

# The inventories of archaeological horizons 4 and 3 and the loess section of Grub/Kranawetberg, a Gravettian site in Lower Austria

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**Abstract:**

Excavations at the Gravettian site Grub/Kranawetberg from 1993 to 2011 exposed four archaeological horizons (AH) separated by sterile loess deposits. The lowest AH 4 contains a number of features, consisting of two hearths which both are surrounded by small pits. The overlying AH3 is separated from AH4 by 8 to 10 cm of loess. In AH3 there are no features. Above AH3 there are two more AHs (AH2 and AH1) with significantly lower find densities.

Chronologically both AH4 and 3 are very close (ANTL-WEISER et al., 2010) but there are big differences in the assemblages and the presence/absence of features. According to the present state of research the assemblages of the two AHs seem to reflect the presence of different groups using this territory possibly under changing environmental conditions. In 2010 and 2011 a series of samples for an IRSL- and OSL-dating program (ZÖLLER et al., this volume) has been collected from two deep trenches in the east of the excavated area. Results suggest an occupation of AH4 to AH1 between 30ka BP and 27ka BP. The site gives an insight not only into an important part of the cultural development before the Last Glacial Maximum but possibly also into climatic changes during a longer time span of the Upper Pleniglacial period in this part of Austria.

**Das Inventar der archäologischen Horizonte 4 und 3 und das Lössprofil von Grub/Kranawetberg, einem Lagerplatz des Gravettien in Niederösterreich****Kurzfassung:**

Die Ausgrabungen an der Gravettienfundstelle Grub/Kranawetberg bei Stillfried erbrachten vier archäologische Horizonte. Der unterste (AH4) enthält zwei Herdstellen, die beide von einer Reihe von Grübchen umgeben sind. Der darauf folgende Horizont (AH3) ist durch eine 8–10 cm mächtige Lössschicht von AH4 getrennt. In AH3 gibt es keine evidenten Strukturen. Über AH3 liegen zwei weitere archäologische Horizonte mit lediglich einigen verstreuten Funden. Chronologisch sind beide Horizonte zwar nahe beisammen, sie sind aber sehr unterschiedlich, was die Strukturen und das Inventar angeht. Zum gegenwärtigen Zeitpunkt scheinen die beiden Horizonte die Anwesenheit von zwei Gruppen widerzuspiegeln, die dieses Gebiet möglicherweise unter sich ändernden Umweltbedingungen nutzten.

In den Jahren 2010 und 2011 wurde eine Reihe von Proben für IRSL und OSL Datierungen an zwei langen Profilen im Osten der ausgegrabenen Fläche genommen. So gesehen gibt der Platz nicht nur Einblick in einen bedeutenden Abschnitt der kulturellen Entwicklung vor dem Kältemaximum der letzten Eiszeit, sondern auch in die klimatischen Veränderungen des Hochglazial in diesem Teil von Österreich.

**Keywords:**

*Gravettian, cultural changes, raw material, settlement structures, personal adornments*

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## 1 Introduction

After surface collections of Palaeolithic artefacts on the fields of the Kranawetberg, a hill west of the village Grub near Stillfried in the March valley in the northeast of Lower Austria (Fig.1), the Prehistoric Department of the Natural History Museum Vienna started archaeological investigations in 1993 (ANTL et al. 1997). From 1993 to 2011 excavations at the site Grub/Kranawetberg exposed two different areas of activity (ANTL & FLADERER 2004). First, from 1993 to 1995, a bone accumulation with remains of mammoth, rhino, giant deer, wild horse and reindeer was excavated (ANTL et al. 1997; BOSCH et al. 2012). Then, approximately 20 metres to the east an area with hearths and high find

density was exposed (ANTL et al. 1997; ANTL & FLADERER 2004). The focus of this paper shall be put on this second area.

