Report on Europlanet-grant 053-TNA3

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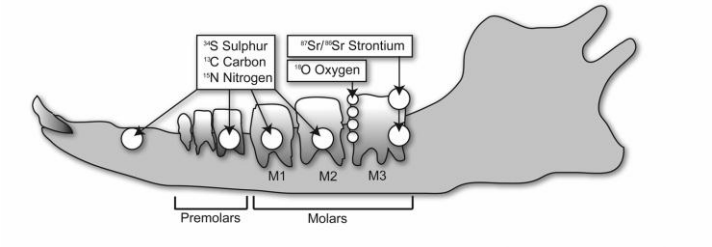
Introduction:

Prior to the current application a larger post-doctoral research project was performed at the University of York, UK. This was part of the large (13 PhDs/PD; 25+ researchers) multi-national Marie-Curie LeCHE (Lactase persistence in the early cultural history of Europe) project and lasted for two years. The Methods used by the independent research groups in the project involved stable istotopes, genetics, lipids and proteomics as well as pottery and archaeozoological analyses. Assemblages of archaeological and modern samples were used to get general insight into the consumption of milk in early societies.

Isotope application in archaeology:

C/N isotopes are well established for palaeodietary research in archaeological sciences but the application of strontium isotopes in combination with other isotopes is currently being assessed but appears a promising methodology to determine provenance. Similar studies were recently carried out in Germany and also in the United Kingdom, showing long-distance cattle circulation towards ritual sites (cp. Viner et al. 2010; Bentley/Knipper 2005).

A combined isotope approach, using carbon, nitrogen, oxygen, sulphur and strontium isotope ratios was applied to bone and teeth (premolar, first, second and third molars) of cattle, recovered from the ditches of a so-called causewayed enclosure site (a tripled ditch/walled enigmatic henge monument) of Champ-Durand (France) in order to gain insight into the circulation of cattle. This would lead to further information on the meaning of cattle as object of wealth, as offerings for religious ceremonies or evidence for communal or social events like tribal feasts. Overall the study would provide further knowledge of the function of these archaeological sites.



Sample spots of various isotope samples

Previous research:

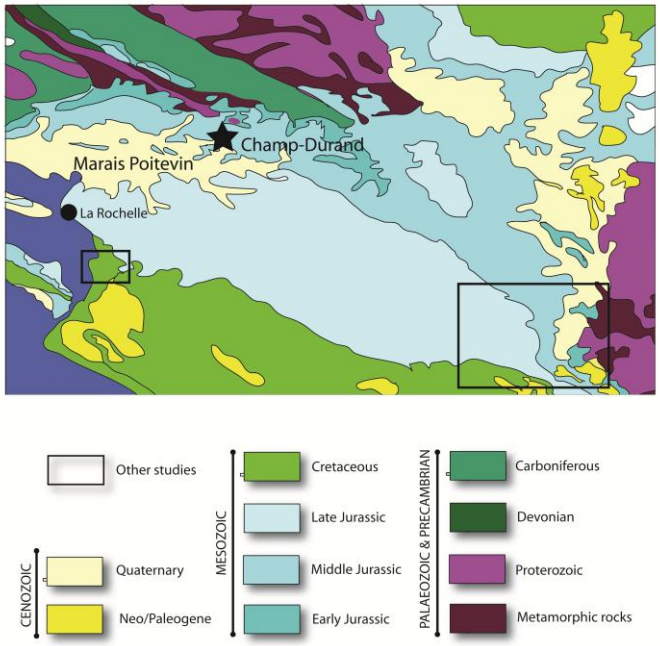
The first results of 40 combined Sr and S isotopes revealed a general local signal controlled by the diverse geology nearby. Limestone from the Vendee and Charente region, as well as oceanic seawater influence provide a strong Sr isotope baseline signal that was probably altered by outcrops of older geologies from the Amorican Massif. Therefore, the results on the cattle remains suggested a local origin of the animals, e.g. the cattle seem to have not been transported there from regions with higher $^{87}Sr/^{86}Sr$ ratios. This implied that by the time of henge formation (c. 3300-3150 calBC) a rather local, well-established cattle economy had developed in this region.

