


RESEARCH ARTICLE



# Species identification using ZooMS, with reference to the exploitation of animal resources in the medieval town of Odense

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## ABSTRACT

ZooMS (Zooarchaeology by Mass Spectrometry) is increasingly being used as a method for species identification of archaeological and historical remains. The method identifies species from the peptide mass fingerprint of extracted collagen – the principal protein of bone, ivory, dentine, leather, and parchment. ZooMS has the advantages that it is a fast and simple method, that requires only small sample sizes or even non-destructive sampling. The taxonomic resolution of the method varies, but ZooMS is diagnostic for most domesticated animals and for the relatively depauperate Scandinavian fauna, although some groups (seals, martens) cannot be resolved, and it cannot discriminate some domesticates (dog, cattle) from their wild counterparts. In this article, we overview the method and demonstrate the value of ZooMS and illustrate our points via a case study of 20 samples from 12th to 14th century layers in the Danish medieval town of Odense. Four artefacts were tested by a non-destructive eraser technique because of their uniqueness, but only one could be identified. The remaining 16 were identified following destructive analysis of the sample, one sample could not be identified.

Through the identification of a gaming piece as walrus tusk the analysis demonstrated the long distance trade networks of Odense and the pursuit of some inhabitants for luxury products and high living standards. Conversely, the species identification of combs showed that the medieval comb maker would use the resources immediately available to him to create an affordable everyday object rather than rely on imported antler.

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## Introduction

The study of animal remains such as bones, skin, and fur in an archaeological context provides insights into past relationships between animals, people, and the environment. Because of the mutual nature of these relationships, animal remains in context have been used to address a wide range of aspects of the human past as amongst many others diet, resource exploitation, animal domestication, economy, environment, trade networks, and cultural identity, and the study is relevant across prehistoric and historic periods, settlement types, and geographical regions (Steele 2015). Identifying the species of animal remains is one of the key prerequisites for discussing such aspects of human culture.

This article explores the protein fingerprinting methodology of ZooMS (Zooarchaeology by Mass Spectrometry, Buckley *et al.* 2009) which uses

amino acid sequence variation in the dominant structural protein, type I collagen, which is abundant in bone, skin, and tissue, for species identification in Scandinavian archaeology. Since its introduction, the method has reached maturity and is becoming increasingly popular within archaeology as it is a cheap, easily applicable, and minimally or even non-destructive method for species identification (Fiddymont *et al.* 2015, Coutu *et al.* 2016). Moreover it has been demonstrated to be an excellent method for screening large bone assemblages for specific species (Welker *et al.* 2016).

In this article, we will introduce ZooMS and then present a case study in which the method has been used as part of an analysis of the 12th to 14th century animal resources from the Danish town of Odense.