## 2 Methods

**Fieldwork methods:** First, we removed the recent top soil (30 to 40cm) and 120 to 180 cm of sterile loess covering the deposits containing the AHs 1 to 4. Then, AHs were excavated following the lithostratigraphic boundaries. All objects larger than 0.5cm were recorded three-dimensionally, i.e. piece-plotted. Until 2001, this was done manually by drawing maps in scales of 1:10 and 1:5 to record the location, inclination and position (dorsal or ventral down) of all find

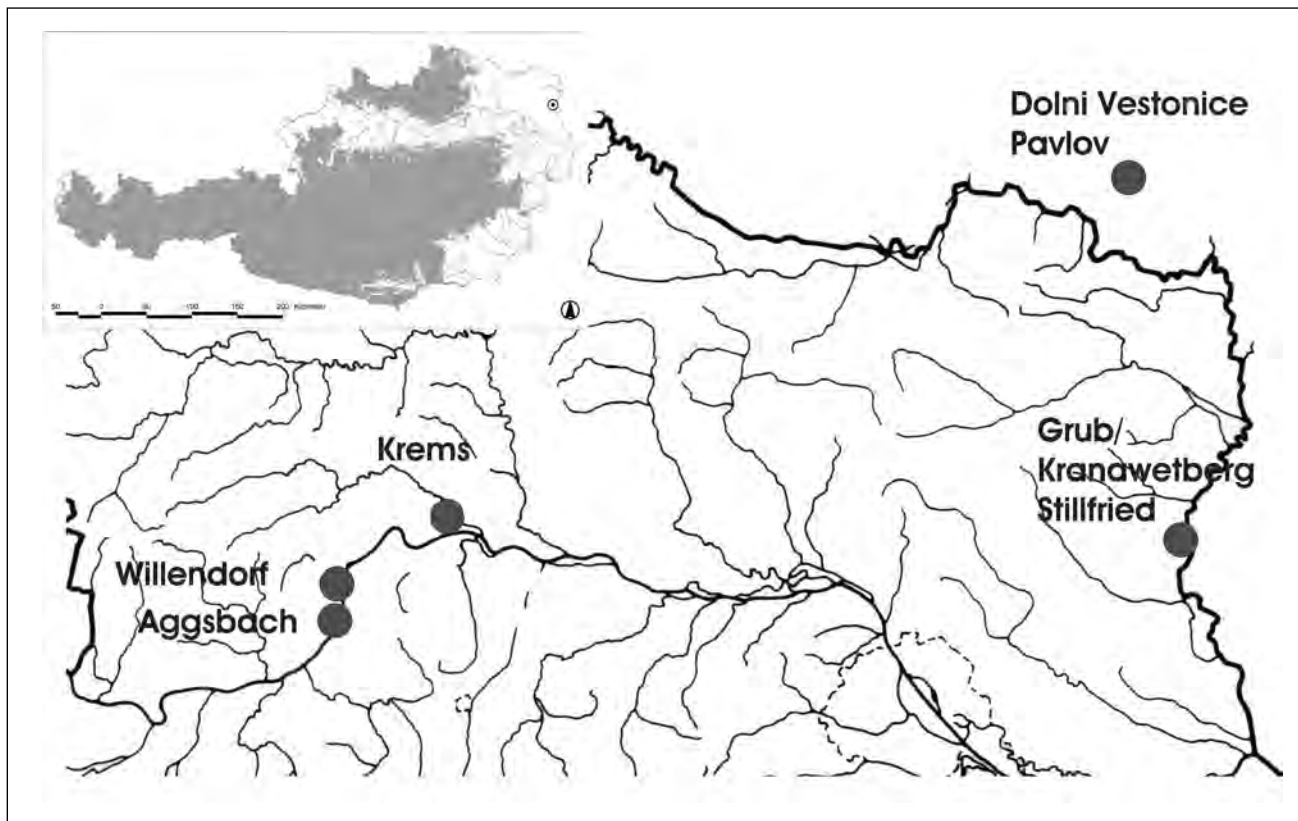


Fig. 1: Map of Austria with the geographical position of Grub/Kranawetberg (small inset) and a more detailed view to the north of Lower Austria and Southern Moravia with the geographical position of Grub/Kranawetberg and other sites mentioned in the text.

Abb. 1: Österreichkarte mit der geographischen Lage von Grub/Kranawetberg (kleines Rechteck) und eine Detailansicht des nördlichen Niederösterreich und Südmähren mit der Lage von Grub/Kranawetberg und anderen im Text erwähnten Fundstellen.

categories. Starting in 2002, we implemented a digital documentation system using totalstations, a field database, and rectified photos (NIGST et al. 2004; 2010). The final product is an interactive database and GIS of the site. Additionally to the digital excavation documentation system, we kept a separate diary (by the archaeologist in charge of the excavation) containing various sorts of further remarks, drawings with the position of measured points, finds in special context and instant remarks concerning structure of the sediment and discussion of the situation as a whole. Parallel to the measurements minutes are kept containing the reference points and the degree of possible deviations. All sediment removed is collected per quarter-square meter and wet-sieved with a grid size of 1 mm.

