

The utilisation of mammoth remains as raw material and its importance for the Gravettian people of the German Danube

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SUMMARY: The upper Danube valley is discussed as a migration corridor both for animals and humans as well as a preferred habitat of mammoth until crossing the Swabian Jura. It could be shown that mammoth played an important role not only as a subsistence component but also as a raw material source in all gravettian cave sites along the upper Danube, sometimes also in a fossil or subfossil site. Mainly the value of ivory is observed. Due to the high risk for mammoth hunting the seasonal aggregation of several social units in the Achthal is focussed on its geographical situation as a terminal point of the main mammoth migration with probably only small herds.

1. INTRODUCTION

The Danube was always an important migration corridor both for animals and for humans. This corridor connected the Eastern Hungarian plains to the Western Austrian and German parts of the Danube valley. The Danube plains extend up to the Viennese basin. Behind this basin the Danube flows in a narrow valley to the West, where it broadens once again behind until it reaches Krems. At this point, the valley becomes narrow and rebroadens only with the Northern "Alpenvorland", where it is bordered to the North by the Bavarian Forest, and finally by the Bavarian and Swabian Jura. To the West of Ulm the river valley narrows and at this point the volume of water in the river is strongly reduced: after this the Danube crosses the Swabian Jura in a narrow valley.

With one exception located on the left bank of the river, all of the archaeological sites described in this paper are situated in side valleys nearby the Danube. In South-Western Germany the Gravettian is mainly known from cave sites with a concentration in the Ach valley: Geissenklösterle, Brillenhöhle, Hohlefelds and Sirgenstein (Scheer 1994). The Bockstein-Törle site is located in the Lone valley not far

away to the North-East of the Ach valley. The Weinberghöhle, Klausen Höhlen and Abri im Dorf sites are located downstream. Only one open-air site at Salching is known along the German Danube, situated on the right river bank. New AMS dates sampled at the Geissenklösterle and Hohle Fels Caves and ranging between 27 and 29 ky (Hahn 1995) unambiguously attribute the sites in the Ach valley, as well as the Weinberghöhle and Salching, to the early Gravettian. Refitting of stone tools have definitely shown that at least three of the Ach valley caves were occupied contemporaneously during a short period of the Gravettian (Scheer 1990). This early phase of the Gravettian is characterised by ivory pendants, flechettes and some rare shouldered points or tanged Font Robert points (Scheer 2000). However at the Bockstein Törle (Hahn 2000) and probably at the Klausen Höhle (Hedges *et al.* 1997) a late phase of the Gravettian with flat-faced burins but also dihedral burins and pendants of ivory and stone is represented. The stratigraphical position of Klausen Höhle and Abri im Dorf is unclear. The early phase of the Gravettian belongs to the end of an interstadial, probably the Kesselt/Maisière oscillation or the succeeding

colder phase of the l'inter Maisière Tursac (Djindjian & Bosselin 1994). Based on climatic evidence the cold-temperate, probably not too humid continental climate indicated tundra-like grasslands with a low percentage of copswood and sparse trees and shrubs, along with moorlands and some open waters on the kastic plateaux of the Swabian and Bavarian Jura.

2. EVIDENCE AND IMPORTANCE OF MAMMOTH

According to Vereschagin & Barishnikov (1982) mammoths were moving above all in broad river valleys or lacustrine environments. The Hungarian plains up to the Viennese Basin and probably Krems could be characterised as the preferred habitats of mammoths, as suggested also by Oliva (2000). A few mammoth herds certainly migrated through the narrow valley of Austrian Alps reaching the broad Alpenvorland. The narrowing of the Danube valley to the West of Ulm presumably marked the boundary of the mammoths habitat.

Due to selection by humans faunal remains at archaeological sites do not represent the natural composition of the fauna. Even when we assume that hunting took place close to the settlements, archaeological faunas can only give an indication of the local faunal composition. Rel-

atively high percentages of mammoth bones are present mainly in the Weinberghöhle, but also at Geissenklösterle (Table 1). In a recent faunal analysis Münzel (1997, 1999) has shown that the weight of bones identified taxonomically as mammoth and identified to mammoth-woolly rhino in size, dominate the total weight of large mammal bones at Geissenklösterle and are therefore considered to represent the most important component in the archaeological fauna followed by horse and reindeer. This is true considering the amount of meat but certainly not in terms of hunting frequency.

