



Universiteit  
Leiden  
The Netherlands

**Beyond the trenches: a landscape-oriented chronostratigraphic approach to MIS 5 Middle Paleolithic open-air sites on the European Plain : case studies from Lichtenberg and Khotylevo I**

Hein, M.

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## SUMMARY

The research presented in this thesis is aimed at the establishment of robust chronostratigraphic frameworks for Late Pleistocene Neanderthal open-air sites on the European Plain. It is argued that a firm chronological and stratigraphic foundation is the prerequisite for understanding Neanderthal behavior and its potential synchronization with environmental or climatic events. Only that way, behavioral traits can be inspected in terms of adaptation to certain developments and changes. This is trying to be illustrated by conducting case studies at Khotylevo I, Western Russia and Lichtenberg, Northern Germany at opposite ends of the European Plain. Very deliberately, the surroundings of these sites were included in the consideration. They can provide insightful background information, which help to better decipher site formation processes and may also elucidate Neanderthal habitat preferences. The two study sites share many similarities, concerning their northern location, their Keilmesser-dominated artifact assemblage, and the stratigraphic potential of their embedding sediment sequences. While for both sites, previous chronological data supported their assignment to MIS 3, the characteristics of their deposits also made an earlier occupation in MIS 5a seem possible. This ambiguity was to be resolved using geomorphological surveys, pIRIR<sub>290</sub> luminescence dating (ca. 30 samples) and sediment analyses, the latter also including palynology for additional environmental context. The chronostratigraphic results led to a revision of the timing for the occupations at the two sites: In Khotylevo I it happened during MIS 5a and in Lichtenberg at the MIS 5a/4 transition. The new ages are consistent with the stratigraphic and palaeoenvironmental findings and are therefore considered robust and reliable. They provide evidence for an emergence of the Keilmessergruppen before the onset of the Pleniglacial/ MIS 4, which had been a matter of debate so far. The MIS 5a/4 occupation in Lichtenberg further demonstrates Neanderthal capability to cope with severely cold conditions that could be reconstructed for that phase.

The landscape-oriented approach of the investigations directly resulted in the discovery of two unknown occupations in Lichtenberg. The first one could be allocated to the Mid-Eemian Interglacial (PZ E IVb/V), the second one was dated and palynologically assigned to the late Brörup Interstadial (ca. 90 ka, PZ WE IIb). Since

the artifacts from these two fully-forested intervals differ from the later Keilmesser-dominated artifact assemblages considering shape, size and tool variability, it is proposed that changing environments co-determined the lithic technology.

Chronostratigraphic achievements also include the first comprehensive chronology of the widespread 2<sup>nd</sup> fluvial terrace (MIS 5b to MIS 3) on the Russian Plain, a first numerical age for the termination of Brörup Interstadial (ca. 90 ka) in the type region, and the first detection of climatic fluctuations during the MIS 5a/4 transition on the European Plain (correlated with Greenland Interstadials GI-20 and GI-19). These findings will help to better contextualize contemporaneous archaeological sites in the wider region.