**Laboratory methods:** As to the lithic raw material microscopic analysis of a reference sample of one thousand pieces was carried out by Alexander Binsteiner. As a first step to a detailed technological analysis a preliminary type list of the lithic material has been established. As far as the fauna is concerned a detailed analysis of the faunal remains of the bone accumulation was made by F. Fladerer and M. Bosch (ANTL-WEISER, FLADERER, NIGST & VERPOORTE 2010; BOSCH, NIGST, FLADERER & ANTL-WEISER 2012). The malacological analysis was based on sediment samples from series at the western periphery of the settlement structures. Different types of molluscs and their preferred habitat were described and the number of each species was listed by F. Stadler (ANTL-WEISER, FLADERER, PETICZKA, STADLER & VERGINIS 1997).

In the East of O16 and O19 series of sediment samples from 1.5 to 4m below surface were taken (Fig. 2). The samples for IRSL and OSL dating were taken parallel to the sediment samples in O16 and O19.

### 3 Results

Within the area with hearths four AHs can be distinguished. Most of the archaeological material is concentrated within AH 4 and 3. Both AHs are clearly separated by 8 to 10 cm of loess; only in the area of hearth II (Fig.3) AH 4 and 3 are extremely close.

All features like hearths and pits belong to AH4. Hearth I and hearth II show repeated use and seem to be covered by AH4 (Fig. 4). As the distribution of finds in AH4 corresponds to the distribution of features (NIGST, 2003; 2004; NIGST & ANTL-WEISER 2012) it is clear that the features and AH4 constitute a unit but it will be a matter of further discussions in which way post-depositional processes possibly contributed to this impression. Above the shallow depression of hearth II there are several rather big bones on the top of AH4, which were not completely covered by loess and therefore must have been visible during the initial occupation of AH3.

Both hearths are surrounded by a series of small pits. On the bottom of these pits there are often rather big stone tools or stones with traces of grinding. The areas with pits are approximately 5 to 6 m in diameter and about 7.5 to 8 m apart from each other (Fig. 3). Between the two concentra-



Fig. 2: Grub/Kranawetberg: Sequence of AHs and loess in O19 with sample locations for pollen analysis on the left and sedimentological analysis on the right.

Abb. 2: Ostprofil in O19 mit Spuren der Probenahme für Pollenanalyse links und für Sedimentanalyse rechts.

tions of pits there is a continuous high density of finds. The base of AH4 is slightly folded in this area as a consequence of periglacial processes. Apart from the hearths different traces of fire as burned sediment and big pieces of charcoal burned *in situ* could be detected, especially in the north and northwest of the eastern concentration.

Around hearth I in the west of the excavated area a sudden decrease of find density has been observed 0.5 to 1 m outside the pits to the north, west and south, whereas the find density around hearth II is only decreasing to the north. South of the pits of hearth II there is an area with

