

Katrien Dierickx*, Dr. Michelle Alexander, Dr. David Orton

BioArCh, Department of Archaeology, The University of York, UK

*katrien.dierickx@york.ac.uk

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 stocks¹. The most abundant species in Late Medieval sites are herring and cod, however Pleuronectiformes are potentially amongst the first marine taxa targeted^{1,2,3}. 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 techniques⁵. 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 'fingerprinting', 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^{6,7}. Age and size reconstructions can give insights into historical fishing pressures⁸. 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.

SeaChanges – Innovative Training Network

Thresholds in human exploitation of marine vertebrates

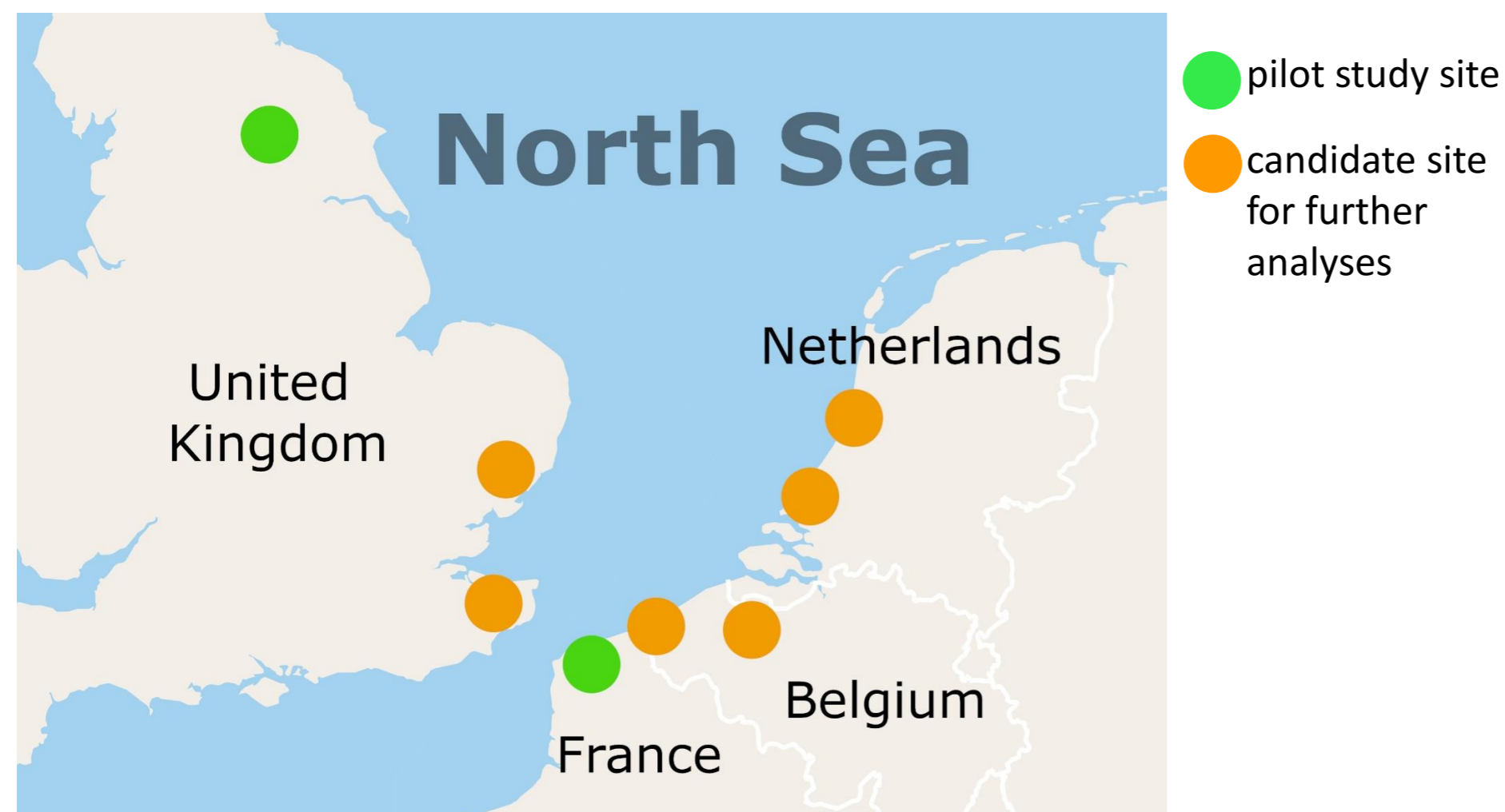
SeaChanges provides training to 15 PhD students across Europe to forge a new generation of interdisciplinary researchers, combining marine biology, archaeology, as well as zoology and conservation ecology. Together, we will apply diverse methods on archaeological remains to improve the understanding of past marine resource use in all European seas of key marine species, assess past impacts and use these to inform the present.

