Report on the outcomes of my TNA visit

My visit to Vriji University involved analysing the dentition of six individuals from the Bronze Age site of Staxton Beacon and twelve individuals from the Late Bronze Age to Late Iron Age site of Melton. Both sites are located on the Yorkshire Wolds, England, a geologically contiguous area of cretaceous chalk. Previous studies have established the local biologically available strontium isotope signature for this region and a number of measurements have been made on enamel from Anglo-Saxon individuals (Montgomery *et al*. 2005). Much less work has been published on earlier prehistoric inhabitants of the Yorkshire Wolds. There is much debate concerning possible changes in mobility from the Neolithic to the Iron Age associated with greater links to mainland Europe. These include the origin of the 'Beaker culture' in the Early Bronze Age and the 'La Tène' culture in the Early Iron Age. Here we conducted a pilot to see whether individuals who spent their early life away from the 'Yorkshire Wolds' could be indentified using strontium isotopes.

Specific Aims

- To explore whether individuals buried at each site spent their infancy and childhood near the site
- To associate the degree of mobility since childhood with differing burial practices, pathologies and traumas and diet.

Methodology

Throughout my residency I learned about and was heavily involved with the numerous procedures and preparations required to prepare samples for analysis using the Thermal Ionization Mass Spectronomy unit. As a result of the three weeks of analysis, results were obtained for two teeth for each of the six individuals from Staxton Beacon and eleven of the individuals from Melton (the remaining individual only had one tooth present in her dentition). Ten individuals (four from Staxton Beacon and six from Melton) were analysed using their first and third permanent molars. Five individuals (two from Staxton Beacon and three from Melton) did not have third molars and as such their first and second permanent molars were examined. One individual had a single tooth, a second permanent molar, and that was used for the analysis. One individual did not have any first permanent molars present and therefore their second and third permanent molars were used. Finally one individual was a juvenile aged to 9 years ± 24 months and therefore their first deciduous molar and their first permanent molars were examined for strontium isotopes. These three individuals were all attributed to the site of Melton.

Results and discussion

The local signature for the Yorkshire Wolds has been established by Montgomery and colleagues (2005) to be between 0.7074 and 0.7092. This is the value between leachates (chalk 0.70748, sand 0.70837) and

metoric rainwater (0.7092) measured at sites in this area (Montgomery *et al* 2005: 128). The pilot data (below) show that several individuals from each site do not have Sr ratio consistent with spending their infancy and childhood on the Yorkshire Wolds. In some cases there is a difference between the M1, M2 and M3 (depending on available samples) indicating mobility or a move in residence between the ages of one to three (M1), four to seven (M2) and seven to thirteen (M3) (Hillson 1996: 125). We cannot be sure where these individuals spent their childhood, the values above 0.7092 correspond to Jurassic found in vast area of the UK and mainland Europe (these values are underlined in Table 1). However there are also a number of individuals who do have Sr ratios consistent with them spending their childhood on the Yorkshire Wolds (see Table 1 for a summary of the findings).

No significant differences have been observed for both sites based on sex, age or pathology. Additionally, as the Melton site has a more detailed dating record, a pattern was examined based on dates throughout the Iron Age, however no additional differences or significances were found. A proposal has been submitted for radiocarbon dating of the Staxton Beacon individuals and upon completion the relationship between time period and strontium values will be examined further.

Site	Time Period	Skeleton	Tooth 1	Sr value	Tooth 2	Sr value
SB	BA	2	M^1	0.709165±9	M^3	0.709304±11
SB	BA	3	M^1	0.709380±8	M^3	0.709171±9
SB	BA	4	M_1	0.708504±9	M_3	0.710093±9
SB	BA	7	M_1	0.708089±10	M_2	0.708261±10
SB	BA	9	M_1	0.709464±11	M_3	0.709015±9
SB	BA	11/12	M_1	0.708670±10	M_2	0.708769±13
M	IA	1032	M_1	0.708923±10	M_3	0.708851±10
M	IA	1184	M_1	0.709042±9	X	X
M	IA	1489	M_1	0.709455±9	M_3	0.709724±9
M	IA	1823	M_1	0.709540±10	M_2	0.709403±10
M	IA	2554	M_1	0.709868±14	M_2	0.709839±10
M	IA	2722	M_2	0.709421±9	M_3	0.708950±7
M	IA	3397	M_1	0.709028±9	M_3	0.709172±11
M	IA	3890	M_1	0.708709±11	M^3	0.708522±9
M	IA	4039	DM^1	0.709364±11	M_1	0.709199±10
M	IA	4075	M_1	0.709876±11	M_3	0.709887±10
M	IA	4297	M_1	0.708892±6	M_2	0.709202±11
M	IA	6122	M_1	0.709076±10	M_3	0.709713±10

Table 1: Summary of normalised strontium findings.