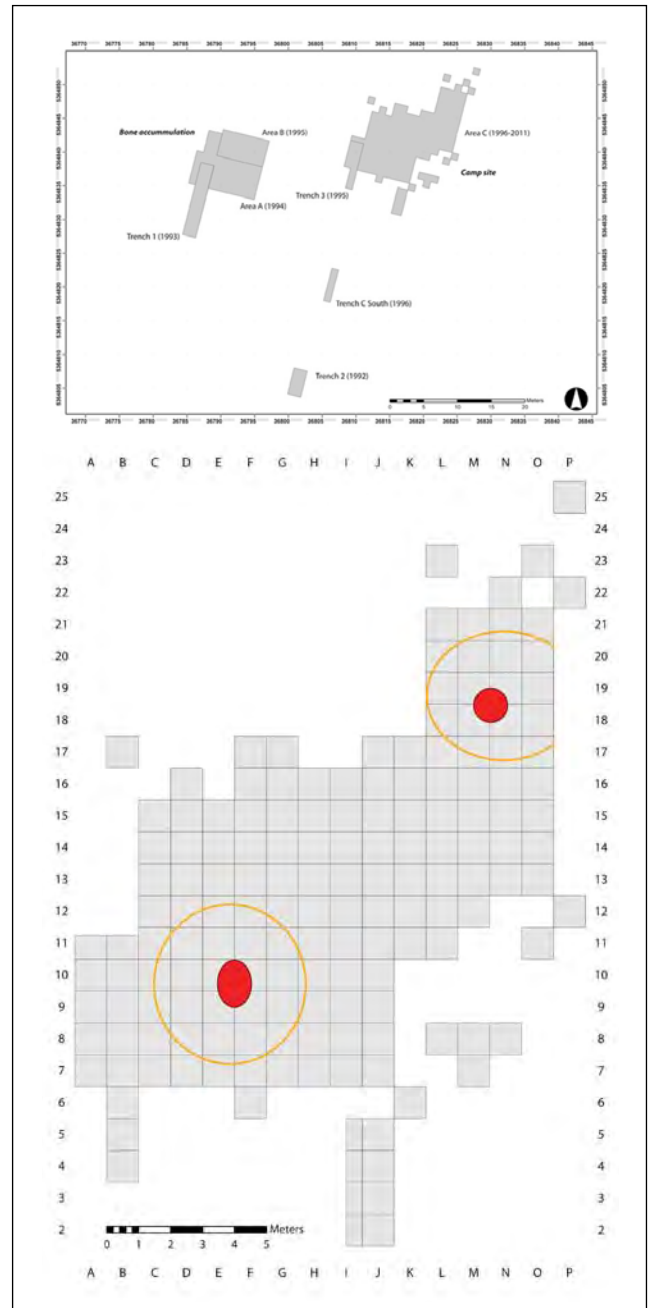


Fig. 3: Grub/Kranawetberg: General map of the excavated area (small inset) with a more detailed view of the area with settlement structures after Ph. R. Nigst, showing the two hearths (in red) and the area with pits around the hearths (in orange).

Abb. 3: Übersichtsplan des ausgegrabenen Bereiches (kleines Rechteck) mit einer Detailsicht des Bereiches mit den Siedlungsstrukturen nach Ph. R. Nigst, die die beiden Feuerstellen (Rot) und den Bereich der Grübchen um die Feuerstellen (Orange) zeigt.

a lower find density than in the concentration itself. The eastern and western border of this concentration has not been fully excavated. In some places AH4 is separated by thin lenses of loess into two small layers which indicates that AH4 consists at least of two occupations, the hearths even show up to four periods of use, which is clearly visible by the superposition of four different phases of firing.

The centre of overlying AH3 is only 2 m to the NW of AH4's hearth II. In AH3 there are no evident structures. Below the centre of AH3 there are traces of fire like burnt bones, large (4–5 cm) pieces of charcoal and patches of

