Extending our understanding of past animal diet using stable isotope analysis

Extending animal dietary insights from stable isotope analyses

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Understanding the diets of archaeological animal populations can inform on the diverse and complex interactions between past human, animal and plant communities. Stable isotope analysis of animal skeletal structures recovered from archaeological sites is a commonly applied technique to provide dietary insights. In this issue, two papers make valuable contributions to furthering interpretations of human-animal-plant relationships captured by isotopic studies of past animal diets.

Díez-Canseco et al. (2022) provide an important methodological contribution for extending the potential of intra-tooth carbon and nitrogen isotopic analysis of dentine collagen in high-crowned animal teeth. In the study of archaeological animal diets, analyses of sequential stable isotope analyses on dentine have been under-utilised to date, especially when compared to the more numerous studies on sequentially-sampled tooth enamel. This relates in part to the shortage of modern baseline studies on dentine to support archaeological interpretations. This publication provides a first valuable study applying intra-tooth dentine analysis in experimental domestic sheep (*Ovis aries*) raised under controlled life conditions, including the isotopic composition of the diet. The addition of this base-line study broadens the scope for further development of sequential nitrogen and carbon isotope analysis in archaeological hypsodont tooth dentine, with a range of potential insights that can be delivered on temporal dietary transitions and animal management strategies.

Also in this issue, Shev and Laffoon (2022) take a different approach to explore human-animal-environment relationships from stable isotopic dietary reconstructions of endemic herbivorous rodents from the precolonial Dominican Republic, aimed at testing ideas that some species were managed. Utilising carbon and nitrogen isotopic values of collagen and carbon isotopic values of enamel from three species of hutias (Capromyinae), edible rat (*Brotomys* sp.), and domestic guinea pig (*Cavia porcellus*), they employ a Bayesian dietary mixing model (FRUITS v.3.0; Fernandes et al. 2014) to estimate the contributions of different dietary sources. Their modelling outcomes indicate some animals consumed significant levels of domestic C_4/CAM plants – probably maize which was ubiquitously grown in the region. The study shows the potential for using dietary mixing models to differentiate between domestic and wild plant dietary source contributions for such taxa. The archaeological significance lies in understanding of the niche constructing behaviours of these communities and how the horticultural practices of the indigenous communities, such as slash-and-burn farming, created habitats attractive to endemic synanthropic rodents. This may have involved the opportunistic movement of animals into these created niches or the deliberate human supplementation of their diets.

These studies demonstrate the exciting potential to extend stable isotope approaches in the investigation of past socio-ecological networks and to enable more rigorous outcomes. The continued application of tools to achieve accurate food intake estimates will help to explore the nature, details, and significance of past multi-species relationships.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study

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