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The larger mammal fauna from the Lower Paleolithic Schöningen Spear site and its contribution to hominin subsistence



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ABSTRACT

The locality Schöningen (Germany) is an important source of knowledge about Lower Paleolithic hominin subsistence. The locality includes a series of sites dated to the late Middle Pleistocene with a Holsteinian (MIS 11) and Reinsdorf Interglacial (MIS 9) age. One of the youngest sites is Schöningen 13 II-4, the Spear Horizon site also known as the Horse Butchery site. The organic remains excavated here are exceptionally well-preserved as they were embedded in anaerobic, waterlogged sediments in an area where the groundwater is rich in calcium carbonate. The fossil assemblage is ideal for the study of patterns in hominin interference with the mammalian species encountered at the site.

The vertebrate record is extensive and very diverse. The fossil larger carnivore guild of the Spear Horizon faunal assemblage includes saber-toothed cat, fox, and wolf. Herbivores are represented by an elephant species, two equid species, two rhinoceros species, two cervid species, and two large bovid species.

Evidence of hominin interference presents itself as either marks on skeletal remains related to the use of bones as knapping tools or hammers, or as marks that indicate butchering activities such as skinning, dismembering, defleshing, filleting, and marrow extraction. The humerus of the saber-toothed cat clearly shows that the bone has been used as a knapping tool. The fossil remains of the other larger carnivores do not show any signs of hominin interference or exploitation. This also applies to the limited number of elephant and rhinoceros remains found at the site. The large horse *Equus mosbachensis* dominates the larger mammal record and played a major role in hominin subsistence. Marks on the horse bones indicate that a large number of carcasses have been butchered. Traces on the fossil remains of both red deer (*Cervus elaphus*) and the large bovids also indicate exploitation by Lower Paleolithic hominins.

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1. Introduction

An increasing number of Paleolithic sites with a rather well-preserved archaeozoological record emphasize the importance of mammalian species in hominin subsistence strategies. The Middle Paleolithic site Biache-St. Vaast (France; stratigraphically correlated with Marine Isotope Stage [MIS] 7), for example, yielded a large amount of butchered carcasses of aurochs (*Bos primigenius*), brown bear (*Ursus arctos*), and narrow-nosed rhinoceros (*Stephanorhinus hemitoechus*; [Auguste, 1995](#); [Dusseldorp, 2012](#)), whereas fossil material from other Middle Paleolithic sites show abundant butchering marks (e.g. cut marks, filleting marks, impact notches) that indicate hominin exploitation of a variety of both large and smaller mammals ([Brasser, 2012](#); [Gaudzinski-Windheuser and](#)

[Kindler, 2012](#); [Blasco et al., 2013](#)). The number of Lower Paleolithic sites with clear evidence of hominin modification of skeletal material, however, is limited. One of the few and most important Lower Paleolithic localities is the early Middle Pleistocene site Boxgrove (UK; MIS 13), which yielded well-preserved fossil material of butchered carcasses of different larger mammal species (*Ursus deningeri*, *Cervus elaphus*, *Megaloceros* sp., *Equus ferus*, *Stephanorhinus hundsheimensis*, and *Bison* sp.; [Parfitt and Roberts, 1999](#)).

The Schöningen sites have proved to be highly valuable sources of knowledge about Lower Paleolithic hominin subsistence in Central Europe. The locality includes a series of sites dated to the late Middle Pleistocene with a Holsteinian (MIS 11) and Reinsdorf Interglacial (MIS 9) age. One of the youngest sites is Schöningen 13 II-4, the Spear Horizon site, also known as the Horse Butchery site, where the famous wooden spears have been discovered among a large amount of skeletal remains of butchered horses ([Thieme,](#)

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1997). The Spear Horizon also yielded a large amount of mammalian fossils, which, among other organic fossil remains, were exceptionally well-preserved within anaerobic, waterlogged sediments located in an area where the groundwater is very rich in calcium carbonate (Lang et al., 2012; Serangeli et al., 2012). Due to the good preservation and the large amount of mammalian remains, the fossil assemblage is ideal for the study of patterns in hominin interference with mammalian species. So far, the mammalian fauna from the Spear Horizon site has not been described in detail, except for thorough descriptions of a skull fragment of a red fox (*Vulpes vulpes*; Van Kolfschoten, 2003), a humerus of a saber-toothed cat *Homotherium latidens* (Serangeli et al., 2015), and the fossil remains of the large bovids *B. primigenius* and *Bison priscus* (Van Kolfschoten et al., 2012). In a number of publications, faunal lists were presented together with some general information (Van Kolfschoten, 2012, 2014). Voormolen investigated hominin impact on the mammalian fauna of the Spear Horizon site and studied about one-third of the total assemblage (Voormolen, 2008).

In this paper, more information on the entire larger mammal assemblage encountered at Schöningen 13 II-4 is presented, including data on the size of some of the taxa and several pathological features. The taphonomical analysis was built upon the work of Voormolen (2008), while using his criteria. The indications of hominin interference related to subsistence strategies, presented in this paper, are based on the entire fossil assemblage from the Spear Horizon site (including the collection studied by Voormolen [2008]), with the exception of a restricted number of specimens that were not available for investigation.

