

## BORON ISOTOPES: A BIOGEOCHEMICAL PROXY FOR SEAWEED IN MAMMAL DIETS

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Photo: ALAMY via Simons, P. (2020). *Feeding Seaweed to sheep could help to save the planet*. The Times. <https://www.thetimes.com/uk/article/feeding-seaweed-to-sheep-could-help-to-save-the-planet-nk2zm9dpg>

### March 27, 7:30pm, Earth & Space Sciences 001

The Orkney Islands in northern Scotland have become a natural laboratory for the exploration of dietary isotopes related to maritime human and animal lifeways. Specifically, the island of North Ronaldsay has been the focus of this research thanks to a humble and yet remarkable animal, the North Ronaldsay sheep. The North Ronaldsay sheep are an ancient breed that arrived on the island during the British Neolithic period (at least 5,000 years ago). What makes these sheep remarkable and useful for research is that they are adapted to having a diet that is exclusively or near exclusively seaweed. Seaweed is the world's oldest complex, multicellular plant, and humans have been using it for food for thousands, if not hundreds of thousands, of years. The ability to detect seaweed in ancient mammal diets, especially in the absence of historical writing or art, is very difficult. A biogeochemical proxy is needed, and boron isotopes is a good candidate. Seaweed is rich in boron and provides a boron isotope value that is distinct from other plants on North Ronaldsay. The sheep on North Ronaldsay, and their seaweed diet, provide a unique means to assess boron's potential to act as a proxy for seaweed in ancient mammal diets as well as to begin to study mammal boron physiology.



Dr. Carrie Wright is a bioarcheologist and archaeological scientist specializing in isotope biogeochemistry. Carrie works to investigate ancient peoples' (and animals') lives through their skeletons. We write our life stories on and in our bones and teeth: the food we eat, the changes that happen to our bones as we grow and age, the bones we break and heal, the sicknesses we may suffer, and even, possibly, our social behaviors. Carrie looks for surface clues on skeletons (bioarchaeology) for evidence of things like disease, stress, and injury as well as using the bones to estimate a person's age-at-death, their sex, their stature, and possibly their ancestry. She then does chemical analysis on small bone and dental samples to determine carbon, oxygen, strontium, calcium, and/or boron isotope values, which provides information about a person's diet, their mobility (see if a person moved from place to place), and to see if we can learn about the natural environment in which a person lived. Bringing these two approaches together, bioarchaeology and biogeochemistry, is what allows the stories of people that lived and died thousands of years ago to be told.