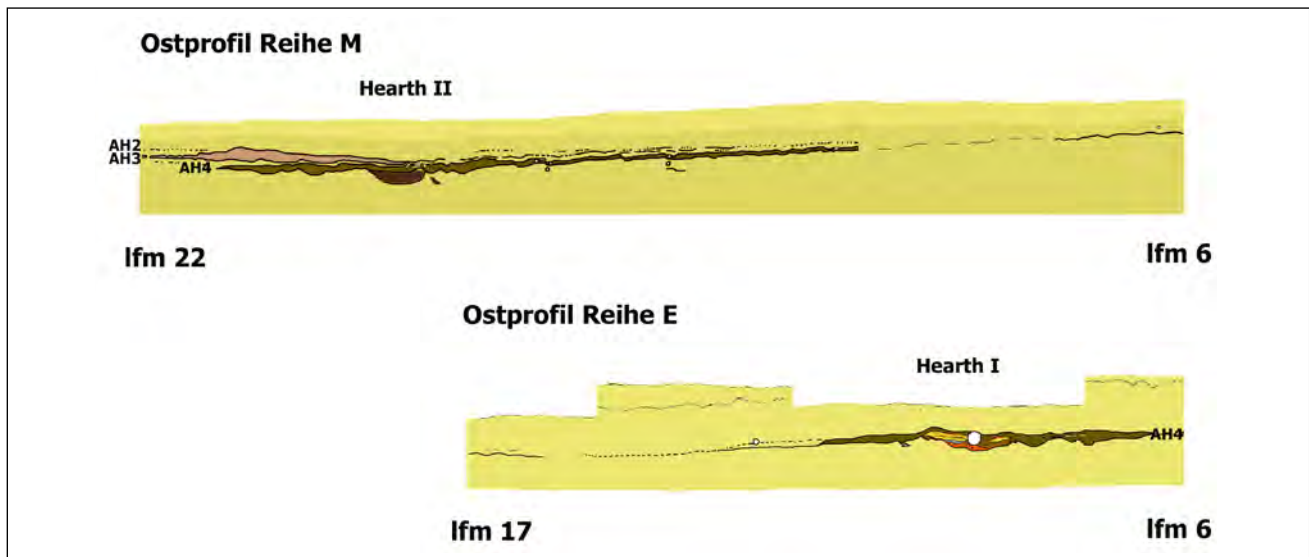


Fig. 4: Grub/Kranawetberg: Section through hearth I in the east of row E from south to north and through hearth II in the east of row M from south to north.  
 Abb. 4: Schnitt durch Feuerstelle I, Ostprofil Reihe E von Süd nach Nord und Schnitt durch Feuerstelle II, Ostprofil Reihe M von Süd nach Nord.

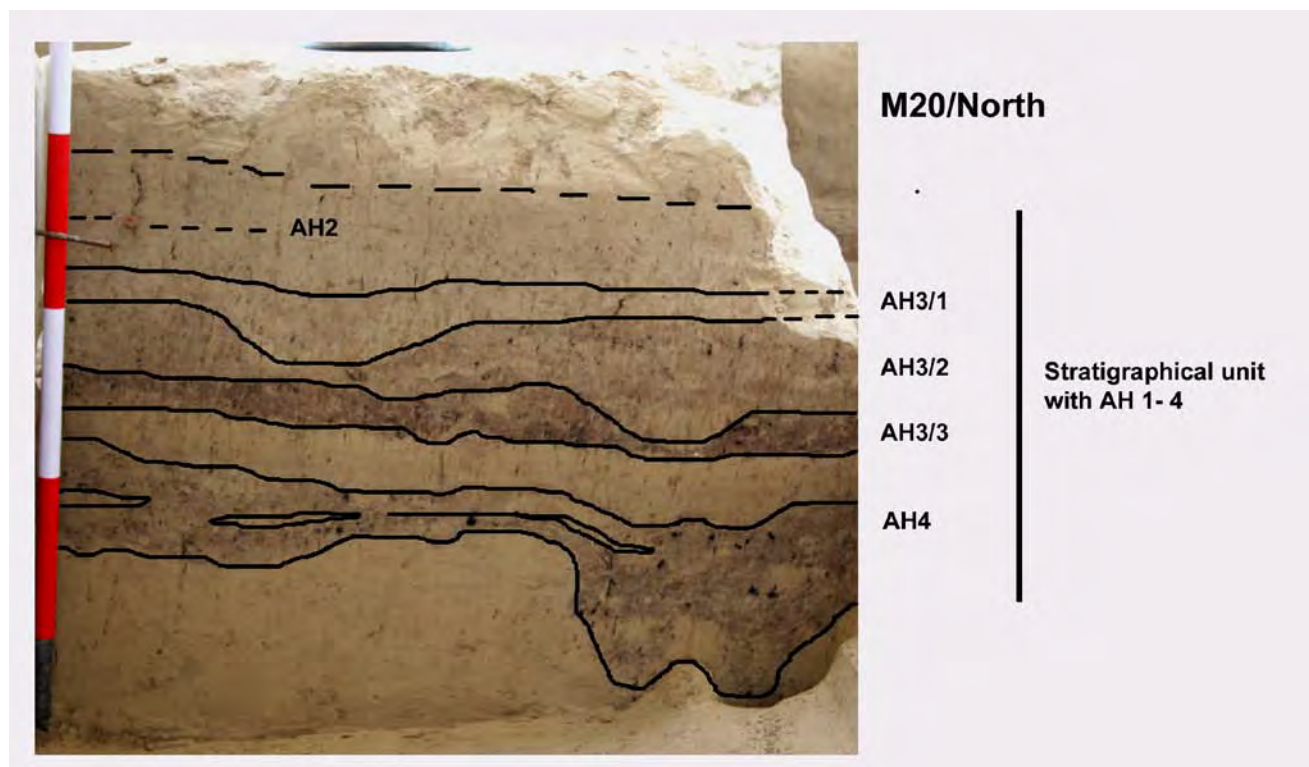


Fig. 5: Grub/Kranawetberg: North-section of square M20 showing the stratigraphic positions of AH1 to AH4.  
 Abb. 5: Nordprofil von M20 mit der stratigraphischen Lage von AH 1–4.

burnt sediment, but there no structured hearths comparable to those of AH4 have been found. The occupation of AH3 covers the whole excavated area. In the west (row A to G) (Fig. 3) AH3 is a horizon with only some scattered bones and artefacts. From row I (Fig. 3) to the east and especially to the northeast find density in AH3 increases. AH3 is associated with a clearly visible light brown horizon, which can be distinguished from the loess, from row J to the east and row 10 to the north (Fig.3). Within square M21 (Fig. 3), AH3 is about 16 cm thick and decreases dramatically in thickness in M22 to approx. 5 cm. In M21 AH3 can be divided into three different events of occupation (Fig. 5).

