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Large mammals affected by hominins: Paleogeography of butchering for the European Early and Middle Pleistocene

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ABSTRACT

In the last few decades, some progress has been made towards a synthesis of the data on the presence of early hominins in Europe and their dispersals across the continent in the Early and Middle Pleistocene. The sites that have been documented present various datasets, including hominin fossils, large and small mammal remains, and archeological artifacts.

In this paper, the main focus is on sites where clear evidence exists of the processing of large mammals by hominins, in the form of cut marks, percussion marks, and others. In this regard, the taxonomic diversity of the mammals is considered alongside the type of hominin activity. All these sites serve as background for the recent discovery of the earliest (MIS 11 or 9), and indeed the only Polish, example of Middle Pleistocene human butchering activity (at the Bełchatów site).

The study revealed that the filleting of meat, as found in Bełchatów, was also the means of meat processing employed on the oldest site of those with evidence of butchery, which is located in fact in the transition zone of Europe and Asia. This means that processing, even in its simplest forms, could have been a strong influence on adoption of meat eating among members of the *Homo* genus, as has been discussed recently. This emphasizes the significance of human choice, and seems to have occurred regardless of the geographical setting of human activity.

This paper also presents a paleogeographic synthesis of butchering for the European Early and Middle Pleistocene and summarizes our current understanding of food processing by hominins, by scrutinizing the data on large mammals affected by such processes.

1. Introduction

The evidence of butchery activity in assemblages is best shown by the presence of cut marks, which have been the subject of taphonomic studies (Pawłowska, 2010). Butchery procedures are older (more than 3 Ma) than the Pleistocene and are known from the African sites. Stone-tool-inflicted cut marks for flesh removal have been found on ungulate bones from Dikika (Ethiopia) that are older than 3.39 Ma, as has been recently discussed (McPherron et al., 2010). This behavior is attributed to *Australopithecus afarensis*. Additionally, more data comes from the combined Gona/Bouri (Ethiopia) sample located close to Dikika site (Domínguez-Rodrigo et al., 2005). There, hominids exploited a range of taxa as food resources, from bovids to equids. Butchery encompassed carcass evisceration, filleting, and possibly skinning and dismemberment, and was carried out with stone tools.

The first hominin occupation of Eurasia occurred in the Early Pleistocene more than 1.8 Ma ago (de Castro and Martinón-Torres, 2013). Fossils recognized as *Homo* are attested in Dmanisi (1.8 Ma), Barranco Leon D (1.4–1.2 Ma) and Sierra de Atapuerca sites in Spain, namely Sima del Elefante-TE9 (1.2–1.1) and Gran Dolina-TD6 sites (0.9–0.78). The majority of these sites are pre-Jaramillo sites. The Jaramillo paleomagnetic event (1.07–0.98 Ma) is the distinctive chronostratigraphic marker for the Early Pleistocene, while the Matuyama–Brunhes Chron boundary (0.78 Ma, MIS 19) serves as the division between the Early and Middle Pleistocene (Bellucci et al., 2015; Markova and Vislobokova, 2016). Thus, this latter paleomagnetic event, internationally accepted in the stratigraphic scales, serves here as the boundary between the Early and Middle Pleistocene.

Among their faunal remains, these sites have yielded evidence of butchery activities. This means that processing, even in its simplest forms, may have been a strong influence on the adoption of meat eating among early members of the *Homo* genus (Zink and

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Table 1
Early Pleistocene sites with evidence of butchery of large mammals. Abbreviations: Ar (Argon), BS (Biostratigraphy), CN (Cosmogenic nuclides), ESR (Electron Spin Resonance), OSL (optically stimulated luminescence), PM (Paleomagnetism), U (Uranium Series), Ma (million years), N (number of specimens).

