The Krems-Wachtberg camp-site: mammoth carcass utilization along the Danube 27,000 years ago

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SUMMARY: During a rescue-excavation undertaken in 1930, 219 identifiable bones from at least eight mammoths, six wolves, five foxes, three wolverines, two reindeer, one red deer, two ibexes, and one musk ox were uncovered. Three AMS-dates from charcoal indicate a ^{14}C-age of 27,7-27,1 ka BP. Mammoth remains dominate the total bone count (141). The presence of four very young calves argues for a proliferating mammoth population. The skeletal representation pattern provides evidence for the transport of all butchering units, at least from the carcasses of the calves, from the death site. Cut marks are concentrated on rib surfaces. Multiple impact marks document the cleaving of massive long bones. Cortical bone fragments from limb bones and ribs were preferably used as raw material for tools.
The skeletal representation of the carnivores, and the cut mark and breakage pattern observed on their bones indicate skinning activities as well as consumption of the meat.

1. Site Location

The Krems-Wachtberg site is situated on an exposed south-easterly slope, at a height of 260 m a.s.l., within a cluster of Aurignacian and Gravettian sites. The topography is characterised by a hilly area with upland ridges with a base altitude of c. 500 m a.s.l. and peaks at c. 1000 m, and valley floors at c. 200-190 m a.s.l. In summer 1930 the chance discovery of bones within the loess sediments was followed by a short rescue excavation. The most striking feature within the small site of c.15 square meters were two ditches c. 30 cm in depths filled with ashy sediments (Einwögerer 2000).

The archaeological inventory comprises the oldest, and up till now the only two zoomorphic burnt clay figurines from Austria. The stone artefact assemblage yields c. 2300 finds including 70 tools and over 500 bladelets. Their morphology shows strong affinities to lithics from the Moravian sites of Dolní Vestonice and Pavlov, which are located approximately 100 km away.

Charcoal was determined as dwarf *Pinus* sp. and *Abies* sp (Cichocki 2000). AMS-dates (27,7–27,1 ka BP), the presence of clay figurines, and the stone tool analysis closely resembles assemblages assigned to the "Pavlovian" culture (for example Klíma 1965, Svoboda 1996).

2. Material

The bone sample comprises c. 340 elements and fragments. The archeological documentation did not include a complete inventory of all recoverable bones (Fladerer 2001, in press). The bone surfaces are corroded and destroyed by root etching, and only the deepest parts of cut marks made by humans are preserved (Fig. 4).

3. Mammoth Body Representation

Proboscidean remains dominate the total bone count (NISP 141, 53% of total NISP) as well as species representation. The skeletal representation shows that elements of the heads, including isolated teeth, represent up to 25% of the carcass remains. An analysis of cranial fragments shows that the age structure predominantly comprises four calves and subadults

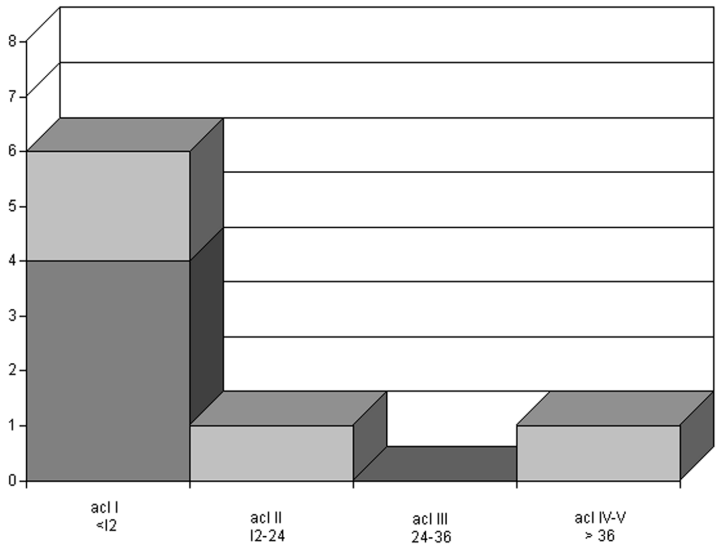

Fig.1 - Age structure of eight mammoths from the Krems Wachtberg, 1930 excavation. Dark shaded area in age class I indicates proportion of nursing calves, younger than two years. Individual count vertically, age classes and year intervals horizontally (after Haynes 1987) (from Fladerer 2001).