Above AH3 there are two more archaeological horizons (AH2 and AH1) with only some scattered finds. These horizons yielded individual finds in the western part of the excavated area, e.g. a fragmented mammoth tusk in square G11. In the east (squares L-O/19-21) especially AH2 yielded a more regular scatter of finds. Above AH1, the sediment structure changes considerably. Whereas the layer containing the archaeological horizons with a maximum thickness of 0.8 m shows many traces of organic activity the loess above is characterized by a brighter colour and higher density of the sediment.

Tab. 1: Grub/Kranawetberg: radiocarbon dates for AH 4 and 3. Abbreviations: AH: Archaeological Horizon, lab.nr.: radiocarbon dating laboratory number.

Tab. 1: Grub/Kranawetberg: Radiokohlenstoff-Alter für AH4 und 3. Abkürzungen: AH: Archäologischer Horizont, lab.nr.: Labornummer des Radiokohlenstoff-Datierungslabors.

AH	material	pre-treatment	lab.nr.	<sup>14</sup> C date	1 sigma	reference
AH3	charcoal	ABA	GrA-28183	24,780	+/-140 BP	ANTL-WEISER ET AL., 2010
AH3	charcoal	ABA	GrA-28184	25,640	+/-160 BP	ANTL-WEISER ET AL., 2010
AH3	charcoal	ABA	GrA-28185	25,010	+/-150 BP	ANTL-WEISER ET AL., 2010
AH4/hearth I	charcoal	ABA	GrA-9066	24,830	+/-230 BP	ANTL-WEISER ET AL., 2010
AH4/post hole	charcoal	ABA	GrA-9065	24,930	+/-240 BP	ANTL-WEISER ET AL., 2010
AH4	charcoal	ABA	GrA-9063	24,620	+/-230 BP	ANTL-WEISER ET AL., 2010
AH4	charcoal	ABA	VERA-364	25,300	+/- 90 BP	ANTL-WEISER ET AL., 2010

The radiocarbon dates suggest that AH4 and AH3 had been deposited within a relatively short interval (Table I). The above mentioned list shows that the dates of AH4 and AH3 overlap clearly. Statistically the dates of AH3 appear even older than those of AH4. This is partly due to one rather old date from AH3, which is the oldest one of all. One reason for this discrepancy might be found in the relatively small number of items dated so far. Also the use of collected wood of different ages cannot be excluded and has a strong effect on a small series. Nevertheless on the base of given data we have to expect a rather short time span between the two horizons. In spite of the rapid succession of AH4 and AH3 there are big differences concerning the archaeological material of the two AHs. Apart from differences concerning the presence/absence of features, the raw material used for lithic artifacts is completely different. From AH4 we have mainly flints and cherts whereas from AH3 radiolarites are the most abundant raw material type. AH4 and AH3 of Grub Kranawetberg yielded more than 1000 formal lithic tool types, between 4000 and 5000 blades and bladelets and thousands of flakes. At the present state of analysis it is not yet possible to give a detailed list of formal tools of each AH. This is due to the fact that between 1995 and 2001 artefacts had been drawn manually on plans which are not yet fully digitalized. Nevertheless an estimate of the distribution of formal tools from AH1 to AH4 might already give an impression of the high density of finds in AH4 (Fig. 6). Among the formal tool types of AH4, microgravettes are dominant; in AH3 there are mainly backed bladelets and small bladelets with fine retouching. Two complete and one fragmented notched backed point have been excavated in AH4.

Until now we found 245 beads and pendants of ivory, which are restricted to AH4. The number of ivory objects is still incomplete because the majority of the tiny beads (most of them 6–8 mm) was found within the remains of the sediment after wet sieving. As there are still a lot of samples yet to be sieved and a big amount of remains to be separated into the different find categories (silex, stone, bones, grains of coloured material, charcoal etc. which are smaller than 0.5 cm) a detailed list of bead types at the

present state of analysis would be premature. Personal adornments made of mollusc shells (174 pieces) as well as remains of colour are abundant in both AH3 and AH4. Also tools of antler and bone are present in AH4 as well as in AH3. Worked pieces of ivory are more typical for AH4. Although the analysis of the faunal remains has yet to come, it seems that there is a great abundance of mammoth in AH4 and of reindeer and horse in AH3.

