Quaternary International 587-588 (2021) 230–250

Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

The new Upper Palaeolithic site Korman' 9 in the Middle Dniester valley (Ukraine): Human occupation during the Last Glacial Maximum

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ARTICLE INFO

Keywords:
Upper Palaeolithic
Late Pleistocene
Epigravettian
Ukraine
Dniester
Last Glacial Maximum

ABSTRACT

Korman' 9 is a newly discovered Upper Palaeolithic site in the Middle Dniester valley (Ukraine). Here we present chronostratigraphic, palaeoenvironmental, chronological, lithic and faunal data. Within a ~4 m deep sequence we have identified four Archaeological Layers (AL 0 to III) and AL I can be attributed to the Epigravettian, AL II most probably to the Epigravettian (small sample size), and AL III most probably to the Gravettian. AL 0 is too small to allow a cultural attribution. Lithic analysis for AL I shows microblade technology and a toolkit dominated by microliths (backed and marginally retouched microblades and bladelets). Faunal analysis demonstrates that exploitation focuses on reindeer and horse. The archaeological results fit well into the regional Upper Palaeolithic record, and the correlations with sites like Molodova V, Korman' IV, Cosautsi, and Dorochivsti III are well established. Our results allow us to conclude that humans were present at Korman' 9 during the Last Glacial Maximum under arctic (AL II and AL III) and sub-arctic (AL I) conditions. We also discuss implications for our findings for the discussion of human presence/absence during cold and arid conditions around the Last Glacial Maximum.

1. Introduction

The Middle Dniester valley is a key region for the Palaeolithic of Eastern Europe. Archaeologically it is an extremely rich landscape with abundant sites attributed to Middle Palaeolithic, Upper Palaeolithic and Mesolithic as well as later periods (e.g., Chernysh, 1973; Klein, 1973; Noiret, 2009). Especially important are a number of open-air sites with long loess-paleosol sequences containing abundant Middle and Upper Palaeolithic archaeological layers. The long-term excavations of the Middle and Upper Palaeolithic sites of Molodova I, Molodova V, and Korman IV conducted by A.P. Chernysh and I.K. Ivanova have provided rich data for the chronostratigraphy, palaeoenvironment, and archaeology of the region (Chernysh, 1973, 1977, 1982, 1987; Ivanova and Chernysh, 1965; Ivanova, 1959, 1977, 1982, 1987) (Fig. 1).

Palaeolithic remains in the Middle Dniester valley have been known since the 1920s. The first Palaeolithic sites (Korman' I, II, and III) in the area of the village Korman' were discovered by Ambrozewicz in 1926–1927 (Ambrozewicz, 1930). In 1930–1931 Moroșan (1938) reported Korman' IV in the loamy slopes on the right bank of the Dniester. Between 1969 and 1975 Korman' IV was excavated and studied in comprehensive research project by A.P. Chernysh and I.K. Ivanova. This work resulted in an interdisciplinary study of Korman' IV, comparison of the collections with other sites, and the establishment of a chronological and cultural scheme for the Middle and Upper Palaeolithic of the region. Most research in the area was conducted in the 1960s and 1970s; from 1980s onwards the flooding of the Dniester river valley by the Dniester

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https://doi.org/10.1016/j.quaint.2021.02.021
Received 30 April 2020; Received in revised form 3 February 2021; Accepted 12 February 2021
Available online 16 March 2021
1040-6182/

which dated to 18.0 ka BP (~21.9 ka cal BP) (e.g., Noiret, 2009).

Regarding this regional scheme, AL II, dated to 18,440 BP (~22,300 cal BP) and located at the base of subunit 4-1b, might occur in a similar position as Cultural Layer 5 at Cosautsi dated between ~18.3 ka BP (~22.3 ka cal BP) and ascribed to the Frankfurt glacial extent recorded in Northern Poland (e.g., Kozarski, 1980). AL III as well as the tundra gleys of sub-units 4-3a and 4-4a most probably belong to the Frankfurt glacial extent as well. Finally, the bioturbated horizon of sub-unit 4-4b is probably recording the Cosautsi VI Interstadial with cultural layers 6 b to 9 dated between 19.1 and 19.4 ka BP (23.0–23.3 ka cal BP), which follows up the Leszno glacial extent recording the Last Glacial Maximum in Poland.