(Figs. 1-2). In addition two smaller individuals (older juveniles or young adults (females?)) can be recognized from postcranial material. The diaphysis of a femur of a small subadult individual, and part of an articulated anterior left foot represent individuals 5 and 6. At least one animal older than individual 6 and younger than the adult male is represented by the metapodials. This subadult (individual 7) may have died between 16-26 years. A right tusk (187 cm in length) represents a bull mammoth. Amongst the postcranial material adult individuals could be identified from several rib fragments, and several cortical limb bone fragments. These bones could belong to the putative bull (Fig. 3).

The presence of parts of the head, such as skull and jaw fragments indicate dismemberment of the head during an advanced stage of butchering. In the case of at least one of the calves and the subadult individual 6, heads have been transported to the camp. Foot bones of calves and adult individuals occur in the living-floor assemblage and are evidence of the removal of the feet at the death site (Fig. 3). Carpals, tarsals and phalanges are common elements at regional Upper Paleolithic residential sites (Fladerer 2001).

4. Mammoth Bone Modification and Bone Use

Impact notches on several long bones represent the most striking form of modification at the Krems-Wachtberg site (Fig. 3). Multiple notches can be observed on the 43 cm long proximolateral fragment of a femur. At least eight impacts are aligned on the caudal face of one of the longitudinal fracture edges. Approximately 15 cortical bone fragments attest to the fracturation of long bones and ribs.

The modification of the lower mandible of juvenile mammoth 4 with its missing teeth and mandibular arches is worthy of particular notice. The left alveolus of the third milk molar and the first permanent molar are filled with a grey ashy material. The base of the concreted ashy filling in the cavity has been exposed during excavation or in the course of the following 60 years due to damage of the mandibular bone (Einwögerer 2000). The morphology of the convex base is regular and does not dispay the irregular surface that would usually be observed on the negative of a base of the filling of an alveola. A modification of the jaw by palaeolithic humans is also strong-

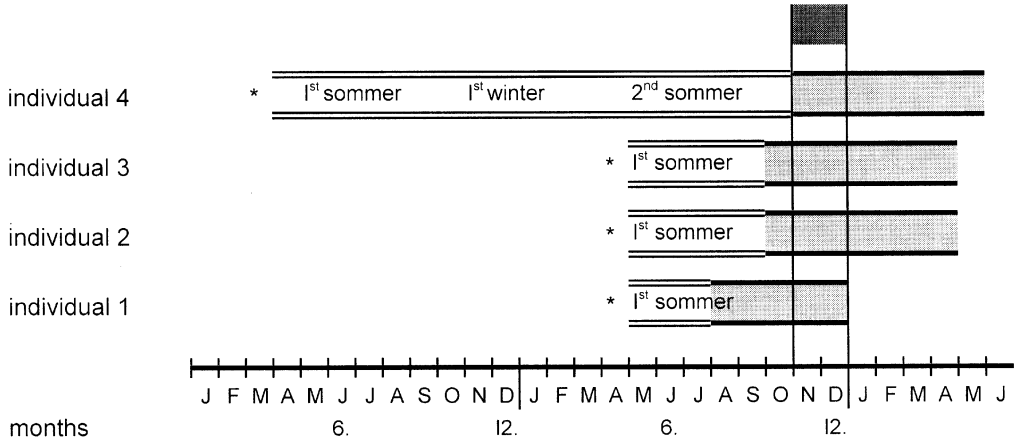

Fig.2 - Individual ages at death of four nursing mammoth calves as suggested by dental development, attrition, and replacement according to Laws (1966; see also Saunders 1992) and G. Craig (in Haynes 1991). Asterisk: hypothetical date of birth. Light shaded area: possible span of individual tooth-age. Short dark bar at the top indicates a possible common death season for all four individuals in the early winter months (November/December). From Fladerer (2001), modified.