Research done in 2011:

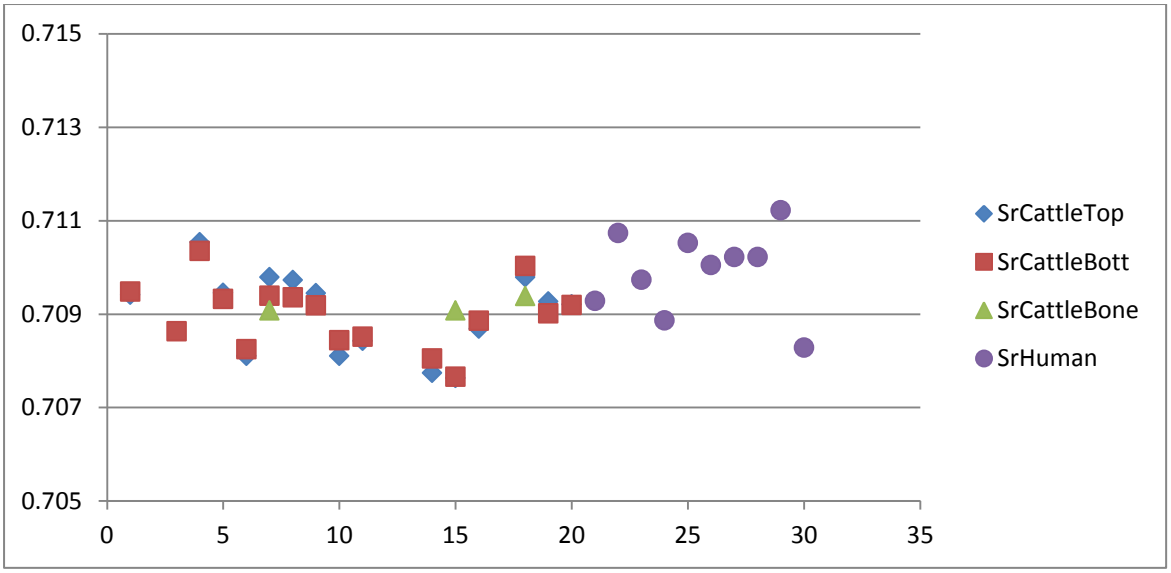
In a follow-up project we concentrated on the human remains recovered from the same ditches with the aim to discover what proportion of the human population was of local origin. Specifically, our aim was to locate "foreign" signals within the human population, proving the migration of distant "clans" or religious believers towards this site, where they finally ended up in the ditches. Financed by the Europlanet grant 053-TNA3, author Frederick Feulner visited the facilities of the VU Amsterdam to analyze ten human teeth samples for $^{87}Sr/^{86}Sr$, which had already been samples for C/N by colleagues from Oxford.
Feulner arrived Sunday 31. October in the Netherlands and left on Saturday 12th November. During the first five days he was introduced to the laboratories by chemist R. Smeets and colleagues. He was introduced to working procedures in a clean lab for the first time and taught how to sample, perform chromatographic separation of Sr and make the necessary filaments for thermal ionisation mass spectrometry (TIMS). The second week was used to for further training in order to deepen the acquired knowledge and skills and finally to load and analyse the prepared samples by TIMS. Measurements were performed, followed by discussions with supervising Prof G. Davies.

Altogether, the stay lasted for 14 days (incl. two travel days and a weekend; i.e. 10 days in the labs). Travel, accommodation and subsistence were paid by the Faculty of Earth and Life Sciences.
I am preparing to publish all the results in a peer-reviewed journal but initial results have been reported in an upcoming French monographic book on the causewayed enclosure of

Champ-Durand, at the ICAZ conference 2010 in Paris and at the Human Development in Landscapes 2 conference in Kiel in 2011.



Simplified geological map of the Vendee region



Previous (cattle) and new (human) Sr data. Humans show elevated values in comparison to cattle.

Frederick Feulner

Key References:

Bentley/Knipper 2005: R. A. Bentley/C. Knipper. Transhumance at the early Neolithic settlement at Vaihingen (Germany). Antiquity 79 (2005).

Viner et al. 2010: S. Viner/J. Evans/U. Albarella/M. P. Pearson. Cattle mobility in prehistoric Britain: Strontium isotope analysis of cattle teeth from Durrington Walls (Wilthsire. Britain). Journal of Archaeological Science 37 (2010) 2812-2820.