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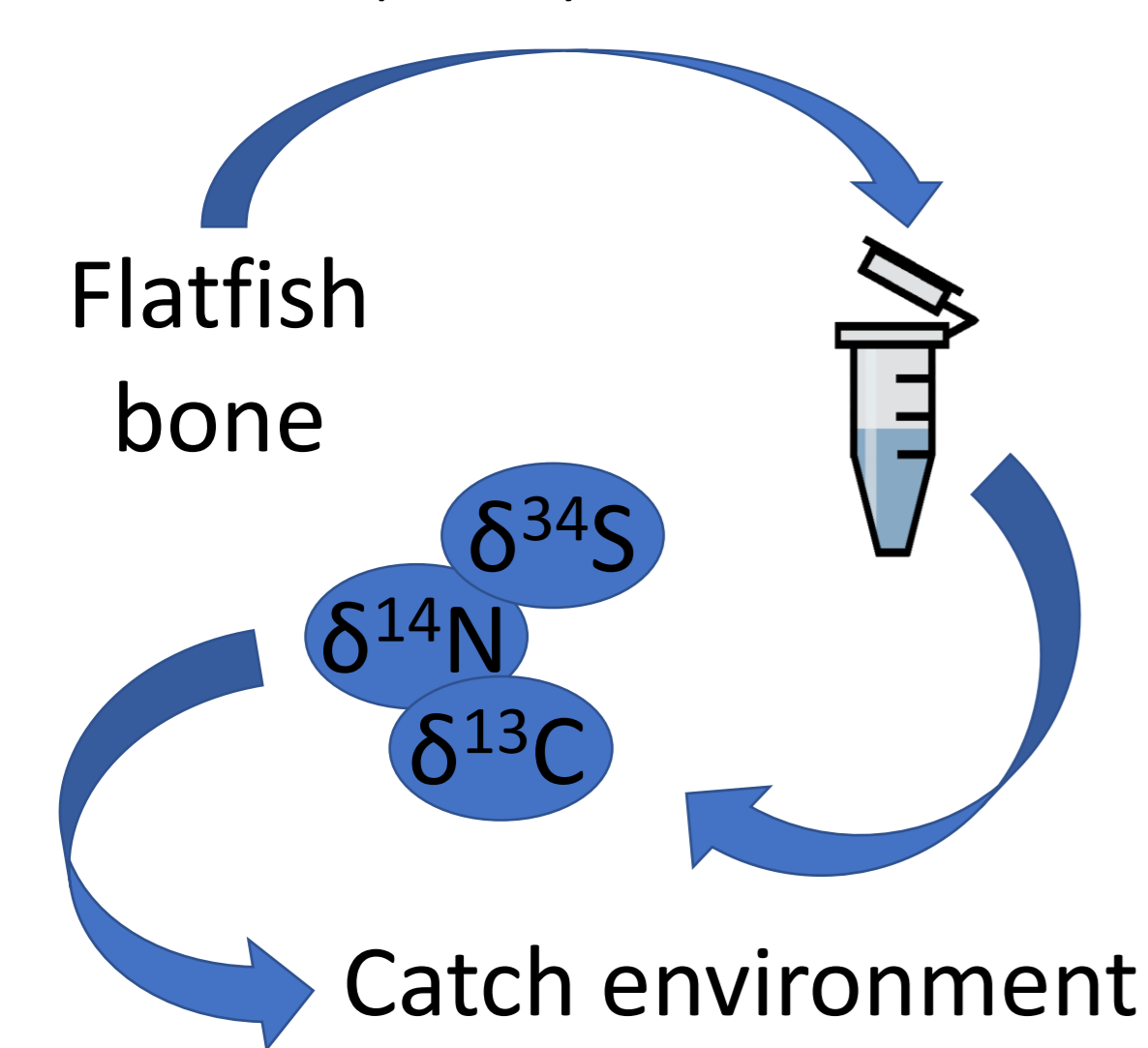
Methodological outline