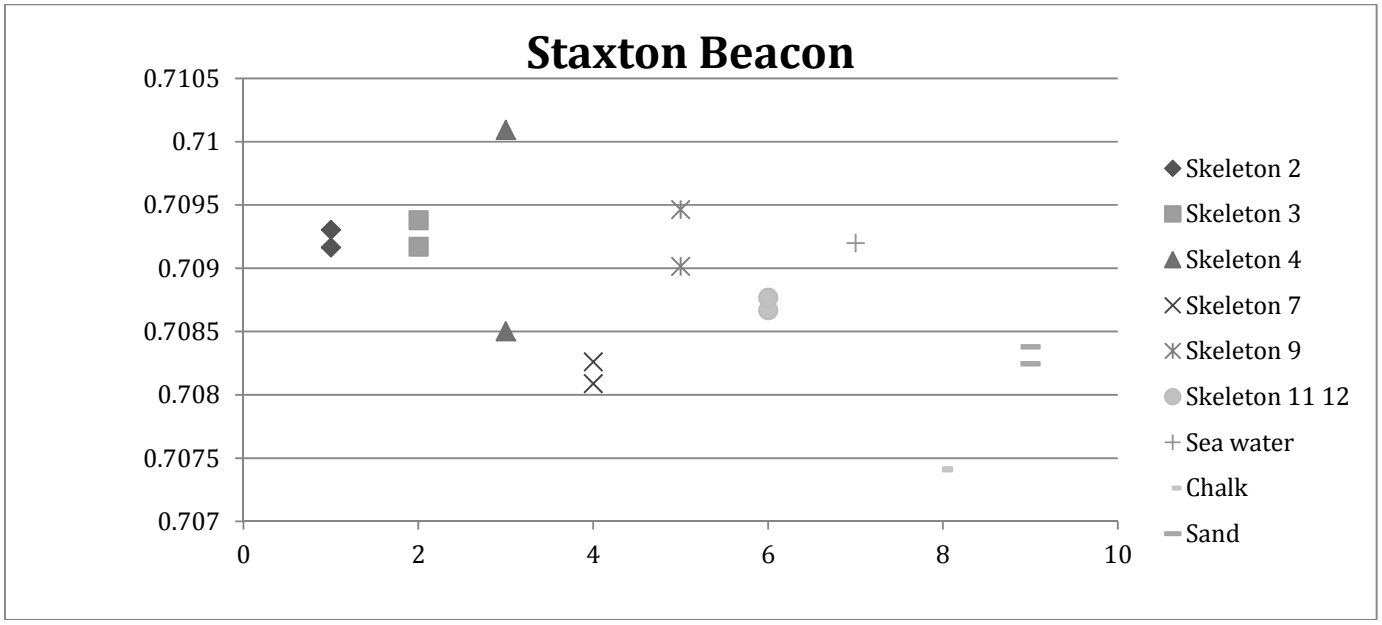

Chart 1: Strontium values for Staxton Beacon.