The remains of the species were differential-ly utilised. Among other hints cut marks on cave bear bones indicate hunting of the species and a comparatively higher exploitation of bear remains - more than expected. The highest counts of butchering marks were recorded on bones of mammoth and horse (Münzel 1999). Mammoth and reindeer provided not only a source of meat, but their bones, tusks and antler were used as raw material.

The skeletal material found in the caves represents the remains of hunted prey modified by butchering, choice of portions of the carcasses for transportation (since carcass portions had to be transported until 90 m from the bottom of the valley to the caves), charring of the bones, and loss of bone during carnivore gnawing ac-

Tab. 1 - Large mammal fauna from the Gravettian layers of the Brillenhöhle, Hohle Fels (HF), Weinberghöhle (WH) and Geißenklösterle (MNI of GK only teeth).

species	Brillenhöhle			HF			WH	Geißenklösterle			
	quantity %			MNI			MNI	MNI	quantity%		weight%
	V	VI	VII	V	VI	VII			I		
<i>Ursus spelaeus</i>	28,0	41,7	31,8	11	18	27	7	6	69	30,9	37,7
<i>Canis lupus</i>	1,2	0,9	0,3	1	1	1		1	2	0,3	0,4
<i>Vulpes sp.</i>	5,6	5,5	7,2	4	4	14	2	5	13	2,4	1,2
<i>Panthera spelaea</i>	0,3	0,1		1	1						
<i>Rangifer tarandus</i>	7,4	4,8	6,0	3	5	6	1	2	1	4,0	9,0
<i>Equus caballus</i>	3,2	4,4	4,6	2	3	3			2	2,5	8,7
<i>Bos</i>		0,1	0,1		1	1		1			
<i>Mammuthus primig.</i>	0,9	0,8	1,5	1	1	2	2	6	1	2,4	14,3
<i>Coelodonta antiquitatis</i>							1		0	0,1	0,2
<i>Capra ibex</i>	0,9	1,2	1,0	2		4			1	0,9	1,9
<i>Saiga tatarica</i>	0,3		0,2	1		2			0		
<i>Rupicapra rupicapra</i>			0,1			2			1	0,1	0,4
<i>Cervus elaphus</i>	0,3			1					1?		
<i>Lepus sp.</i>	34,2	21,3	27,6	6	14	22	5	9	8	5,3	2,2
total fauna	339	743	1683	70	124	262				4435	11349

tivities. The bulk of mammoth and other species remains have been deliberately modified by humans. Münzel (1999) describes the faunal assemblage from Geissenklösterle as representing the last stage of a "chaîne opératoire", in other words a deliberate selection of skeletal parts as raw material for the production of artefacts. Comparative analyses of faunas from other south German Gravettian sites are lacking or are currently being undertaken. At Salching bones were not preserved. Minimum numbers of individuals are given for the Brillenhöhle (Boessneck & von den Driesch 1973), Hohler Fels (Markert 1996) and Weinberghöhle (von Koenigswald 1974). In comparison to the evidence from Geissenklösterle and especially in the Weinberghöhle, the mammoth seems relatively less frequent, but with a minimum of four individuals (MNI), an important source of meat.

The six individuals (MNI) of mammoth at the Weinberghöhle appear to indicate a certain specialisation of mammoth hunting (von Koenigswald 1974).

There is no doubt that the mammoth was an important subsistence component as shown by numerous cut marks found on its bones. The role of mammoth as a source of bone and ivory will now be discussed. For the Geissenklösterle Münzel (1999, Tab. 55) demonstrated that skeletal elements which could be used as raw material comprise between 50% to 90% of the weight of bones per species. In the case of mammoth 88% of these remains are ribs and 9% is ivory. Even when the high numbers of ivory pendants are excluded, 40% of the mammoth remains have been deliberately modified and 4.7 % bear traces of cut marks. When the non-identifiable bones of mammoth or woolly rhino size are considered, 83 % are ribs, 29% of the bones are deliberately modified and 13.5 % bear traces of cut marks. The deliberate selection of these elements of mammoth as raw material is supported by the fact that their numbers exceed the numbers of these elements in other species present. Beside bones comparable in size to those of bear or horse and those of reindeer appear to have had a certain value as a source of raw material.

In general the inventories from Geissenklösterle, Brillenhöhle, Hohle Fels and Sigenstein and even the Weinberghöhle are comparable with each other apart from some local characteristics. The lithic industry as well as characteristic bone tools such as ivory pendants (Scheer 1995), numerous projectile points with rounded bases along with "bone polishers" made of mammoth sized bones are common features of the inventories.

