specialists around the world, not only because of its fascinating mammal record, including iconic taxa such as mammoths, giant deer, bison, wolves, saber-tooth cats, etc., but also because of the observed direct link between turnovers in the synthesis of consecutive mammal palaeocommunities and global climatic oscillations. Initial interest was focused on the Middle and Late Pleistocene, the period with an ever-increasing contrast between the glacial and interglacials. However, it soon became clear that the lower part of the Pleistocene (considered to start at ~1.8 Ma at that time) was a pivotal period during which the later and modern European mammal fauna largely emerged through successive events of migration, origination and extinction. Most of the modern Eurasian genera and many of the modern species lineages became clearly morphologically recognizable by the end of the Early Pleistocene.

With the Iron Curtain still very much in place, H.-D. Kahlke's famous Weimar seminars between 1960 and 1980 bridged the gap between European mammalian palaeontologists from East and West, highlighting the Early Pleistocene fossil record, full of evolutionary events and cross-correlation opportunities. This opened the way for later pan-European concepts and cooperation.

Conscious of the increasing influence of terms like *migration* and *dispersal* in the Quaternary European palaeontology and to emphasize the importance of the local record to wider-scale interpretations, von Koenigswald and Werdelin organized in 1991 at Andernach, Germany, a legendary workshop on the "Mammalian Migration and Dispersal events in the European Quaternary" and published its results in a special volume (Koenigswald and

Werdelin, 153: 1992) of *Courier Forschungsinstitut Senckenberg*. Although it represents a small percentage of this collective volume, the impact of the Early Pleistocene bio-events on the formation of the later mammalian faunas is clearly underlined in some works, especially those by Torre et al. (1992) and Turner (1992).

The growing number of contacts among European mammal palaeontologists studying the Early Pleistocene mammal record resulted in 1994 in a remarkable field excursion in the middle reaches of the River Don in Russia. This field trip was organized by one of the leading Russian Late Cenozoic geologists, Julia Iossifova. This excursion was joined by a group of the most active Dutch and British geologists and palaeontologists. The joint study of a series of stratigraphically important mammalian localities spanning the Late Pliocene and Early Pleistocene resulted in the idea "to organise a meeting devoted to the environmental, biological and physical changes that characterised Pliocene–Early Pleistocene time throughout Europe" (van Kolfschoten and Gibbard, 1998). The phonetic similarity of the name of Don River prompted a name of the conference "The Dawn of the Quaternary" that was held in Kerkrade (The Netherlands) in 1996. This conference that brought together 125 geoscientists from all over the continent resulted in multiple scientific papers on the Early Pleistocene biota of Europe published in an outstanding volume of proceedings (van Kolfschoten and Gibbard, 1998).

It should be noted that a number of scientific activities in the study of Early Pleistocene mammals at the transition from the 20th century to the 21st were supported and held under the auspices of the INQUA Subcommission on the European Quaternary Stratigraphy (SEQS) and the European Association of Mammalian Palaeontologists (Euromam). The latter format waits for its revival.

The mid-1990 would focus the attention to yet another key event of the European Early Pleistocene: the arrival of

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the genus *Homo* (Carbonell et al., 1995; Gabunia and Vekua, 1995). This triggered an intensification of fieldwork and a long and still lively discussion on the terms and conditions under which it took place. The ever-increasing number of new fossil mammal sites in the Lower Pleistocene of Europe yielded impressive new fossil findings and, at the same time, realisation grew of the need to overcome the local record and to assimilate the data on a wider scale in order to reveal true mammal dynamics at multiple levels:

- chronological;
- ecological;
- taxonomical.

The same decade saw the improvement of existing techniques and the establishment of new tools that increasingly enabled detailed recording of the Pleistocene climate oscillations, as well as decrypting local palaeoenvironmental conditions, a combination that led irrevocably to a more holistic view of the European mammal faunas. Recognizing, the importance of the climatic oscillations as a turning point in faunistic development, the IUGS settled in 2009 a long debate on the beginning of the Quaternary by including the Gelasian in the Pleistocene, bringing the lower boundary of the epoch to 2.6 Ma (e.g., Gibbard et al., 2010). This act significantly broadened the Early Pleistocene framework, leading inevitably to an overall reconsideration of its mammalian context.