7.5. Implications for human occupation

The chronostratigraphic position of AL I fits very well with an attribution to the Epigravettian. Major other contemporary Epigravettian assemblages originate from Cultural Layers 3a and 4 at Cosautsi, Layer 4 at Molodova V, and Layer 5 at Korman' IV. According to the chronostratigraphic position and correlations mentioned above, AL II most probably should also be attributed to the Epigravettian. If – as argued above – AL III also belongs to the period associated with the Frankfurt glacial extent, i.e. between 19.2 ka BP (23.1 ka cal BP) and 18.0 ka BP (21.9 ka cal BP), an attribution to the Gravettian would be interesting as AL III would then represent one of the latest occurrences of the Gravettian, even later than the Gravettian cultural layers 5 to 2 at Dorochivtsi III (Kulakovska et al., 2015; Haesaerts et al., 2020). The technological features are in good agreement with an attribution to the Gravettian, but the sample size of diagnostic pieces is small. While the assemblage of AL III amounts to 932 lithic artefacts, we have to stress that 92.17% are chips, and, hence, the attribution is based on a low number of lithic artefacts. To resolve this issue, new fieldwork at Korman' 9 is needed to increase sample size of AL III and collect charcoal samples for radiocarbon dating of either AL III or the underlying humic horizon 4-4b, which would provide a maximum age for AL III. However, currently nothing speaks for an older chronostratigraphic position of AL III than the one proposed above, because we seem to not have evidence of a major break (or gap) in our sedimentary sequence.

The chronostratigraphic position and environmental conditions of the archaeological layers at Korman' 9 are interesting for the issue of human occupation, specifically debates around presence vs absence of humans during the Last Glacial Maximum (e.g., Montet-White, 1990; 1994; Haesaerts and Damblon, 2016; Street and Terberger, 1999; Svoboda, 1990; Svoboda and Novák, 2004; Terberger and Street, 2002; Verpoorte, 2004; 2009). While the definition of the Last Glacial Maximum varies, we follow here Mix et al. (2001) and Clark et al. (2009) and define it as the maximum extent of the glaciers, roughly from 26,500 to 20,000/18,000 years ago. However, it is evident that several maximum glacier extents occurred within this period and that they differ regionally. Here we utilize the Leszno, Frankfurt and Pomeranian glacial extents of the Scandinavian Ice Sheet as recorded in northern Poland (e.g., Kozarski, 1980).

Our data suggest that human occupation of AL 0 at Korman' 9 occurred under very cold but rather moist conditions (tundragley) postdating the Cosauti V-a interstadial and, hence, can most probably occurred during the Pomeranian glacial extent. While this would show us human presence during this time, the low sample size of AL 0 does not allow us to make any statement on human behaviour in this climatic setting. AL I represents human occupation during an interstadial and dated to ~17.9/18.0 ka BP (~21.8/21.9 ka cal BP), so during the Cosauti V interstadial (Haesaerts et al., 2003, 2004, 2010, 2020), which can be correlated with a brief increase in moisture and temperature within the (older) part of Greenland Stadial (GS) 2-1, separating the Pomeranian and Frankfurt glacial extents. Both AL II (dated to ~18.4 ka BP [~22.3 ka cal BP]) and AL III are currently positioned in the Frankfurt glacial extent and their chronostratigraphic position in the East Carpathian regional scheme can be correlated with the first (oldest) part of GS 2-1. The evidence of Korman' 9 demonstrates (i) human presence during medium-cold interstadial conditions (AL I) and during cold stadial conditions (AL II, AL III) within the larger time-window of the Last Glacial Maximum, but particularly within the Frankfurt glacial extent (AL II and AL III) and just after it (AL I), and (ii) the presence of trees (*Picea*) in the Middle Dniester valley as is evident by charcoals from, e.g., AL II, dated to ~18.4 ka BP (~22.3 ka cal BP). These results fit very well in the regional East Carpathian record, specifically with the evidence from Cosautsi, Molodova V, Korman' IV, and Dorochivtsi III (Haesaerts et al., 2003, 2004, 2010, 2020; Noiret, 2004, 2007, 2009) with evidence of repeated human occupations and abundant charcoals throughout the sequences.

