Mammoth and subsistence practices during the Mid Upper Palaeolithic of Central Europe (Moravia, Czech Republic)

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SUMMARY: Accumulations of mammoth remains, associated with a variety of archaeological artefacts (Gravettian complex), are found in Mid Upper Palaeolithic large open air settlements from Moravia (Czech Republic). These settlements belong to the Würmian Pleniglacial (Isotope Stage 2) before the Last Glacial Maximum. The human influence on the origin of these bone heaps remains unclear. Zooarchaeological analyses have shown that the Milovice G big mammal assemblage is dominated by *Mammuthus primigenius*. An interpretation of the mammoth bone heap setting in this Central European area is proposed comparing it to other sites.

1. Introduction

Large Upper Palaeolithic open air sites have yielded huge accumulations of mammoth bones in Central Europe, in the Moravian area of the Czech Republic, and in southern Poland. These famous settlements belong to the archaeological Gravettian complex (Otte 1981, Kozłowski 1986), formed during the first part of the last Würmian Pleniglacial (beginning of Isotope Stage 2, about 29,000-21,000 BP), before the Last Glacial Maximum. The Czech Republic settlements include Předmostí in Central Moravia, and Dolní Věstonice, Pavlov, and Milovice in South Moravia. Large human settlements were discovered, with rich and varied archaeological assemblages of stone and bone artefacts. Furthermore, collective as well as single burials, and ceramic figurines (mammals and Venuses) were found. These are the oldest figurines known at date.

The way the Palaeolithic people procured mammoth remains is still unclear. The mere association of mammal fossils and archaeological implements does not necessarily mean that these mammals were hunted. The occurrence of Proboscidean bones in an archaeological context can be explained by three hypotheses: hunting, scavenging or bone collecting. In both latter cases, the mammoth death is due to another predator than humans, or to a non-biological factor. Our attempt is to methodologically gather valid zooarchaeological criteria to test these hypotheses (Péan & Patou-Mathis in press), and to apply this analytic reasoning to some Gravettian mammoth sites from Moravia (Péan 2001).

We carried on zooarchaeological studies on the Milovice G big mammal assemblage. The site of Milovice lies on a slope, in a small dry blind valley, in loessic sediments (Oliva 1988). The open and arid palaeoenvironment belongs to the mammoth steppe type (Péan 2001), with local coniferous wooded areas.

A thick Gravettian layer was found in this site (Oliva 1988). The archaeological finds mainly come from sector G: lithic tools, one hearth, one circular structure made of mammoth bones, described as a hut. The lithic implements are mostly small debitage, among which retouched tools are dominated by projectile-shaped elements (gravettes, microgravettes, *fléchettes* and shouldered points). Almost no core was found. The site was interpreted as a place where lithic tools were produced and resharpened. As for worked faunal

hard material, only a few hollowed reindeer antlers, sometimes incised, and perforated fossil molluscs were found. There is no worked ivory or bone.

2. Materials and methods

The Milovice G big mammal assemblage is curated in the Moravské Muzeum of Brno (Czech Republic). Zooarchaeological studies were carried on through palaeontological, palaeoecological and taphonomical analyses. The palethnographic interpretations take into account the other palaeoecological studies, and the archaeological context. Mammoth dental development classes are gathered into 5 groups (according to G. Haynes 1991). Skeletal preservation is described through Percentage of Survival (Ps = elementMAU / maximum cMNI). Data from Milovice G is confronted to available quantitative data concerning mammoth bone heaps from other Gravettian settlements of Moravia.

Complementary palaeoecological data from Milovice G is given by stable isotope analyses (^{13}C, ^{15}N) of bone collagen from mammoth and other mammals (carried in collaboration with H. Bocherens, Université Paris 6).

3. Results and discussion

In Milovice G, among a total fauna of 40 big mammal individuals, 21 mammoth individuals (cMNI) were identified, including the "hut" bones (Péan 2001, Péan & Oliva, in press). Beside the predominating *Mammuthus primigenius* bones, remains of reindeer, horse, wolf, cave lion, wolverine, fox and hare were also found (Fig. 1).

From the age profile, based on dental criteria, the mammoth population is dominated by young individuals, mainly juveniles and subadults (Fig. 2). Mature adults and old individuals are completely missing.