#### 4 Discussion

Chronologically both AH4 and AH3 are very close (ANTL-WEISER et al. 2010), but there are big differences concerning structure and contents. Compared to the settlement structures in AH4 we have only a concentration of finds with a clear centre in AH3. There are evident differences in raw material procurement and in personal adornments. Remains of mammoth seem more abundant in AH4 but detailed zooarchaeological analyses concerning preferred game have yet to be conducted.

First analyses of spatial organization around hearth I (NIGST 2004; NIGST & ANTL 2012a; 2012b) showed different zones of artefact distribution. One zone with a high density of artefacts was interpreted as the place of a dwelling while the other zones were interpreted as the periphery of it. This interpretation was also supported by the distribution of pits around hearth I. As to hearth II there are similar structures, which have yet to be analyzed. Comparable structures with central hearths and pits have been excavated in Dolní Věstonice II, occupation unit 3 (Southern Moravia) (SVOBODA 2003; NIGST & ANTL 2012) and during recent excavations at Krems Wachtberg around the big central hearth (Lower Austria) (EINWÖGERER, et al. 2006; EINWÖGERER 2010; NIGST & ANTL 2012).

A very interesting aspect is that there is evidence for AH4 to be contemporaneous with the bone accumulation (BOSCH 2009; BOSCH et al. 2012). This is based on the fact that an upper left first molar of mammoth, found in the AH4, belongs to the same maxilla as a right upper first molar found at the bone accumulation. This observation fits very well with the intense use of ivory in AH4.

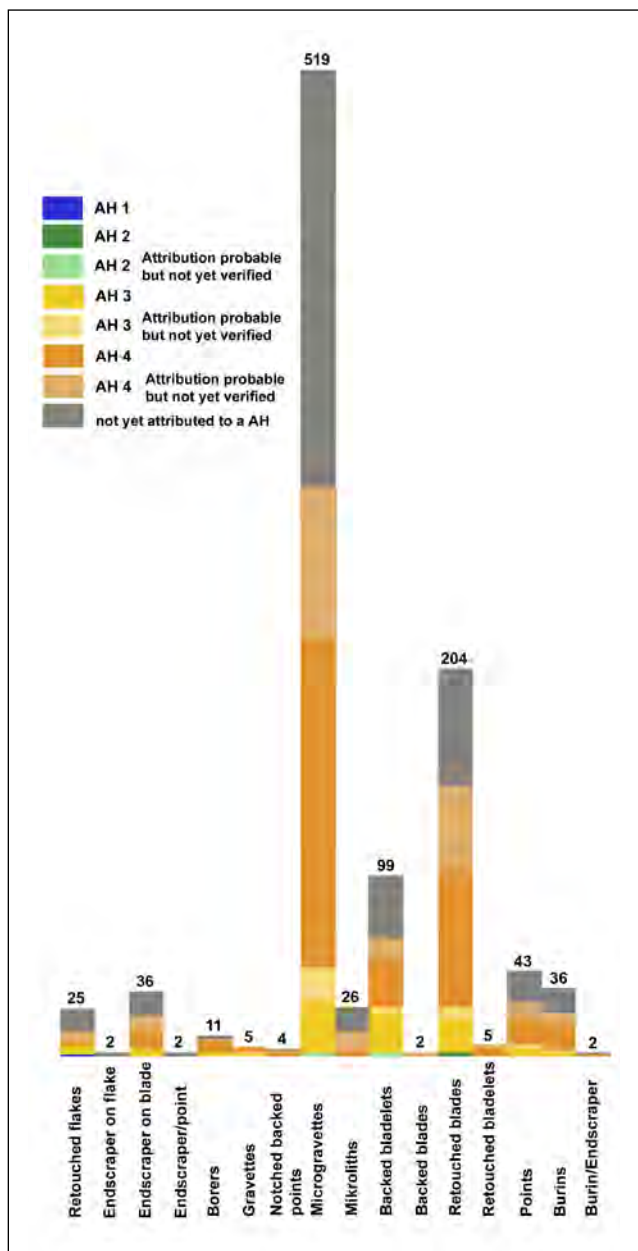


Fig. 6: Grub/Kranawetberg: Distribution of formal lithic tool types from AH1 to AH4.

