Flatfish and the origins of European marine fishing
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Background
During the early medieval period (5th–10th century CE), most fish consumed around the southern North Sea were freshwater species. From around the 11th century CE, significantly more marine species appear in archaeological deposits. We see that this increase occurred in both England and in Flanders, and might be related to population growth, urbanisation, Christian fasting traditions, and decline of freshwater fish stocks. The most abundant species in Late Medieval sites are herring and cod, however Pleuronectiformes are potentially amongst the first marine taxa targeted.1–3. Until now, their role in this economic transition has been unclear due to difficulties in identifying marine versus estuarine species.

Methodology
This PhD project aims to develop identification methods to classify archaeological flatfish remains from the southern North Sea to species level using both osteology4 and molecular techniques.2 Out of the more than 20 species of Pleuronectiformes found in the North Sea, 15 of the families Pleuronectidae, Scophthalmidae and Soleidae are of interest in this study because of their occurrences and sizes. Traditional comparative osteology4 will be combined with geometric morphometrics. Spectra obtained by bone collagen fingering, or ZooMS, might differ between species and allow cheap molecular identification5. Carbon, nitrogen and sulphur stable isotopes in bone collagen will also be used to explore catch environments of archaeological samples.1–5. Age and size reconstructions can give insights into historical fishing pressures.6. Archaeological sites in the United Kingdom, France, Belgium, the Netherlands and Germany are targeted. Using this combined approach, this project further aims to reconstruct a timeline for the presence and frequency of each species from key sites from around the southern North Sea littoral and explore how flatfish fisheries changed around the marine fishing revolution.

Methodological outline
A. Species ID development
i. Comparative osteology
ii. Collagen fingerprinting (ZooMS)
iii. Geometric morphometrics

B. Selection of sites

C. Identification of archaeological bones
D. Stable isotope analysis
E. Age reconstruction

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E. Age reconstruction

A) Species ID development

C) Identification of archaeological bones

i. Comparative osteology

ii. Collagen fingerprinting (ZooMS)

iii. Geometric morphometric analysis

Gadus morhua

Pleuronectes platessa

Scophthalmus maximus

Hippoglossus hippoglossus

Flatfish bone

Collagen

MALDI-TOF-MS:

Landmarks -

 Principal Component Analysis

Impact
Marine fisheries have been an important economic activity for centuries, but this was not always the case. The reasons behind the transition from mainly freshwater to marine fishing are complex and incompletely understood, but are significant for understanding medieval societies and their resource bases. Furthermore, insights on how flatfish have been affected in the past, could help to better understand the precise human impacts on their populations.

References

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