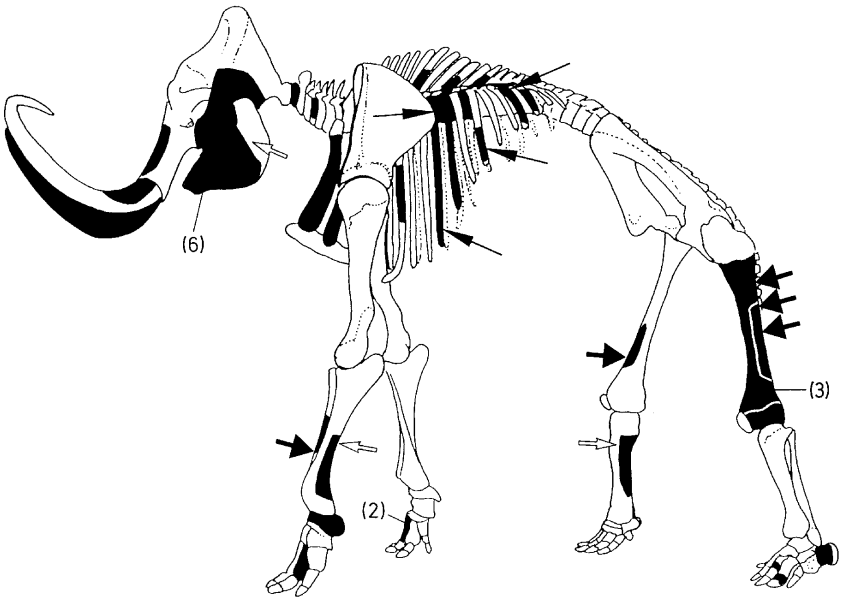

Fig.3 - Body-part representation of mammoths (shaded). Numbers in parentheses indicate the minimum number of individuals counted on each element. Short arrows in bold face: impact marks. Long narrow arrows: cut marks. White arrows: breakage probably resulting from a heavy blow. Outline after Mol & Essen (1987). From Fladerer (2001).

ly suggested due to the lingual edges of the first molar. Both sides show symmetrically destroyed (and later corroded) lingual walls, and the molars were apparently intentionally removed. Some tusk fragments show modifications which are also interpreted as produced by humans (Fladerer 2001).

Cut marks are preserved on six out of a total of 110 specimens, and occur on ribs and cortical bone fragments (Fig. 4; Fladerer 2001).

Bones were utilised and modified as tools:

(1) A compact bone fragment (134 mm long x 12,7 mm thick) was heavily reduced on the medular face by scar-like modifications. It was probably used as a core.

(2) The distal fragment of an anterior rib with spongiosa exposed (maximum width of 57 mm) is comparable to spoon-like tools from Dolní Vestonice II (Klíma 1995). Both cranial and lateral edges, and the terminal-ventral edge are polished by use.

(3) A fragment of a caudal rib (165 mm in length) displays reduced cranial and caudal edges along the dorsal part of its preserved length, and a distinct terminal-ventral smoothing. This find compares with flesher-like or polisher-like implements shown, for example, by Klíma (1995).

(4) A broken juvenile rib (65 mm in thickness) has been smoothed terminally comparable to find no 3.

(5) MK 1047 is a multiple retouched spindle (bobbin)-like tool made from a cortical fragment of a long bone (Fig. 5). The flat fragment (18x5x1,5 cm) is terminated proximally and distally by transverse fracture edges. One side is dominated by a large longitudinal spiral fracture lending a blade like appearance to the find. The opposite side is primarily modified by three impact notches, two of which were directed to the outer side of the bone producing a bifacial modification. At least three additional smaller notches have produced a scalloped edge. Polish within the notches also suggests utilisation of the tool as a flat spindle (bobbin). A few additional fragments, mainly from ribs and thick cortical long-bones, with flake scars, support evidence of the importance of mammoth remains as a main source of raw material for the Pavlovian people.

