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Hunters of the giants: Woolly mammoth hunting during the Gravettian in Central Europe



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ABSTRACT

Between 30,000 and 20,000 years ago, Gravettian hunter-gatherers spread across most of Europe. In Central Europe, large and important sites have been discovered, especially those in the Czech Republic at the base of the Pavlovské (Palava) Hills, and in southern Poland. The remains of different mammalian carnivores and herbivores accumulated in bone assemblages at these Gravettian sites. Mammoth bones and teeth are significant components in them. Mammoths certainly played a significant role in the lifetime of the Central European societies of Gravettian hunter-gatherers. These Pleistocene giants provided not only food, but also raw materials for tools and the production of ornaments. The presence of the remains of many mammoths shows that the Gravettian people were specialized in the hunting of these animals.

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1. Introduction

Between 30,000 and 20,000 years ago, rapid climatic changes occurred as the Scandinavian ice sheet expanded. Not only did palaeoenvironments change, but human societies also transformed themselves, which resulted in the formation of the Gravettian technocomplex (Svoboda, 2007; Kozłowski, 2015). Throughout the next millennia, Gravettian hunter-gatherers occupied a large part of Europe, in an area covering several million square kilometres, stretching from the Atlantic Ocean to the Russian plains, from the Pyrenees to the Ural Mountains. The most distinctive features of the Gravettian are characteristic stone tools (backed bladelets and shouldered points) and female figurines, often called 'Palaeolithic Venuses'.

Generally, the Gravettian technocomplex can be divided into early (Pavlovian) and later (Willendorf-Kostienkian/Late Gravettian) stages. The most famous early stage sites in Central Europe are located at the base of the Pavlovské (Palava) Hills and at Central Moravia (the Czech Republic) (Svoboda et al., 2002; Oliva, 2007). They are Pavlov I, Dolní Věstonice I, Dolní Věstonice II, and Předmosti. During successive millennia, hunter-gatherers moved into new places of occupation, such as the Vah River valley

(Slovakia) and south Poland (Kraków region). The Willendorf-Kostienkian stage is best known from sites such as Petřkovice and Milovice I in the Czech Republic, several others in the Moravian area of Slovakia, and Kraków Spadzista in Poland (Musil, 2003).

In this article, we present the results of the studies of mammal-bone assemblages recovered from the Central European sites (Czech Republic and Poland) and dating to different phases of the Gravettian. However, we focus on mammoth remains, which are sometimes abundant. We intend to show how important these Pleistocene giants were to Gravettian hunter-gatherers societies.

2. Materials and methods

The studied animal remains are from excavations conducted at a few Gravettian sites located in South Moravia in the Czech Republic and in South Poland. The mammoth remains from Pavlov I and II and Dolní Věstonice I were studied in the Moravian Museum (*Moravské zemské muzeum*) in Budisov where they are stored. Paleontological materials stored from Dolní Věstonice II and Pavlov VI were studied in the Paleolithic and Paleoethnology Research Center in Dolní Věstonice (Institute of Archeology Brno, Academy of Sciences of the Czech Republic). Osteological materials discovered during excavations at Jaksice II and Kraków Spadzista sites are in a collection at the Institute of Systematics and Evolution of the Polish Academy of Sciences, in Kraków.

Mammoth bones and teeth were identified based on the comparative collections in the Institute of Systematics and

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Evolution of Animals, Polish Academy of Sciences in Kraków, and the papers of Olsen (1972) and Ziegler (2001).

The frequencies of skeletal elements and animal individuals from the studied sites were measured in terms of the Number of Identified Specimens (NISP) and Minimum Number of Individuals (MNI). NISP is defined and used as the number of specimens (bones, teeth and fragments thereof) identified to the taxon they represent. "Identified to the taxon" also means they were also ascribed to the skeletal element and taxonomic order. MNI was estimated by sorting – but not matching – left and right elements (Klein and Cruz-Uribe, 1984; Lyman, 1994).

All bones were examined in great detail to document all possible modifications, such as traces from human or animal activities and the abiotic environment. The bones were examined to identify cut marks using criteria established by several authors (e.g. Shipman and Rose, 1983; Olsen and Shipman, 1988; Lyman, 1994). Amongst others, there are V-shaped cross-sections of slice marks and their anatomical location (characteristic for cut marks), which allowed us to distinguish cut marks from trampling marks (Olsen and Shipman, 1988). The mammal bones were carefully inspected using a strong directional light to find slice marks. When desirable, each mark was examined under low-power magnification and the majority of them were photographed by a digital camera.

