



# Mammoth hunting – Impact traces on backed implements from a mammoth bone accumulation at Kraków Spadzista (southern Poland)



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## ABSTRACT

This article presents the results of use-wear analysis of the backed implements (shouldered points and backed blades) discovered at Kraków Spadzista, trench B + B1. Of the 197 examined tools, 113 specimens (55%) bear traces of use. In this group, 55 artefacts show a complete set of clear, characteristic impact traces and could be interpreted as the flint parts of thrown weapons. They were used in mammoth hunting at the Kraków Spadzista site 24 thousand years ago. The hafting method can be identified on the basis of the direction of linear traces and impact negatives. Most of these artefacts were placed at the top of wooden or bone shaft. Only single specimens were attached laterally.

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## 1. Introduction

The Kraków Spadzista site is one of the most famous Gravettian sites in Central Europe (Fig. 1). The archaeological, paleontological and geological studies allow this site to be described as a mammoth hunters' camp site (e.g. Kozłowski et al., 1974; Sobczyk, 1995; Wilczyński et al., 2012; Wojtal and Sobczyk, 2005). It is situated on a rocky promontory on the northern slope of Blessed Bronisława Hill – at the eastern part of the Tenczynski Hump. The site is located on a triangular plateau and is bounded by a rocky cliff to the north and on the east and west by the Pleistocene gorges (Kozłowski et al., 1974; Wilczyński et al., 2012). Dry and free of any sources of water, the plateau is raised about 50 m above the bed of the Rudawa River, which is a left tributary of the Vistula River. On the basis of the techno-typological analysis of the stone assemblages and the taphonomical analysis of animal remains, it is possible to distinguish different zones of the site: zone I – the camp area (trench C, C2 and D), zone II – stone tools workshop (trench E and F), and zone III – mammoth bone accumulation (trench B + B1)

(Wilczyński et al., 2012). The radiocarbon dates, the state of preservation of the mammoth remains and their isotopic analyses show that the accumulation of mammoth bones took place in a rather short period of time, and they were quickly covered by sediments (Pryor et al., 2013; Wilczyński et al., 2012; Wojtal and Sobczyk, 2003, 2005).

In the relatively small trench B + B1, the Gravettian occupation is evidenced by the huge accumulation of mammoth bones (Fig. 2; Table 1). The bones are accompanied by a specific stone assemblage which includes a high ratio of retouched tools – especially shouldered points and backed blades (Wilczyński et al., 2012). Large accumulations of mammoths' bones known from Upper Palaeolithic sites in Central Europe have a long history of research and interpretations of their origin. They were interpreted as results of specialized mammoth hunting, the gathering of mammoth bones, or scavenging from sites where mammoths had died naturally, secondarily exploited by Gravettian hunter-gatherers (Absolon, 1945; Haynes, 1991; Klima, 1963, 1990; Kozłowski et al., 1974; Musil, 1997; Oliva, 2009; Soffer, 1985, 1993; Svoboda, 2001; Svoboda et al., 2005; Wankel, 1890). In recent times, the human hunting of mammoths in the Palaeolithic (at least on some sites) has become increasingly acceptable (Germonpré et al., 2008; Brugère and Fontana, 2009; Wilczyński et al., 2012). The first hypothesis that may explain the origin of the huge accumulations of

