

Human bone points from Mesolithic Doggerland

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Introduction

Mesolithic barbed osseous points are regularly deposited on the Dutch coast. Microwear research indicates that these points were intensively used. Due to heavy modifications the points cannot be taxonomically identified using morphology.

We applied ZooMS to investigate potential patterns of species selection in these heavily curated tools.

Materials

For our study we analysed 10 barbed points from five beaches (Fig. 1). Nine of these points are bone, the other is antler.

Methods

All barbed points were analysed according to the Cold Acid and AmBic ZooMS protocol (Fig. 2). A database of peptide marker series for all European, Pleistocene medium to large size mammals was used for taxonomic identification (Welker *et al.* 2016).

Additionally the barbed points were ¹⁴C dated and their $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ isotope ratios were measured using protocols described in Van der Plicht *et al.* 2016.

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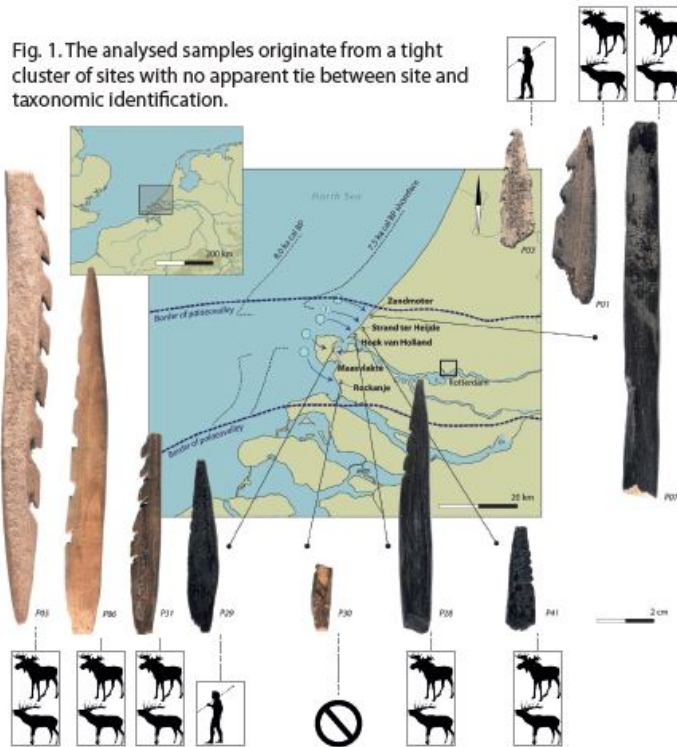
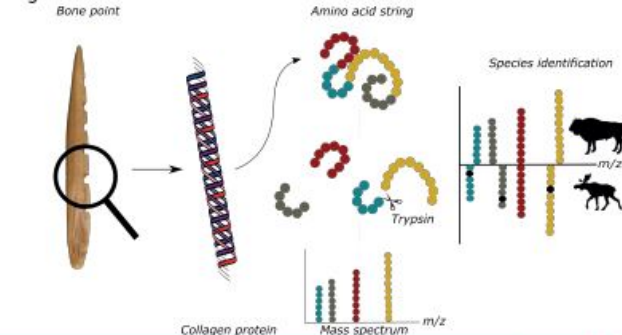


Fig. 1. The analysed samples originate from a tight cluster of sites with no apparent tie between site and taxonomic identification.

Fig. 2 Schematic overview ZooMS workflow



Results

Of the 10 barbed points nine provided results for ZooMS, isotopic analysis and ¹⁴C dating (Fig. 1 & 3). Two species groups were identified using ZooMS: *Cervus elaphus* (red deer) / *Alces alces* (elk) and *Homo sapiens* (human). Fig. 4 shows the characteristic differences between the mass spectra of the two groups.

The $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values of the two human points match with the values for Mesolithic human remains from the North Sea and the points identified as *Cervus elaphus* / *Alces alces* match with the range of variation of terrestrial herbivores.

All barbed points were dated to the Mesolithic with their dates ranging from 9505-7315 BP (uncal) or 11075-8021 BP (OxCal v4.3).

Fig. 3 $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values of the barbed points

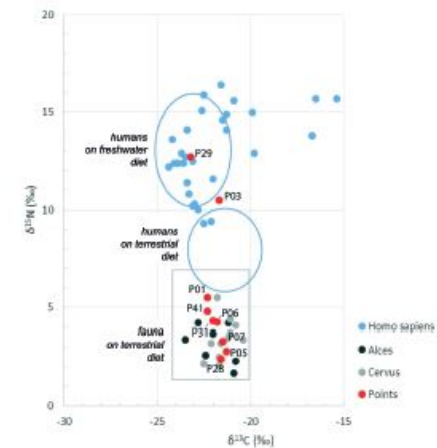
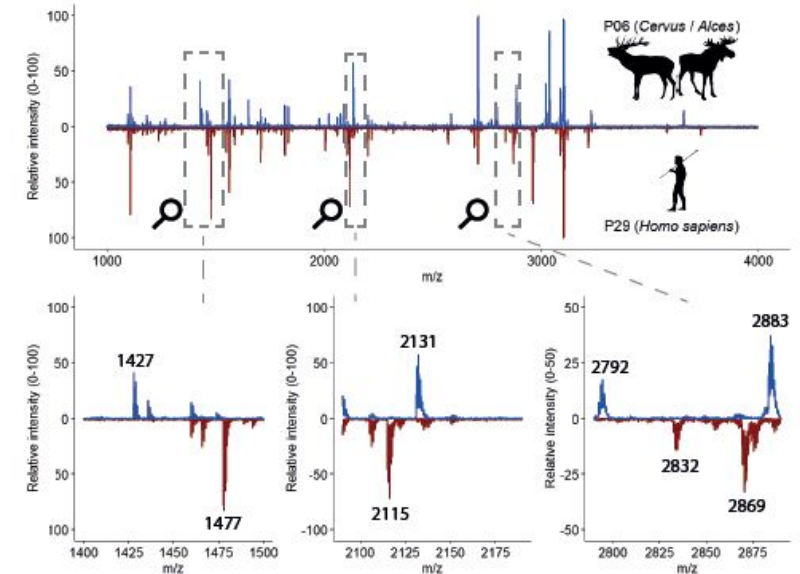


Fig. 4 Mass spectra of a red deer/elk (P06) and human (P29) barbed point



Conclusion

The presence of only *Cervus elaphus* / *Alces alces* and humans may be evidence for the preferential selection of particular species for barbed point production.

Especially the use of human bone for projectile points is rare, but not unprecedented. A more widespread application of ZooMS will reveal whether this pattern is robust or the product of chance.