Ivory was of particular value. Art objects made of ivory are lacking in the Gravettian cultural levels with the exception of a questionable, not conserved venus figurine from the Brillenhöhle. Instead ivory pendants are chronological markers and regional items at the early Gravettian cave sites. The complete production sequence of standardised pendants and individual pieces is well known. These pendants could also have been made of bone or antler, of which there are a few examples. However, ivory appears to have been the preferred material. This was not due to the ease of working ivory, since if not treated ivory is more difficult to work than either bone or antler (Christensen 1999). It is highly likely that palaeolithic people knew how to soften ivory.

Whereas it is easier to work bones which are still fresh, ivory can be worked in a fossil or subfossil state. Experiments have shown that fossil ivory of mammoth, softened in water, is carvable like wood (Hahn *et al.* 1995). Some of the material used for ivory pendants appears to be fossil or subfossil ivory. A comparable analysis of tools made of bone has not been undertaken so far. The choice of ivory for the production of pendants may lie in their function. The tear-drop shaped pendants possibly mimic the canines of deer, which were rare in this region. The wearing of such pendants on the clothes probably had a symbolic character. Ivory was chosen as a raw material for this type of pendant due to its extremely homogenous, fine-grained material which could be highly polished. The presence of pendants made of fossil or subfossil ivory shows that ivory was particularly sought as a raw material for the production of pendants and cannot be considered just as debris from the tusks of hunted ani-

mals. This contradicts an interpretation of ivory as hunting trophies and might point to its symbolic character in terms of prestige, status, sex, clan etc.

It is remarkable that comparable ivory pendants are very rare in relation to the mass of available raw material at Moravian sites, where mammoth is much more abundant (Oliva 2000) and ivory preservation is very good (Oliva 1995; Kozłowski 1992). At Pavlov I and II (Absolon 1945; Klima 1976) as well as Dolni Vestonice (Klima 1983) comparable pendants were often made of stone or in other forms. The question is whether we are dealing with differing values of ivory as a raw material or different traditions along the Upper Danube. However, ivory pendants similar to those found in Southern Germany also occur in the Mamutova cave situated further to the north-east (Kozłowski 1992) indicate the presence of these pendants might be specific to caves sites.

3. CONCLUSION

For the Gravettian people along the Upper Danube mammoth was an important source of meat particularly in the Weinberghöhle. Even when fewer mammoths belong to the hunted fauna at the caves in the Ach valley, the amount of meat even from these small numbers of individuals was much larger in comparison to reindeer and horse, as indicated by the bone weight. Ribs comparable in size to those of mammoth, cave bear and horse were the most important sources of raw material for the production of bone points. Ivory plays an important role in decorative objects disproportionate to the large amount of bone and antler.

The use of fossil or subfossil ivory by the Gravettians could be due to the ease with which this material could be worked or could point to the rarity of fresh ivory, indicating that ivory was collected just like raw material for lithic production. The possibility that other skeletal elements collected from the carcasses of mammoths which had died naturally were utilised cannot be excluded.

Hunting mammoths bore a high risk for the hunters and requires a greater cooperation of

social units (Oliva 2000). A seasonal aggregation of several social units is very probable in the case of the settlement of the caves in the Ach valley. The presence of similar ivory pendants in all of the caves presupposes a certain reciprocal contact. The contemporary occupation of at least three of the caves has been shown by lithic refittings. However, the inventories from each of these sites still have their own individualities. The archaeological remains suggest seasonal contact of four social units. Evidence of seasonality from the faunal remains indicates settlement between spring and early summer. Perhaps this seasonal settlement focussed on the geographical situation of the Ach valley which was the terminal point of the main mammoth migration west of Ulm. The Ach valley as well as the "Wellheimer Trockental" with the Weinberghöhle are both quite narrow valleys, where certainly only a few mammoths appeared which were relatively easy quarry for the hunters. However if hunting took place in the Danube valley, the hunters would have had to transport their prey over several kilometres. In any case mammoth reached the Danube valley or its side valleys west of Ulm. In view of the geographical and archaeological faunal evidence here mammoth were probably only present in small herds. The larger amount of mammoth remains in the Weinberghöhle may indicate either different focal point of hunting or the presence of larger herds of mammoth downstream in the broader valley of the Danube.

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