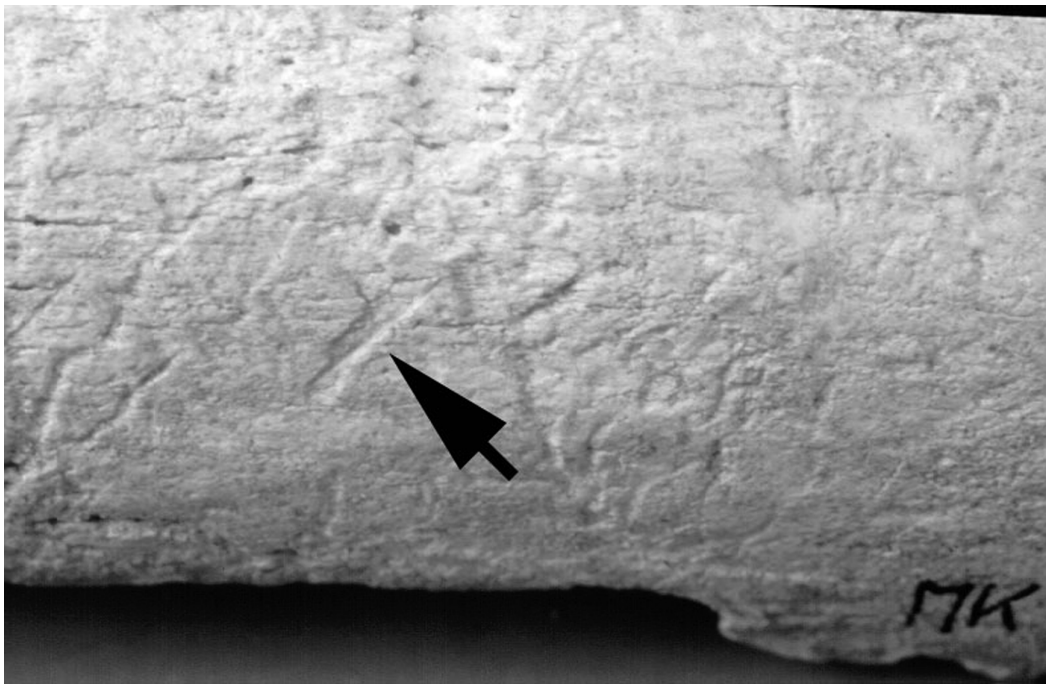

Fig.4 - Cut-mark (lenght = 7 mm) on the external side of a mammoth rib (MK 1063).

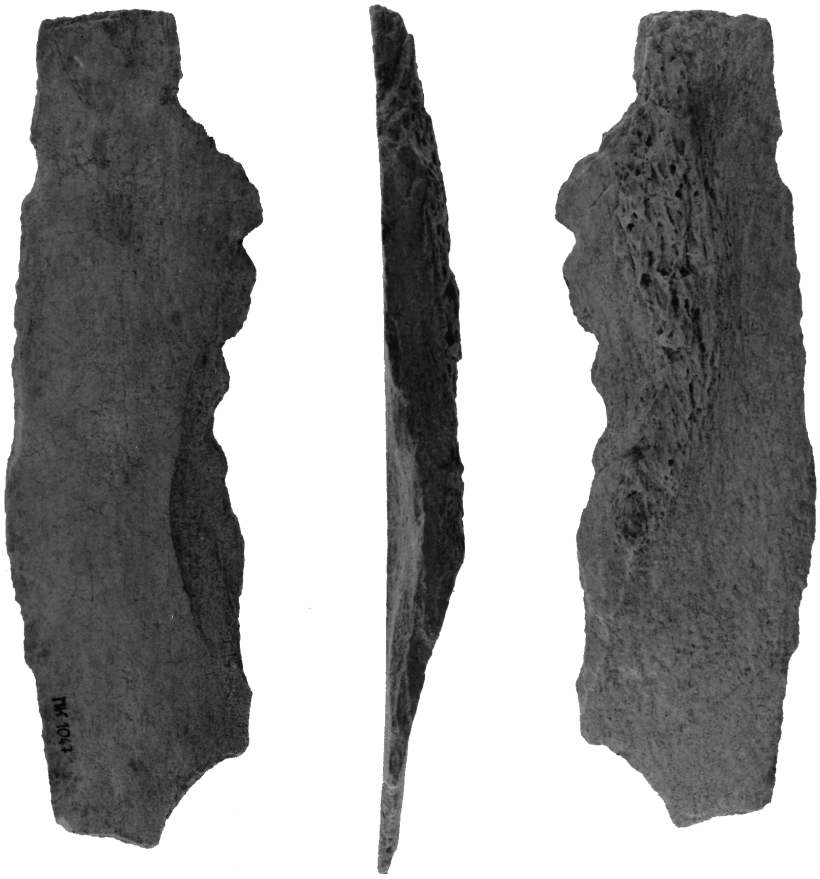

Fig.5 - Krems-Wachtberg, bobbin-like bifacially worked cortical bone tool made from mammoth bone (MK 1047), left: external view, middle: centre, right: internal view.

5. Medium-Sized Herbivores and Carnivores

Rangifer tarandus, Capra ibex, and *Cervus elaphus* which are the most important prey species for the regional middle Upper Palaeolithic (e.g. Musil 1959; Fladerer 1996; West 1997), are represented at Krems-Wachtberg by only a few limb fragments and pieces of antler. The total of 14 carnivore individuals (*Canis lupus*: 6, *Vulpes vulpes*: 4, *Alopex lagopus*: 1, *Gulo gulo*: 3) in the sample represent over 50 % of the total MNI. Articulated bones provide evidence of the deposition of carcass parts enclosed in soft tissues and/or a rapid burial of the finds. This evidence together with impact notches documenting the opening of the medullar cavity along with cut marks produced during filleting can be observed on bones of both herbivores and carnivores. The skeletal representation and modification patterns (in terms of cut marks and impact notches) of the bones of the four species of carnivore do not significantly differ from one another (Fig. 6).