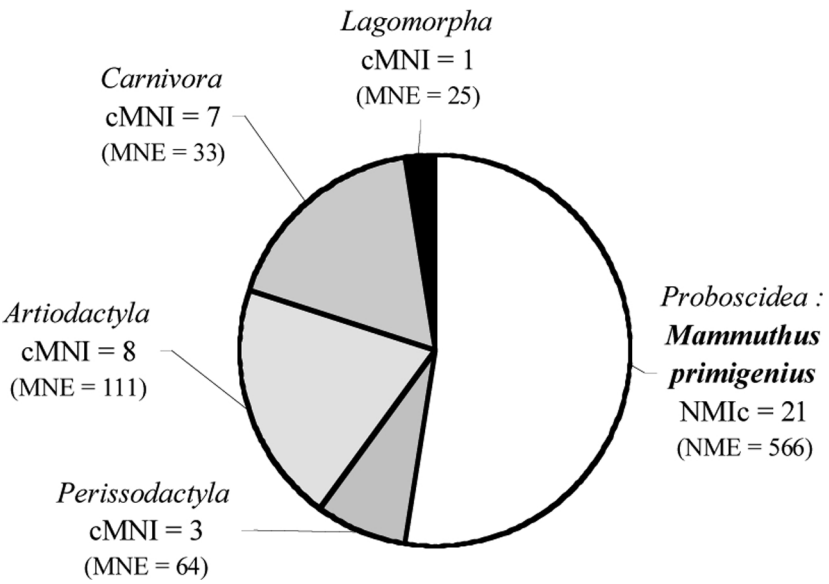

Fig.1 - Large mammals from Milovice G (NME = Minimum Number of anatomical Elements; CMNI = combined Minimum Number of Individuals).

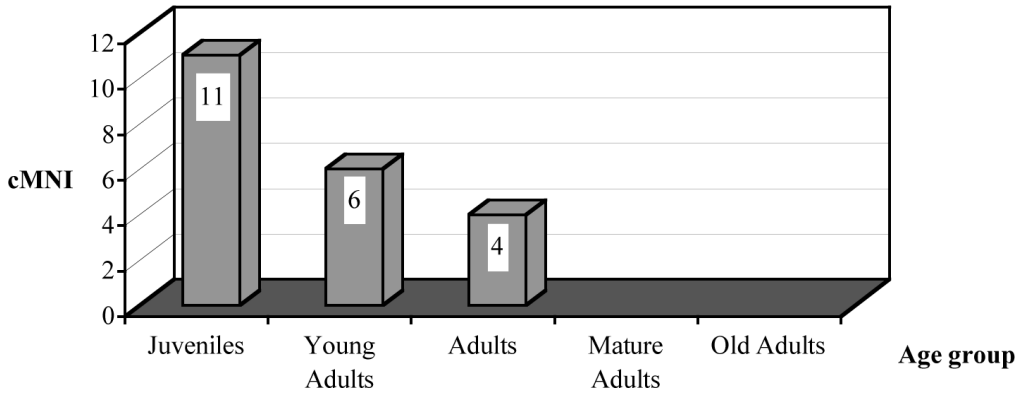

Fig.2 - Milovice G mammoth age profile (from lower molar development stages).

The mammoth bones do not show any anatomical connection. Almost every type of anatomical element was identified among them (except caudal vertebras). There is a low proportion of distal limb bones (especially hand and foot bones), vertebras, and tusks (Fig. 3). Differential preservation may not only explain the reduced proportion of these elements.

Almost all the mammoth remains show a high stage of weathering. Many plant root marks have modified the bone surfaces. Big carnivores activities are limited to gnawing on eight mammoth humerus distal parts. Trampling breakage patterns were noticed.

We interpret the skeletal mammoth preservation as *in situ* deaths of the animals. It is difficult to make a difference between a hunting strategy or a fast access scavenging one. In both cases, it seems that natural traps must have been used in peculiar palaeoenvironmental conditions. Reindeer antler remains and teeth, and a milk tooth of horse refer to a corroborating late spring/early summer season of settlement. At that season, in a Pleniglacial context, yearly mollisol thawing may have created potholes in the clay-loessic sediments of the valley slope where Milovice lies. These indirect observations about seasonality and geomorphological background support the possible role of natural traps in mammoth death.

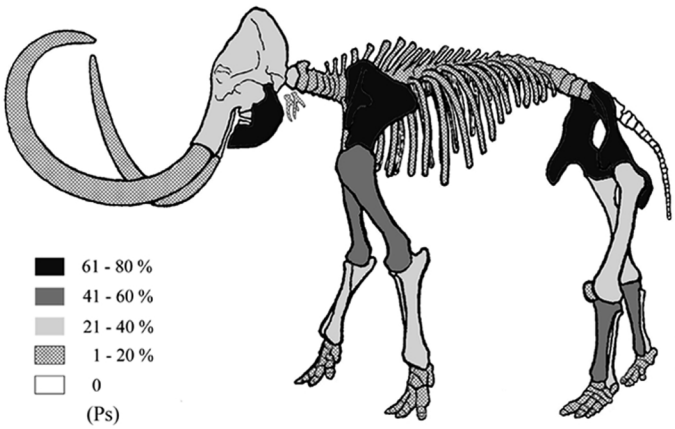

Fig.3 - Milovice G mammoth skeletal preservation (PS=Percentage of Preservation).