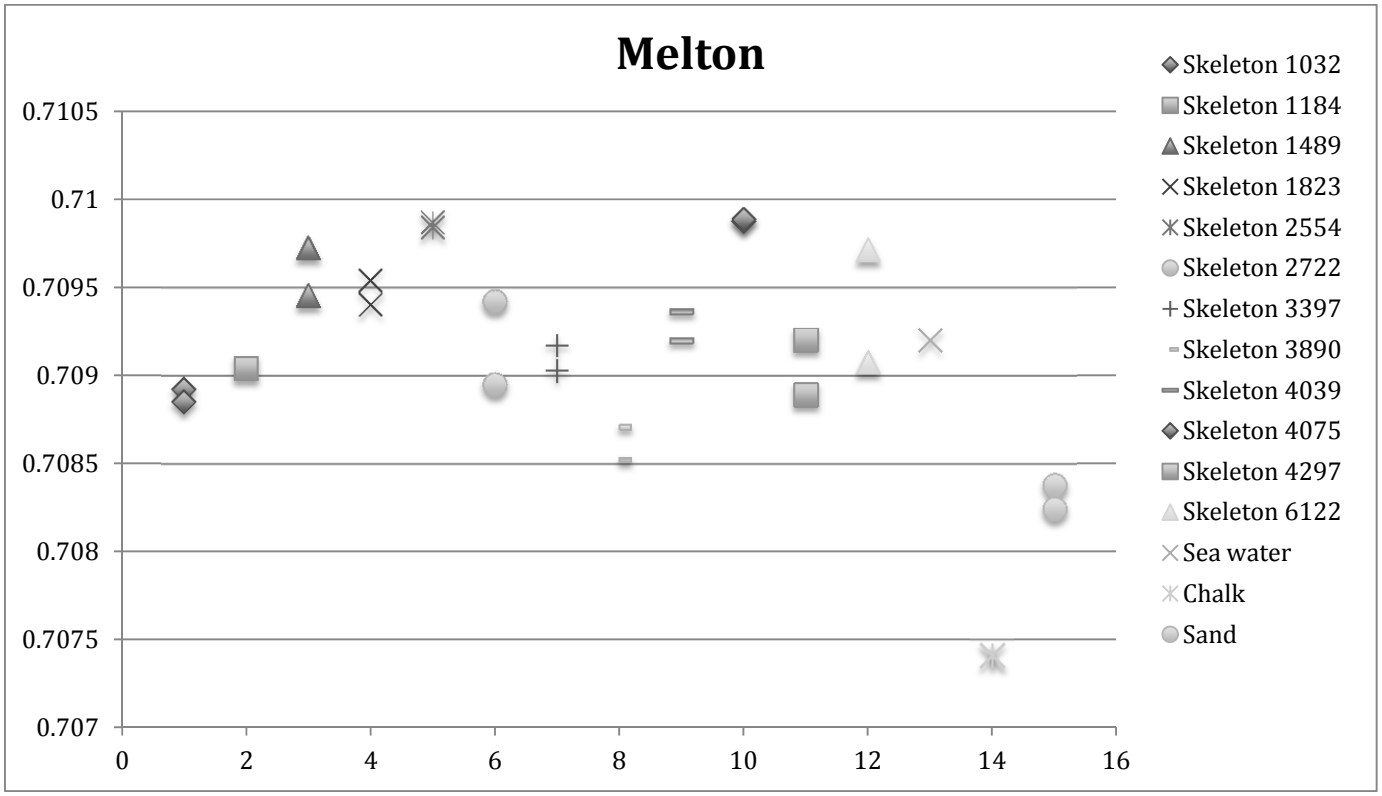

Chart 2: Strontium values for Melton.

Further work – light stable isotope analysis

We are currently conducting carbon, nitrogen and sulphur isotope analysis of bone and dentine collagen and oxygen stable isotopic analysis of the enamel of these individuals. Carbon and nitrogen isotopes will

be combined with the strontium isotopes to look at variability in diet against residential mobility. Sulphur and oxygen isotopes will be used to further investigate the degree of mobility.

Planned outputs 2011

1. This research will form a major component of a PhD thesis that is due to be submitted at the end of September 2011 to the Department of Archaeology at the University of York.
2. Podium presentation at the Canadian Association of Physical Anthropologists 2010 conference, October 28-30, 2009 in Saskatoon, Alberta, Canada. "The prehistoric sites of Staxton Beacon and Melton on the Yorkshire Wolds, England", abstract below.
3. Article for Journal of Archaeological Science on Melton is in prep. Whitaker, Milner, XXX, Davies, Craig "Mobility and diet in the Iron Age on the Yorkshire Wolds at Melton".

The prehistoric sites of Staxton Beacon and Melton on the Yorkshire Wolds, England

The Yorkshire Wolds have had much archaeological and antiquarian interest over the past two centuries and currently two prehistoric sites are currently under investigation, Staxton Beacon and Melton. Staxton Beacon, located in the north-eastern Wolds, was excavated by Terry Manby in 1958-9 and skeletal remains belonging to people from the Bronze Age as well as partially burnt wooden structures were uncovered. Melton was more recently opened during a rescue excavation by On Site Archaeology (2004-5) in advance of a proposed road extension scheme. They found prehistoric skeletal remains spanning the Late Bronze Age to Late Iron Age along with round houses, a linear cemetery and two square barrows. Skeletal analyses were carried out at the University of York, while additional work, specifically stable isotope analysis was conducted at Vrije University in Amsterdam, through the Europlanet Research Infrastructure grant. This has allowed for a multi-faceted assessment to uncover the evidence of life histories and daily life through demographic profiles, paleopathology, non-metric traits and stable isotope analysis of these prehistoric peoples. The research aims include exploring the local versus non-local members of each site and their possible association or separation from the rest of the population through differing burial practices, pathologies and traumas and even diet. This snapshot of two sites on the Yorkshire Wolds is a detailed aspect of the doctoral thesis exploring multiple sites and time periods pertaining to our understanding of prehistoric continuity and change in the English region of East Yorkshire and how that relates to wider British prehistory.