

ZooMS identifications of human and cervid barbed points from Mesolithic Doggerland

Joannes Dekker^a, Virginie Sinet-Mathiot^b, Merel Spithoven^c, Bjorn Smit^d, Arndt Wilcke^e, Frido Welker^{f, b}, Alexander Verpoorte^a and Marie Soressi^{a, b}

a Faculty of Archaeology, Leiden University, Leiden, the Netherlands

b Department of Human Evolution, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

c Institute of Archaeology, University of Groningen, the Netherlands

d Cultural Heritage Agency, Amersfoort, the Netherlands

e Fraunhofer Institute for Cell Therapy and Immunology, IZI Fraunhofer, Leipzig, Germany

f Section for Evolutionary Genomics, GLOBE Institute, University of Copenhagen, Copenhagen, Denmark

Osseous (antler, bone and ivory) artefacts form an important category of material culture, especially for hunter-gatherer societies, where osseous artefacts are the second main type of material culture after lithic tools. Most research on osseous artefacts has focused on their production and usage and there has been little work on their raw material selection. Raw material selection can provide information on the way the makers of the tools interacted with their environment, as well as shed light on the role the artefact played within the toolkit as a whole. Despite its value, raw material selection of osseous artefacts is seldom researched, because manufacture, usage and post depositional processes often obscure the diagnostic features that would allow traditional taxonomic identification. However, by applying biomolecular techniques in archaeology it becomes possible to taxonomically identify morphologically unidentifiable artefacts, allowing us to study raw material selection of osseous artefacts.

In this study we used both standard and non-destructive ZooMS (*Zooarchaeology by Mass Spectrometry*) protocols to study the raw material selection of ten barbed points from Mesolithic Doggerland. Our analysis identified two of the barbed points as human and seven others as cervid, leaving one point unidentified. The use of human bone for the production of barbed points is highly unusual and not previously attested in Mesolithic Europe. Most identifications derived from the standard, but destructive ZooMS protocols, although in two cases taxonomic identifications were obtained non-destructively.

Current knowledge on the biomechanical differences between the bones of different species do not support a functional explanation for the use of both human and cervid bone, nor does the observed pattern match expectations based on the availability of fauna in Doggerland. Instead we interpret the selection of human and cervid bone as an intentional and non-random choice, reflecting a cultural practice of the Mesolithic inhabitants of Doggerland. Specifically, the use of human bone highlights a previously unknown aspect of mortuary practices, the scale of which remains to be revealed by future research.