Abb. 6: Verteilung der retuschierten Geräte auf die archäologischen Horizonte 1–4.

The radiocarbon dates as well as the material culture of AH4 suggest a position of the occupation at the end of the Pavlovian. Apart from the lithic raw material there are also some varieties of personal adornments which support the assumption of closer connections to the north in the course of AH4's occupation, but it must be mentioned that the role of the gravels of the river March as a source of Moravian chert used by the humans occupying Grub/Kranawetberg has yet to be analyzed.

As to the lithic material of AH3, the Carpathian Mountains in the east are a possible source for the radiolarites. The nearly exclusive use of radiolarites, resembling material from the Carpathian Mountains, may indicate increased relations to the East. Having a look at the personal adornments used in AH4 and AH3, we can observe a significant change, which supports the idea that different groups of people are

behind the formation of AH3 and AH4. Further analyses shall clarify the role of the site in a bigger regional context. It will be necessary to discuss to which extent the change in raw material procurement from AH4 to AH3 might correspond to a shift of population to the east at the end of the Pavlovian as has been suggested (OTTE, 1993; OTTE, 2004; ESCUTENAIRE et al., 1999). This shift of population as a consequence of the expansion of the Fennoscandinavian glacier and the climatic deterioration in central Europe is also being discussed by J. Svoboda (SVOBODA, 2000; SVOBODA, 2007) for the time after 25 ka BP.

Within the excavated area the occupations of AH2 and AH1 consist only of some scattered finds. There are some individual finds at this level in the western part of the site and a slight increase of find density in the eastern part. As we dispose of sufficient charcoal from these horizons we will be able to date these occupations in the near future. The analyses will show how near to the Last Glacial Maximum the cultural sequence from the Kranawetberg ended. The calibrated dates for the youngest sample in the profile of Zöllner (ZÖLLNER et al. in this volume) from O19 (Fig. 2) support this presumption.

First malacological analyses suggest a cold climate in an environment of some bushes and trees (ANTL-WEISER et al. 1997). According to F. Stadler there are indications for warmer climatic conditions shortly before the deposition of the AHs or the beginning of warmer conditions (ANTL-WEISER et al. 1997; ANTL et al. 2010). As warmer phases are observed at Pavlov and Willendorf II/8 (HAESAERTS et al. 1996; HAESAERTS et al. 2004) around 25.5ka BP we can expect that warmer conditions prevailed mainly before the deposition of the AHs at Grub/Kranawetberg.

In order to examine the role of climate change during the occupations after AH4 a series of samples for sediment, pollen and mollusc analyses have been collected. Apart from samples within the geological unit containing the archaeological horizons sampling comprised a length from 150 to 37 cm below surface. In 2010 and 2011 a series of samples for IRSL- and OSL-dates have been collected there. The upper parts from surface to -150 cm were sampled in various sequences in the west of the dwelling area as well as at the bone accumulation (ANTL et al. 1997, 1999). A drilling program executed by S. Verginis in 1996 in the west of the dwelling structures proved that there is at least a sequence of 7 m of loess at this place (ANTL et al. 1997, 1999).

## 5 Conclusion

Comparing AH4 and AH3 of Grub/Kranawetberg we could observe a clear change in settlement structures, raw material procurement and personal adornments as well as some differences concerning the frequency of certain tool types. According to the present state of research the assemblages of the two AHs seem to reflect the presence of different groups using this territory possibly under changing environmental conditions, one of them showing closer contacts to the north and the other to the east. The strongest argument for the preference of the existence of different groups seems to be the clear change in personal adornments within a short period of time. Chronologically the sequence of Grub/Kranawetberg overlaps with the sequence of Willen-

dorf II starting with AH4 and AH3 with radiocarbon dates between those of AHs 8 and 9 of Willendorf II (Haesaerts et al. 1996). AH2 and AH1 of Grub/Kranawetberg are younger than Willendorf II/AH9 and thus extend the cultural sequence of the Gravettian in Lower Austria.

Combined with a thick loess deposit below the AHs Grub/Kranawetberg gives an insight not only into an important part of the cultural development before the Last Glacial Maximum but also into climate changes during a longer time span of the Upper Pleniglacial period in this part of Austria.

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