Traces of burning were recorded on the bone material from Gravettian open-air sites. People may burn animal bones intentionally, using them as fuel for cooking, or roasting them when preparing food, and also may burn them during refuse removal or through unintentional exposure to fires (Stiner et al., 1995; Bennet, 1999; Théry-Parisot, 2002; Villa et al., 2002; Schiegl et al., 2003). A colour-based scheme (ranging from natural hue through black to white) is the most commonly used method for the identification of burnt bones (e.g. Buikstra and Swegle, 1989; Lyman, 1994; Shahack-Gross et al., 1997). Other criteria have been applied to confirm the burning of remains (Shipman et al., 1984; Stiner et al., 1995), but the colour of the bones was the only feature we used to distinguish burnt bones in the studied materials.

Mammal bones from the studied sites were also examined to find carnivore modifications. Carnivores are important taphonomic agents affecting bone preservation, potentially influencing bone survival and representation in assemblages. Characteristic types of damage caused by carnivores have been described by Sutcliffe (1970), Haynes (1980, 1983), Binford (1981), and Lyman (1994), amongst others, who noted different classes of modification (punctures, pits, scores and furrows) caused by carnivore teeth.

3. Results

3.1. Skeletal representation of mammals on Central European Gravettian sites

In South Moravia (Czech Republic), near the villages of Dolní Věstonice and Pavlov is a series of Gravettian sites. The sites from east to west are Pavlov VI, Pavlov II and I, Dolní Věstonice I, and Dolní Věstonice II, which is the most western location. This chain of sites extends about 2.5 km along the northern and northeastern slopes of the Pavlovské Hills, 20–70 m above the Dyje River floodplain (Fig. 1).

3.1.1. Pavlov VI

This is the easternmost site in the series located between Pavlov and Dolní Věstonice villages. The site was discovered in 2007 and was excavated by Prof. J. Svoboda in salvage excavations. The site was not large, being approximately 5 m in diameter. It represents a singular settlement unit, a short-term (two–three months) camp-site (Svoboda et al., 2009; Wojtal et al., 2011).

The identifiable bones and teeth (NISP = 384) belong to nine late Pleistocene species, and they are dominated by woolly mammoths (Table 1). On this site, 196 bone and teeth fragments of this species were found, belonging to all parts of the mammoth skeleton, both cranial and postcranial. One complete upper tooth joined to the rest of the maxillary bones was recovered. We could identify 57 teeth fragments (lamella fragments). During excavations, a well-preserved tusk was found, but it was not possible to remove it intact.

The remains of two mammoths were found. One of them was an adult individual, which is confirmed mainly by the similarly large size of the bones and the large size of the tusk. The second individual was identified based on a fragment of a second milk molar. Also found were 371 bone fragments. These lacked the characteristic landmarks but the thickness of the cortical parts suggests they could be mammoth bone fragments.

3.1.2. Pavlov II

The excavations at the site, conducted in 1966 and 1967 by Klíma (1976), yielded 968 mammalian remains (Table 2). The woolly mammoth remains are the most numerous in the osteological material; however, they belong to only one individual. Bones from different parts of the mammoth skeleton were preserved – vertebrae, long limb bones, carpals, tarsal bones, etc. The mammoth bones were mostly fragmented and many of the finds (NISP = 124) could be identified as belonging to a mammoth only based on their dimensions and the thickness of the bone cortical part.

The remains of other species were not so well represented but the number of individuals is higher: e.g., hare (NISP = 42, MNI = 4), horse (NISP = 88, MNI = 3), wolf (NISP = 68, MNI = 3). Unfortunately, most bones are covered by calcitic precipitations and their surfaces are damaged by root etching, making it impossible to detect signs of human or carnivore activity.

3.1.3. Pavlov I Southeast

This site is located on a relatively gentle slope at 190–200 m asl, sloping towards one of the small side valleys and towards the Dyje River to the north. An active creek is on its eastern boundary and the effect of stream erosion must be considered in the reconstructions of the site's complex geological background (Svoboda, 2005).

The site was excavated from 1952 to 1971 by Bohuslav Klíma in several parts: the northwest part (1956 and 1957–1958), southeast section (1952–1956 and 1970–1971), and the middle part (excavated during the 1960s) (Klíma, 2005). We were able to study paleontological materials collected during the 1952–1956 excavations in the southeast section, a total of 46,466 mammalian remains. We could identify 26,797 bones and teeth, which belong to 16 taxa (Table 3). The remains of small and medium mammals clearly dominate. Woolly mammoth teeth and bones were not so numerous and it was possible to identify 2264 fragments. There were also 616 bone fragments that due to their dimensions and the thickness of the cortical part of the bone suggest that they belong to mammoths.

The remains of mammoths from Pavlov I Southeast belong to a minimum of seven individuals, based on the number of occipital condyles. All the parts of a woolly mammoth skeleton were present on the site, from the skull, vertebral column, limbs, and rib cage, and even very small bones such as hyoid bones and sesamoids. Also recorded were small fragments of mammoth tusks. It should be noted that at this site five first milk teeth and five first milk tusks were found. One M1 shows no sign of wear, which suggests it belonged to a very young animal, under 6 months old.

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