The bone accumulating process of the 21 individuals may have occurred during repeated events, as pointed out by the differential collagen preservation, probably in a seasonnal way (Péan, 2001). The catastrophic age profile, without old adults, seems to refer to rather a predator agent than a natural environmental factor.

Butchering activities were done in this site. As shown by comparing with modern African elephant butchery sites (Crader 1983), autopodials and tusks were probably taken away by humans. Tusk ivory was probably worked into tools or art support in other Gravettian sites, such as those located in the vicinity of Milovice (Pavlov and Dolní Věstonice). Observed scratches on cranial, axial and limb bones, are probably due to skinning, dismembering, disarticulation and defleshing activities.

Two other wide complex Gravettian settlements lie in the neighbourhood of Milovice, on the Pavlov hills: Dolní Věstonice (I, II and III) and Pavlov (I, II and III).

The global fauna of Dolní Vûstonice I shows predominant, but not so overwhelming, mammoth remains (Table 1). Inside the upper station of Dolní Věstonice I, which apparently yielded 150 individuals (Musil 1959), the identified specimens of the mammoth bone heap No.III are quite well described (Absolon 1938).

In this Dolní Věstonice I mammoth heap, girdle (scapula, hip bone) and limb elements are predominant, fewer autopodials and axial elements are preserved (Fig. 4). There is no information about rib preservation. We think that this preservation scheme is close to the mammoth skeletal distribution in Milovice G. It can be also interpreted as a butchery site, maybe set on the location where the animals died.

Tab.1 - Predominating big mammals from Dolní Věstonice I (after data from Musil 1994).

Species	%NMI
Mammuthus primigenius	26
Rangifer tarandus	11
Canis lupus	11
Alopex lagopus + Vulpes vulpes	25
Lepus timidus	17
other	10

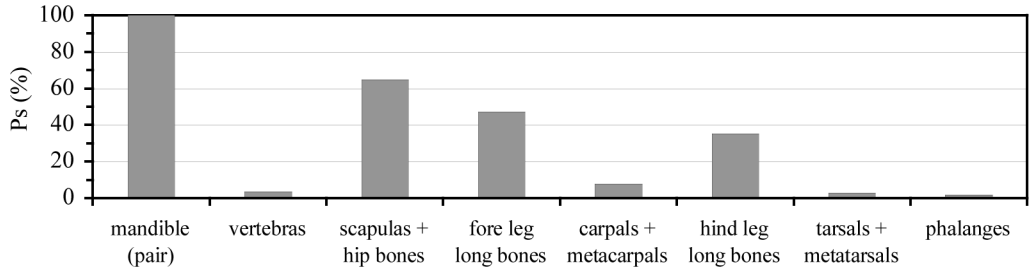

Fig.4 - Mammoth skeletal preservation in the accumulation No.III of Dolní Věstonice I (after counts in Absolon 1938).

In Pavlov I, mammoths are not predominant in every part of the site, and never occur as bone heaps (Musil 1994, 1997). The preservation seems to be linked with the settlement units.

Předmostí is located about 100 km northeastwards, in Central Moravia. The scarce published data about mammoth remains in Předmostí (Kříž 1896) show a better preservation of cranial and limb bones, and also girdle elements. We think that the low proportion of autopodial parts, and an apparent lack of axial parts, would be due to an anthropic activity of butchery.

4. Conclusion

Among the whole Gravettian cultural complex in Central Europe, mammoth bone heaps only appear in the Moravian large open air settlements, and one site of southern Poland, Kraków-Spadzista. In other Gravettian sites of Eastern Central Europe, subsistence is mainly based on reindeer, several other ungulates, and hares (Péan 2001). Mammoth is there an exceptional food procurement, mainly brought to the camp as parts of carcasses, possibly scavenged. Conversely, the Moravian mammoth accumulations, except in Pavlov, look like butchery places on the death location, like in Milovice G. We propose that, in these Moravian sites, Gravettian people may have seasonnally gathered, taking advantage of peculiar environmental marshy conditions, to organize collective mammoth trapping. The long termed settlement type of these Moravian sites, as reinforced by exceptional archaeological items, supports this idea. Further zooarchaeological analyses are needed to validate, or not, this attempted interpretation of the huge accumulations of mammoth remains in the Moravian Gravettian sites.

5. Acknowledgements

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