Now, 25 years after the Anderdach workshop, the amount of multidisciplinary data for the European Early Pleistocene fossil record has tremendously increased. Still, we are far “... from deciphering the multifaceted relationships between climate changes and vegetation, fauna, and human evolutionary dynamics...” (Palombo, 2013). Biogeographic and ecological correlations and schemes at a pan-European scale remain hampered by the weakly resolved chronological context of this period (e.g., Muttoni et al., 2010), underappreciated diachronicity phenomena, disputable geographical and ecological barriers, significant spatial gaps in the knowledge of mammal faunas and the always annoying problem of taxonomic confusion.

For that reason, two of us (DSK and GK) organized a symposium entitled “Towards a Biogeographic Synthesis for the European Early Pleistocene based on the Mammal Record” in the frame of the 14th Annual Meeting of the European Association of Vertebrate Palaeontologists (EAVP) held at Haarlem, The Netherlands, in July 2016. This symposium brought together 21 presentations showing the progress in several aspects of Early Pleistocene mammal faunas from a local taxonomic point of view to a synthetic biogeographic and paleoecological overview – for relevant abstracts, see Holwerda et al. (2016). Enthusiastic about the idea of compiling a thematic issue related to that symposium, AT inspired the rest of us to implement this volume as a testimony of the continued progress made on unravelling the fascinating story of the European Early Pleistocene.

This thematic issue

This thematic issue includes seven contributions focusing on the Early Pleistocene mammal record of Europe. Two

additional works originally intended to be included in this volume (Pandolfi et al., 2017; Maniakas and Kostopoulos, 2017) were inadvertently published recently in a previous issue of the journal (C. R. Palevol, 16(7)). As they are very much part of the story and were originally presented at the EAVP meeting, they are included in this prologue.

The first four articles of this issue emphasize on the syntheses of regional data to critically infer mammal dispersal bioevents related to the arrival of *Homo* in Europe. Palombo (2018, in this volume) analyses at a regional comparative scale (Spain, France, Italy, Greece) the faunal dynamic trends in the northern Mediterranean realm in order to test the effect of local physiogeography and climate on the dispersion and distribution patterns of mammal species during the Early Pleistocene. The analysis suggests significant modifications at regional geographic scale, especially during the post-Olduvai–pre-Jaramillo time interval, which prelude the so-called Mid-Pleistocene Revolution. According to the author, discrete mammal dispersal bioevents succeeded each other at different pace and rate in the different territories. Both real and fake – due to inadequate chronological control – diachrony/asynchrony phenomena provide a serious concern for pan-European biogeographic reconstructions. Palombo deals peripherally with the influence of African faunal elements in the European Early Pleistocene record, a topic extensively addressed in the following work.

Starting from the Southern Levant area at the crossroads of Africa, Asia and Europe, Belmaker (2018, in this volume) provides a critical overview of the Early Pleistocene mammalian intercontinental interaction, focusing on the time-frame of *Homo* arrival in Europe. The author clearly illustrates the subjectivity of taxonomic interpretations, the varying definition of the African biogeographic realm and the chronological discrepancies at multiple scales as key factors for assigning an African origin to a taxon recorded in a non-African context. In the same spirit, Croitor (2018, in this volume) tests the paleobiogeographic context of the early human European dispersal through a multivariate cluster analysis of the West European herbivore associations. By recognizing three successive palaeobiogeographic stages from 2.5 to ~1.0 Ma, the author extrapolates similarity/dissimilarity data among local herbivore assemblages on a physiogeographic regional scale and promotes *Homo* as a temperate sensitive and rather stenotopic taxon. The effect of the taxonomical issue also appears here as the dominant audit of the results.

In the last paper dealing with bioevents involving *Homo*, Sardella et al. (2018, in this volume) provide interesting updated data on three Italian sites (i.e. Coste San Giacomo, Pantalla, and Pirro Nord) that frame the 2.1–1.3 time interval of Early Pleistocene and *Homo* dispersal in Italy. The updated data suggest a strong effect of the Early Pleistocene climatic deterioration on the mammalian palaeocommunities of Italy, which may have allowed a northward dispersal of African hippopotamuses as early as 2.0 Ma ago. The authors also emphasize the herbivore guild and especially the increasing ovibovine signal in the transition before and after the *Homo* dispersal.

The importance of local data in the Early Pleistocene biogeographic interpretations and reconstructions is

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