Site name	Country	Dates	Dating methods	(At least) butchered taxon	Hominins referred at site	Sources
Dmanisi	Georgia	1.8–1.7 Ma	Ar, BS, ESR	Herbivore (e.g., *Bison (Eobison) georgicus*)	*Homo georgicus*	Lordkipanidze et al., 2007; Mgeladze et al., 2010; Mgeladze et al., 2011
Venta Micena	Spain	1.6–1.4 Ma	PM, BS, U, ESR	mammals	–	Gibert and Jiménez, 1991; Scott et al., 2007; Duval et al., 2011; Ros-Montoya et al., 2012
Barranco Leon	Spain	1.4–1.2 Ma	PM,BS, ESR, U	Herbivore	–	Garcia et al., 2011; Moyano et al., 2011
Sima del Elefante	Spain	1.2–1.1 Ma	PM, CN, BS	(N = 8): large bovid (*Bison* sp.), cervid (*Cervus elaphus*); Equidae	*Homo antecessor*	Carbonell et al., 2008; Huguet et al., 2013; Huguet et al., 2015
Fuente Nueva-3	Spain	1.2 Ma	PM,BS, ESR, U	Herbivore; large sized herbivores class, the horse (*Equus altidens*, N = 14)	–	Garcia et al., 2011; Moyano et al., 2011; Espigares et al., 2013
Untermassfeld	Germany	*c.* 1.07–1.05 Ma	PM, BS	(N = 38, 9.1%): Bison (*Bison menneri*), hundsheim rhinoceros (*Stephanorhinus hundsheimensis*), *Eucladoceros giulii*, Cervidae, ancient fallow deer (*Cervus s.l. nestii vallonnetensis*), hippopotamus (*Hippopotamus*), medium-large sized mammal	–	Landeck, 2010; Kierdorf et al., 2012; Garcia et al., 2013; Landeck and Garriga, 2016
Gran Dolina TD3-TD4	Spain	1 Ma		Herbivore	–	Garcia et al., 2011
Gran Dolina TD5	Spain	1–0.94 Ma		Herbivore	–	Garcia et al., 2011
Happisburgh 3	England	0.99–0.78 Ma	PM, BS	Bison	*Homo antecessor*	Parfitt, 2005; Ashton et al., 2014
Vallparadís	Spain	0.98 Ma	BS, OSL, U, ESR	(N = 12): Hippopotamidae, Rhinocerotidae	–	Garcia et al., 2011; Garcia et al., 2013
Gran Dolina TD6	Spain	0.9–0.78 Ma		Herbivore	*Homo antecessor*	Garcia et al., 2011
Arago	France	0.9–0.69 Ma		Bear, argali	*Homo heidelbergensis*	Rivals et al., 2004, 2006; Armand, 2006; Barsky and de Lumley, 2010

Lieberman, 2016). Zink and Lieberman (2016) tested how Lower Palaeolithic processing technologies affected chewing force production and efficacy in humans consuming meat. They found that hominins who simply sliced meat would experience improvements in their ability to chew it, reducing the number of chews and the masticatory force required.

Recently obtained results from Bełchatów (MIS 11 or MIS 9) in Poland show well-preserved cut marks on a mammoth costa, which constitute evidence of filleting. The aim of this paper is to place this earliest evidence of butchering activity in Poland in a broader context by describing European Early and Middle Pleistocene sites where direct evidence exists in regards to the butchery of large mammals.

2. The oldest European evidence of butchery

The presence of butchery in Europe during the Early and Middle Pleistocene is documented at various sites, though it is not possible to mention them all here, given the scope of this synthesis. This is due to several factors. First, the data are not always available in the literature and the degree of detail given in the descriptions of the cut marks is not always adequate where these data are available. There are fundamental discrepancies between the descriptions; some involve detailed analyses of cut marks using scanning electron microscopy (SEM), while others offer interpretations of the data on the basis of only general information concerning the presence of cut marks in mammal specimens. This problem also applies to insufficient basic information on the identification of species and of elements on which the cut marks were found. The focus was thus on selected sites, mainly those stratigraphically corresponding to Bełchatów and, on the taxonomic groups affected by butchery. The other site for which it was possible to list data shown in Table 1. It should be stressed, however, that more localities were scrutinized in preparing the dataset. As a result, there was no data available to suggest the presence of cut marks on large mammal species from these sites (*c.* 30% more than presented here). However, the identification of marks as cut marks that can actually be attributed to human activity is not always easy or ever possible. This is related to the state of the specimens' surface preservation and the methods applied, as well as other factors. Also, the most important issue is that butchery of the carcasses of large mammals—for example, of elephants—does not always leaves marks on the cortical surfaces of the bones, due to the thickness of the cartilage (1–3 mm) and periosteum on the bones; this also depends on the type and quality of the tools used, as has recently been demonstrated by Haynes and Klimowicz (2015), who explain the processing of mammoth carcasses through the example of a similar process performed on modern elephant carcasses by human hunters.

The synthesis of large mammal butchery is given with the data used for the 35 sites in Western and Central Europe for which direct evidence exist in this regards.

2.1. Early Pleistocene sites (*c.* 1.8–0.78 Ma)

Direct evidence of human activity in the form of cut marks on large mammal specimens exists at 12 sites dated to the Early Pleistocene (Fig. 1; Table 1). The majority of these sites are located in Spain (n = 5–8, depending on how the Gran Dolina site is counted), with one each in Georgia, Germany, England, and France. From the stratigraphic point of view, 6 are pre-Jaramillo sites (Dmanisi, Venta Micena, Barranco Leon, Sima del Elefante, Fuente

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