- 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

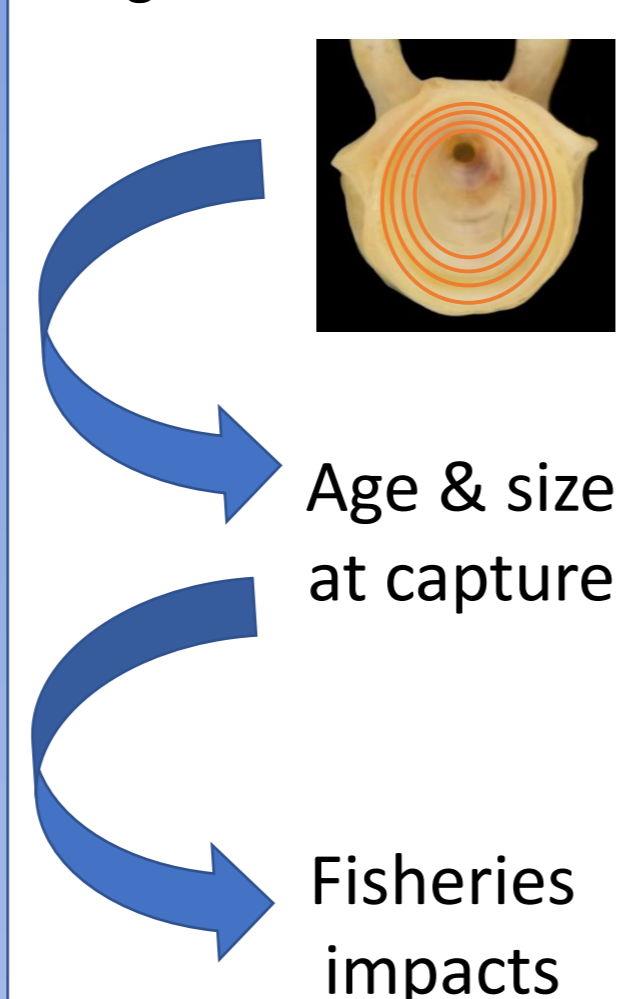
B. Selection of sites



D. Stable isotope analysis

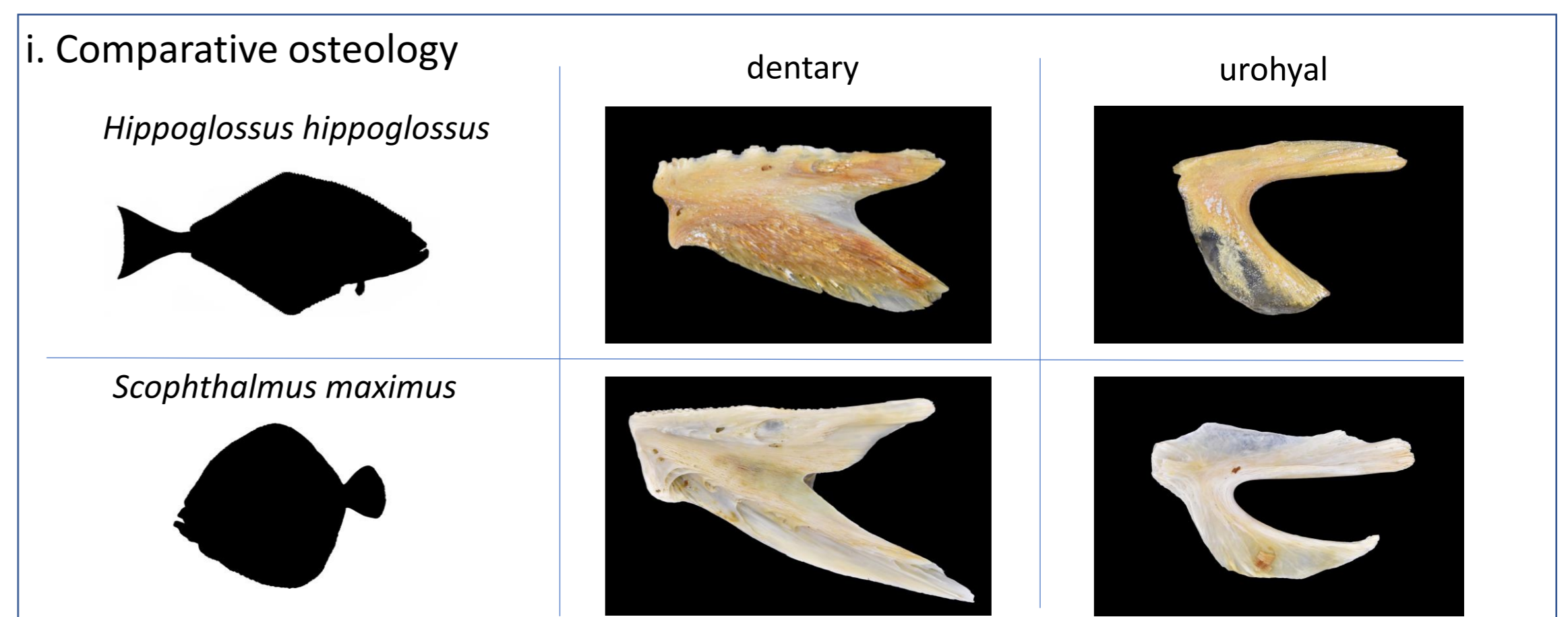