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## Kraków Spadzista

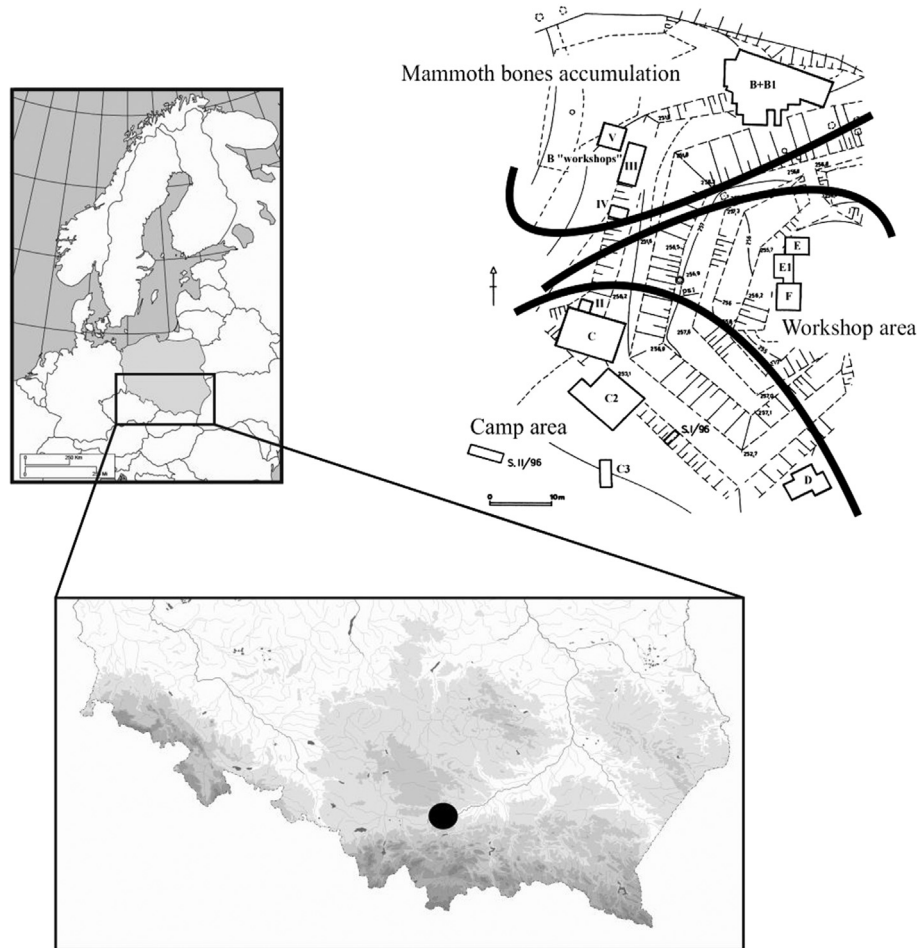


Fig. 1. Location of the Kraków Spadzista site.

mammoth bones at the Kraków Spadzista site was that of hunting in order to acquire constructional elements to erect dwelling structures and food (Kozłowski et al., 1974). Later this hypothesis was rejected in favour of environmental conditions and/or hunters activity – the site was the place for the processing of carcasses of animals that died from natural causes and perhaps, in some cases, hunted (Sobczyk, 1995; Wojtal and Sobczyk, 2005). However, recent studies indicate that at Kraków Spadzista the mammoth bone accumulations could be more likely associated with human hunting activity (Kalicki et al., 2007; Wilczyński et al., 2012). At Kraków Spadzista the active hunting of mammoths could be indicated by the distribution and density of bone material in trench B + B1, as well as the presence of numerous flint tools with the morphological features of hunting weapons – shouldered points and backed blades. Unfortunately, this hypothesis cannot be clearly identified on the basis of faunal remains from Kraków Spadzista, because only single filleting marks were identified on the mammoths' bones – no lithic or osseous tools embedded in mammoth bones such as those on the Yana site were found (Wojtal and Sobczyk, 2005; Nikolskiy and Pitulko, 2013). At the same time the lack of or the low number of cut marks on mammoth bones discovered at Kraków Spadzista does not completely contradict the hypothesis about mammoth killing and butchering at the site, which is indicated by current research on the modern mass killing

of elephants (Haynes, 1987; Haynes and Krasinski, 2010; Haynes and Klimowicz, 2014). At Upper Palaeolithic sites of Europe – especially at Gravettian and Epigravettian, several mammoth bone accumulations have been discovered. They are known mainly from Central and Eastern Europe from such localities as Dolní Věstonice I and II, Milovice I, Předmostí I, Kraków Spadzista, Yudinovo and Gontsy (Absolon, 1945; Germonpré et al., 2008; Iakovleva et al., 2012; Klima, 1963, 1990; Musil, 1997; Oliva, 2009; Svoboda, 2001; Wankel, 1890). In addition, on North American sites the remains of large mammals were discovered together with projectiles. The presence on Paleoindian (Clovis culture) sites of the remains of mammoths and mastodons suggest hunting specialization during this period. It is noteworthy that no other taxon is presented on as many sites or is represented by as many individuals (Waguespack and Surovell, 2003; Surovell and Waguespack, 2008). Among proboscidean remains of numerous bifacial points were discovered which lead to the conclusion that these bone accumulations were an effect of human hunting (Frison, 1987; Frison and Todd, 1986; Frison, 1989; Haynes and Hutson, 2013; Johnson, 2007). The discovery of projectiles together with cut marks on remains may indicate that humans killed mammoths (Haynes, 1999). Nevertheless, the representation of proboscidean specimens on Paleoindian sites is low in comparison with other Gravettian sites from Europe – the average number of mammoth is three per assemblage,

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