They document stages of carcass processing indicating additional utilisation of the carcasses, probably as a source of food. Some ritual meaning in the abundance of carnivores at Central European Late Paleolithic sites is postulated by

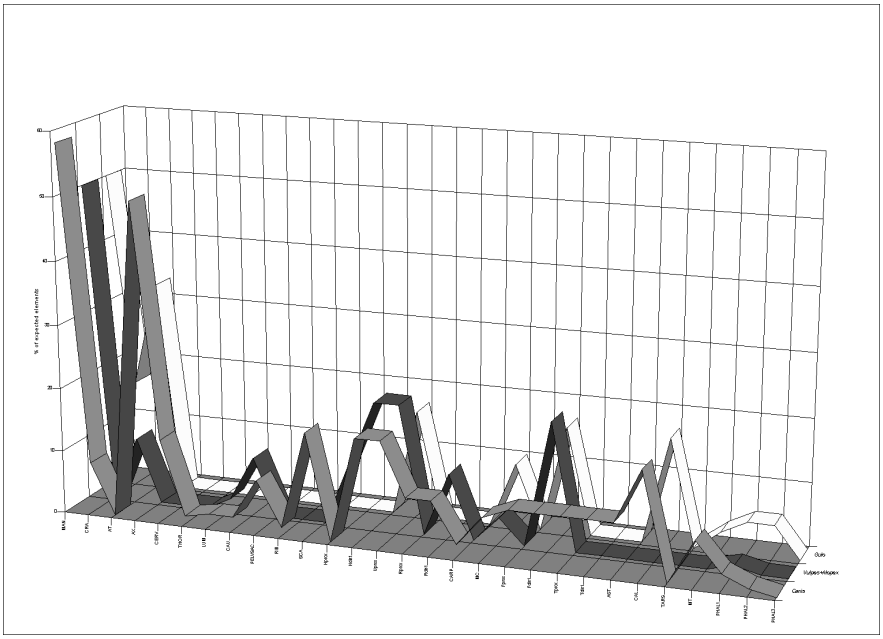

Fig.6 - Percentage of the observed elements of wolves (*Canis lupus*) and foxes (*Vulpes vulpes, Alopex lagopus*) vs. the expected number after the minimum number of individuals (Fladerer 2001).

Soffer (1993). However, since the documentation of the excavated living floor at the Krems-Wachtberg site is very poor, primary location and individual orientation of the bones necessary to test such a hypothesis cannot be reconstructed. Due to the state of preservation and the presence of articulated bones, a rapid natural embedding, or burial by humans, is indicated for the bulk of the faunal remains. Evidence for preserving, collecting and occasionally the selection of bones from anatomically similar positions, along with the burial of carnivore carcass parts, has also been recorded at other Pavlovian residential sites with zoomorphic figurines (e.g. Dolní Vestonice, Absolon 1938).

6. Conclusions

The common occurrence of anatomical units of the carcasses, evidence of significant carnivore activities, and no obvious differences in the weathering stages within the assemblage, suggests that an attritional mammoth death structure from a time-averaged background is unlikely. Evidently, the sample contains selected parts of a local mammoth herd, which is biased towards juvenile individuals. Juvenile mammoths argue against long-term stress within the Middle Danube mammoth population at 27 ka BP since healthy modern elephant populations contain at least c. 30% juvenile and subadult animals (Haynes 1992). In a generalized analogy, the Krems-Wachtberg sample represents at least a group of four nursing females and their calves, which may indicate a herd of up to 20-40 mammoths. The skeletal representation pattern indicate transportation of head, back, and foot parts, as well as long bones and ribs from the death site. Cut marks are concentrated on rib surfaces. Multiple impact notches document the cleaving of massive long bones, sometimes used for bone tool production (Fig. 5).

At least one male may have been part of the mixed herd, or this animal may derive from a separate foraging event. Communal targeting of a complete family group, as suggested by Saunders (1992), seems plausible. The landscape around Krems provided a variety of settings where animals could be ambushed. Several animals may have been ambushed during seasonal migration.

Similar hunting methods were probably used at sites in Southern Moravia (e.g. Klíma 1995, Svoboda 1996), which were partly occupied in the summer. This is indicated by the remains of neonate mammoth calves at several sites in the Middle Danube region. The site of Krems-Wachtberg, was probably occupied during the first months of the winter as deduced from mammoth calf demography (Fig. 2). This interpretation of the season is in accordance with the great volume of ashy deposits within the excavation field.

Furthermore the exploitation of animal fur, and evidence for the extraction of marrow is economically important between autumn and mid-winter when the animals are in a prime condition. In terms of complex subsistence settlement practices, it is suggested that a pattern of communal hunting of mammoth in particular functioned from seasonally aggregating camps during the Upper Palaeolithic period in the Middle Danube region.

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