1.1. The Schöningen 13 II-4 Spear Horizon

The Schöningen 13 II-4 site was discovered in the Quaternary deposits exposed in the open-cast lignite mine east of Schöningen (Germany; 52°08'N/10°57'E), a small town located in northern Germany between Hannover and Berlin (Fig. 1). The late Quaternary deposits were removed in order to access the underlying Tertiary lignite. This process resulted in the discovery of a large number of archaeological sites (Thieme and Maier, 1995), including several Paleolithic ones (Serangeli et al., 2012, 2015). The late Middle Pleistocene deposits exposed in the Schöningen lignite quarry are intercalated between the Elsterian and the Saalian tills. These deposits include a sequence of five to six stratigraphically superimposed horizons with, among others, Paleolithic artifacts, botanical remains, and faunal assemblages. Two distinct depositional sequences (I and II) form the base of the post-Elsterian deposits: depositional sequence II has an age of approximately 300–325 ka (Sierralta et al., 2012) and is assigned to the locally



Figure 1. Map showing the geographical position of Schöningen in northern Germany.

defined Reinsdorf Interglacial, which is correlated to MIS 9 (Van Kolfschoten, 2014). Sequence II has been subdivided into five distinct shallowing-upward cycles with organic mud and peat deposits. Botanical and zoological data from the Sequence II deposits indicate that the lowermost mud and peat deposits (level 1) represent the interglacial optimum of the Reinsdorf Interglacial, whereas deposition of the upper levels (4 and 5) took place at the end of the Reinsdorf Interglacial under climate conditions slightly cooler and drier than today (Böhme, 2007; Urban, 2007).

The depositional sequences of each of the five levels are also subdivided. Level 4 has a maximal thickness of approximately 2 m and, on the basis of lithological features, has been subdivided into nine stratigraphical sublayers (4a at the top of the sequence to 4i at the base; Mania, 2007). The Schöningen 13 II-4 Spear Horizon site roughly covers the upper 30–40 cm of level 4 and comprises the upper part of (sub)layer 4c (calcareous marl) at the base, the transitional layer 4b/c, the overlying organic mud layer 4b, and at the top, the base of the overlying peat layer 4a. Most finds were located within layers 4b/c and 4b. The basal part of level 4 (below the upper part of sublevel 4c) also yielded faunal remains, but due to their stratigraphical position these finds technically fall outside the context of the Spear Horizon and are therefore not included in the sample discussed in this paper. This explains the discrepancies between the list of species identified in the Spear Horizon assemblage and the more extensive number of species recorded in the totality of the Schöningen 13 II-4 sublevels a to i.

The site Schöningen 13 II-4 has an excavated surface of about 4000 m² (Serangeli et al., 2012); it yielded ca. 1500 stone artifacts (including 20–30 stone tools), a wooden throwing stick, and at least 10 wooden spears. The vertebrate record from the site is extensive, very diverse, and includes fish, reptiles, amphibians, birds, and a number of both small and large mammal species (Table 1; Van Kolfschoten, 2014). The larger mammalian fauna from Schöningen 13 II-4 is less diverse than the assemblages yielded from the base of depositional sequence II (Schöningen 12 B,

Table 1

List of larger mammal taxa encountered at the Schöningen Spear Horizon site (Schöningen 13 II-4) and per taxon the amount of specimens with cut marks (Nc), with impact marks (Ni), with cut- and impact marks (Nc + i), the total amount of samples with hominin modification marks (Nc + Ni + (Nc + i) = Nmod), and the percentage of samples with hominin modification marks (%mod).

Taxon	N	Nc	Ni	Nc + i	Nmod	%mod
<i>Canis lupus</i>	3					
<i>Vulpes vulpes</i>	1					
<i>Homotherium latidens</i>	1					
Total Carnivora	5					
<i>Palaeoloxodon antiquus</i>	1					
Proboscidea indet.	3					
Total Proboscidea	4					
<i>Stephanorhinus kirchbergensis</i>	1					
<i>Stephanorhinus hemitoechus</i>	1					
Total Rhinocerotidae	2					
<i>Equus mosbachensis</i>	3965	315	184	283	782	20%
<i>Equus hydruntinus</i>	2					
Total Equidae	3967	315	184	283	782	20%
<i>Cervus elaphus</i>	143	13	1	4	18	13%
<i>Megaloceros giganteus</i>	2					
Cervidae indet.	24					
Total Cervidae	169	13	1	4	18	11%
<i>Bos primigenius</i>	19	1		1	2	11%
<i>Bison priscus</i>	23	5	2	2	9	39%
<i>Bos/Bison</i>	108	6	4	13	23	21%
Total Bovidae	150	12	6	16	34	23%
Artiodactyla indet.	5			1	1	
Large mammal	3436	247	217	145	609	18%
Medium mammal	203	6	1		7	3%
Mammal indet.	2097	56	160	27	243	12%

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