The Korman' 9 data and the East Carpathian record demonstrating human presence during the maximum glacial extents of the Scandinavian Ice Sheet are also in good agreement with the archaeological record of the Middle Danube region (e.g., Haesaerts, 1990; Montet-White, 1990; Haesaerts and Damblon, 2016; Verpoorte, 2004; Svoboda, 1991; Lengyel and Wilczyński, 2018). Sites dated to this time-period include Grubgraben (Haesaerts, 1990; Montet-White, 1990; Haesaerts and Damblon, 2016) as well as Stranská skálá IV (Svoboda, 1991) and Mohelno-Plevovce (Škrdla et al., 2016).

While the data discussed above demonstrate the presence of humans during the maximum glacial extents in both the East Carpathian region and the Middle Danube region, we currently do not have a lot of insight into human behaviour, prey acquisition choices, technological organisation, and landscape use. In the future, studies investigating technological organisation, specifically lithic technological organisation, and richness and diversity of faunal assemblages as well as landscape use inferred by transport of animal units, etc. (see e.g., Barton et al., 2018; Blades, 1999; Kuhn, 1995; Li et al., 2016; Moreau et al., 2016; Nigst and Bosch, in press; Stiner and Kuhn, 1992; Surovell, 2012; Verpoorte, 2009), and a correlation with high-resolution climatic sequence are key to contribute to a better understanding of how climate shaped human adaptations and behaviours. With its dominance of reindeer and horse Korman' 9, AL I, fits some of the patterns known from sites around the Last Glacial Maximum with a reduction in species richness when compared to the Gravettian prior to 24 ka BP (28.1 ka cal BP) (Verpoorte, 2009). These taxa were likely the highest ranking prey among the available game in terms of benefits and costs of hunting and processing. Korman' 9, therefore, has the potential to contribute to future explorations of the specific behavioural adaptations of human populations to cold and especially arid conditions and variations in net primary productivity, which both probably had an impact on the biogeography of hunter-gatherer adaptations.

8. Concluding remarks

In this paper we present first results of our research on lithopedostratigraphy, chronostratigraphy, palaeoenvironment, lithic artefacts, and faunal remains of the newly discovered Upper Paleolithic site Korman' 9 in the Middle Dniester valley, about 1 km upstream of the famous site Korman IV.

As a new site, Korman' 9 contributes to the cultural geography and settlement history of the Middle Dniester valley in particular and the East Carpathian region more general. Our first results indicate that Korman' 9, AL I, shows similar trends as other Epigravettian assemblages of comparable chronostratigraphic position at Korman IV, Molodova V, and Cosautsi.

Interestingly, our data suggests that two of the archaeological layers (AL II and AL III) can be attributed to the Frankfurt glacial extent (correlated with the older part of GS 2-1), while the richest assemblage, AL I, dates to the Cosauti V interstadial (also correlated to GS 2-1), and herewith AL I, AL II, and AL III provide evidence of human presence during the Last Glacial Maximum. We briefly discussed the implications for our understanding of human behaviour of such a chronostratigraphic

interpretation. Future and currently ongoing work include a detailed assessment of site formation processes, study of the combustion features, in-depth studies of lithic technology and faunal exploitation with a focus on seasonality, mobility and landscape use.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

We thank the following individuals for support of our fieldwork and laboratory research: O. Kordunyan, A. Pryor, C. Stimpson, G. Trach, G. Mutri, and E. Croxall. We also thank N. Gerasimenko, and B. Ridush for exchange on topics related to our research at Korman' 9. The fieldwork and analysis were funded by the following grants to P.R. Nigst: EC FP7 Marie Curie Career Integration Grant no. 322261 (NEMO-ADAP Project), Leakey Foundation General Grant (spring 2012 granting cycle), D. M. McDonald Grants and Awards Fund grant, Isaac Newton Trust Small Grant, Isaac Newton Trust Matching Funding Grant, British Academy/ Leverhulme Trust Small Grant, and funds of the Max-Planck-Society. MDB was supported by an EC H2020 Marie Sklodovska Curie Intra-European Fellowship (grant no. 656325, EU-BEADS project). Author contributions: LK and PRN designed research, LK held fieldwork permit, LK and VU organised fieldwork logistics, LK, VU and PRN directed fieldwork, PRN generated all fieldwork funding, LK, VU, OK, and PRN collected and analysed lithic data, PSM collected faunal data, MDB analysed faunal data, FD analysed charcoals, PH and SP analysed stratigraphy, PH provided chronostratigraphic interpretation and regional comparison, LP analysed small mammals, YP analysed malacofauna, PRN wrote the manuscript with input from all other authors.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.quaint.2021.02.021.

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