E. Age reconstruction

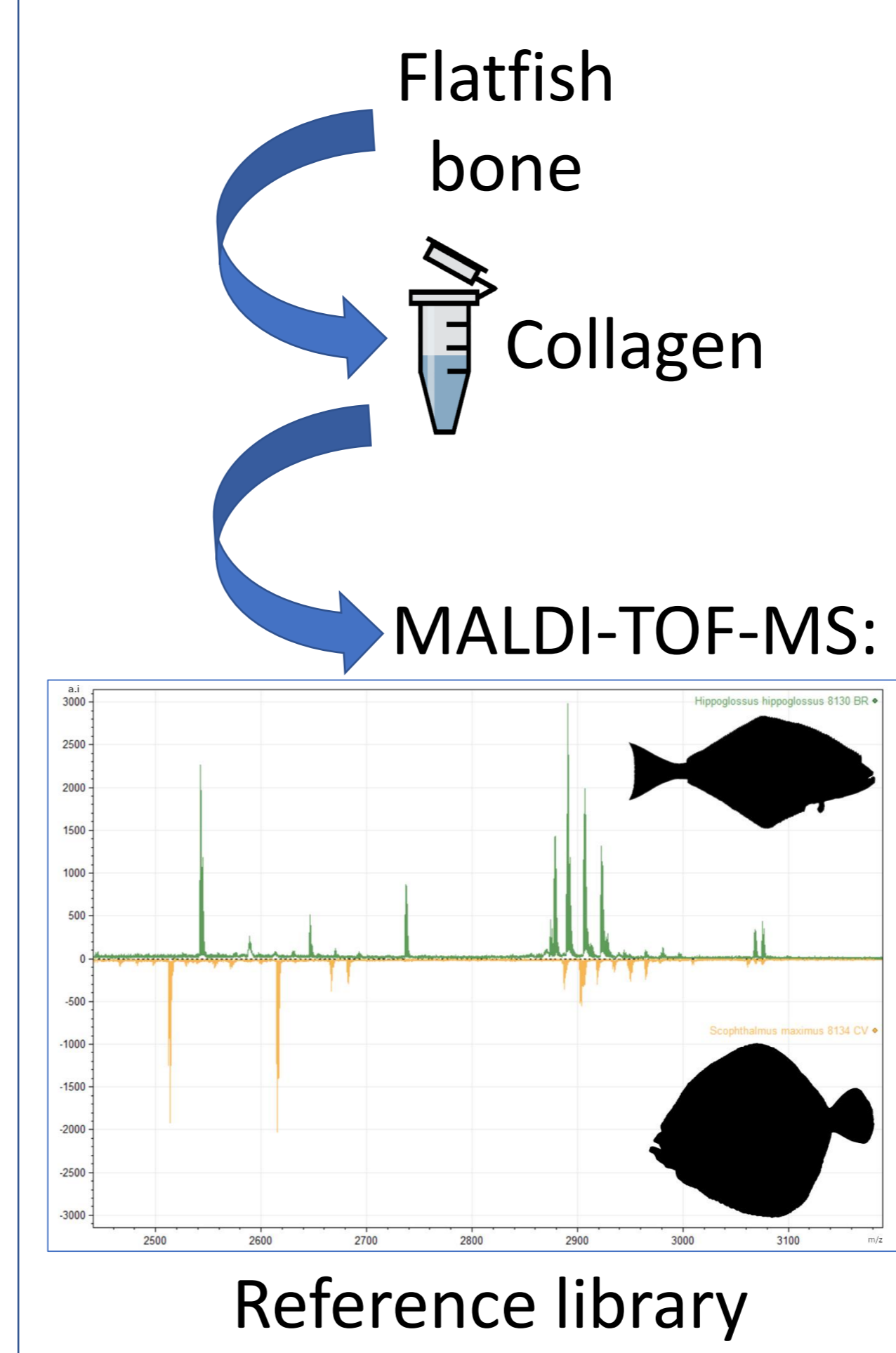


A) Species ID development

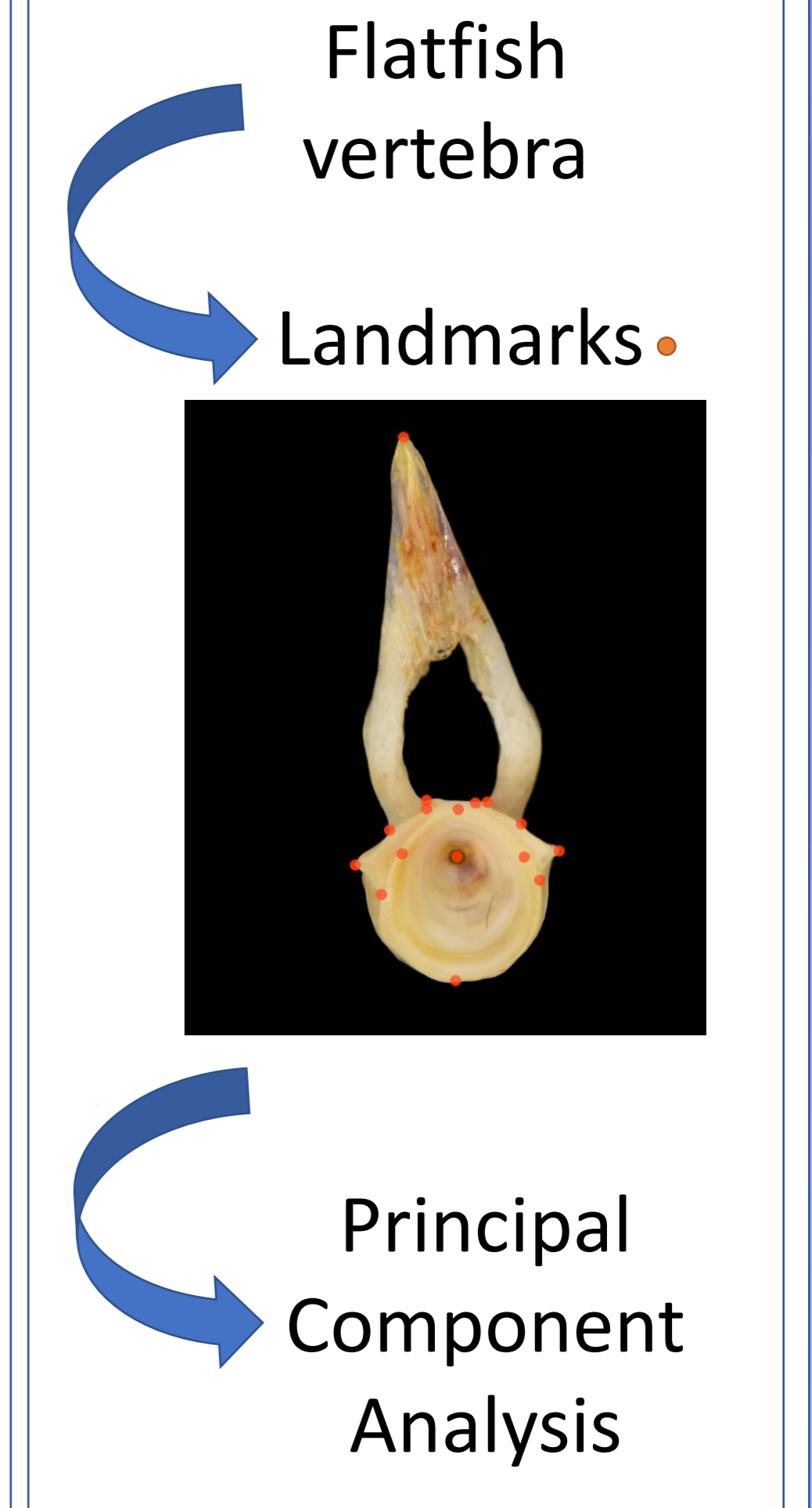
C) Identification of archaeological bones



ii. Collagen fingerprinting (ZooMS)



iii. Geometric morphometric 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.

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