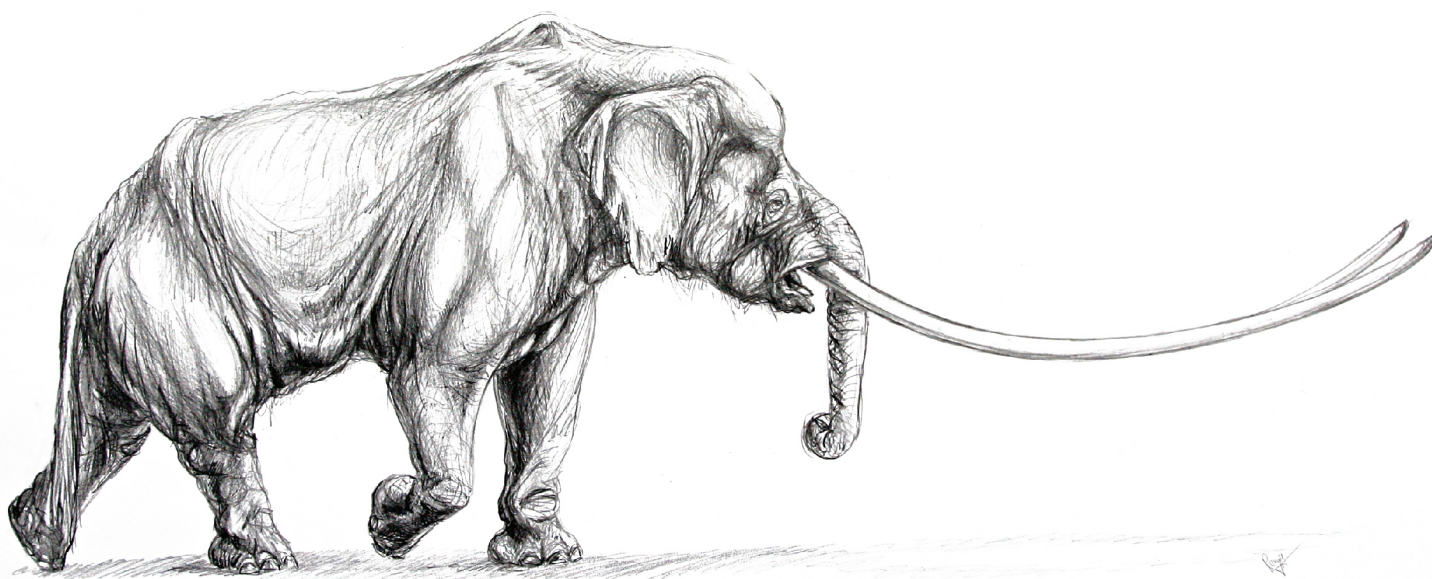




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ABSTRACT BOOK

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Woolly mammoth (*Mammuthus primigenius*) carcasses from European great plain mass death sites as an important food resource of the cave hyaenas (*Crocota crocuta spelaea*) during the Late Pleistocene

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Taphonomic studies on Late Pleistocene large carnivores are common in Europe and occur mainly in deposits in karstic contexts; their sedimentary sequences have frequently recorded the nature and chronology of animal activities (multi-carnivore occupations and ungulate-carnivore relationships). The many cavities formed natural traps for ungulates and/or were used as dens by carnivores, especially the fossil spotted hyaena (*Crocota crocuta spelaea*). Medium- and large-sized ungulates (cervids, equids and large bovids) provided the main prey found in the caves, along with megaherbivore (i.e. > 1000 kg) remains. Woolly rhinoceros (*Coelodonta antiquitatis*) and woolly mammoth (*Mammuthus primigenius*) are usually represented by milk teeth, and small unfused bones, shaft fragments, isolated carpals, tarsals and phalanges; their remains rarely exceed 100 bones/den, although Camiac, Perick and Teufelslucken are exceptions. The taphonomic signature of the cave hyaena-megaherbivore interaction is thus difficult to determine in karstic sites.

In order to estimate cave hyaena consumption patterns, such as the intensity of breakage and tooth marks, on very large bones, a taphonomic study was undertaken on two open air sites which had yielded numerous adult mammoth remains. Although the contexts of these discoveries, from early 20th century excavations and dredging in the North Sea, preclude many of the taphonomic observations usually made on in situ carnivore samples, such as articulations, the presence of coprolites, etc., the excellent preservation of bone surfaces and the quantity of available remains has enabled us to conduct a survey of cave hyaena activity on mammoth carcasses.

In Belgium, the site of Hofstade was recently the object of a palaeontological revision and a first taphonomic analysis (Germonpré, 1993). This rich fluvial deposit is dominated by the woolly rhinoceros (NISP=444, MNI=34 (Germonpré, 1993: 278, table 2 and Germonpré, 2003: 175, table 2) and also by the woolly mammoth (NISP=508, MNI=30 (Germonpré, *ibid*). These two species comprise almost 75 % of the bone sample. Large carnivores, although very rare, are present in the bone assemblage with only one bone belonging to the cave hyaena and three of the brown bear, *Ursus arctos* (Germonpré, *ibid*).

In the South Holland Province of the Netherlands offshore economic and industrial activities in the harbour area and natural erosion of the coastal sandy sediments, allowed large quantities of palaeontological remains to be collected over several years. On-going geo-location of palaeontological

discoveries has identified two main occurrences which yield bones: on the sea bottom at Eurogeul and on the coast at Maasvlakte 2 (Mol et al., 2006). The samples present an interesting taxonomic diversity, ranging from rodents to proboscideans and highlight the biochronology of sites over climatic sequences: the last interglacial, with hippopotamus and straight-tusked elephant and, particularly the last glacial, with woolly rhinoceros and woolly mammoth. The relatively frequent large carnivores, are dominated by cave lions (*Panthera spelaea*) followed by cave hyaenas, the latter identified by bones and, more recently, by coprolites (Reumer et al., 2010).

Our study describes a survey of skeletal elements from adult mammoth carcasses consumed by hyaenas at the two palaeontological sites. The location of hyaena tooth marks on bones, their morphotypes (scores, pits, punctures) and their size are presented to establish the taphonomic characteristics of this major predator/scavenger on proboscidean carcasses. Mass death sites can provide unique information on carnivore activities and taphonomic studies on such primary feeding places are necessary to reconstruct the diets of these predator/scavengers.

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