2 North East Biological Anthropology Research Network Conference 2012

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On Monday 30th January, we and a group of York bioarchaeologists travelled up to Darlington to the North East Biological Anthropology Research Network conference at Teesside University. It became apparent at the train station that, despite the number of BSc, MSc and PhD's we held between us, none of us actually knew the way to the university. Under the circumstances we all turned to the obvious solution: iPhones. All had, however, conveniently decided to refuse their services thus we set off on our journey with somewhat hazy directions. After a rousing walk through the salubrious areas of Darlington, we were warmly welcomed with tea and coffee, and introduced to the other speakers and attendees of the conference which included a number of fellow academics and students from Durham and Teesside Universities. Dr Tim Thompson of Teesside University gave an opening talk, welcoming us all to this one day meeting exclusively for archaeological scientists in the North East. The aim of the conference was to share new and innovative research; and highlight the global reach of research undertaken by this North East group; whose work spans three universities and countless regions across the globe.

The first talk was by Dr Becky Gowland of Durham University on the morbidity and malaria in the Anglo-Saxon marshes. She began with a background of *Plasmodium vivax* in the UK and an explanation of the historic references to malaria-like diseases from the likes of Bald's Leechbook and Chaucer's writings. Her research aimed to use human skeletal remains to find evidence of malaria in Anglo-Saxon England; despite the fact that this particular condition does not often leave evidence of its presence on skeletal material. Gowland used the association between *vivax* and chronic haemolytic anaemia to suggest that there would be a prevalence of *cribra orbitalia* in areas where malaria was endemic, i.e. the marshlands. The study encompassed forty-six sites across twenty-seven counties, and analysed the remains of 5,802 skeletons. The findings showed that *cribra orbitalia* was more common in the low marshlands, rather than urban environments. The topographical, geological and historical evidence studied from the areas indicating high *cribra orbitalia* prevalence presented convincing support of endemic malaria in specific lowland environments in Anglo-Saxon England (Gowland, 2012).

Next, Professor Matthew Collins of the University of York, stepping in for Dr. Oliver Craig, gave an incredible talk on the studies of palaeodiet, starch grain and calculus analysis, and tracing the movements of populations through gut bacteria. He highlighted the many avenues of analysis currently available to the study of palaeodiet including skeletal osteology, stable isotopes, archaeozoology and archaeobotany to name a few. He emphasised, however, that this is but the beginning; new and innovative techniques are beginning to revolutionise our ideas about palaeodietary analysis. The first of these techniques is starch grain analysis. Matthew admitted his initial trepidation in using starch analysis for, if the cellulose structure in wood breaks down so readily, how can that in starch, which is much weaker, survive? The answer came from considering environment. Above 80°C, the glucose units in starch easily hydrate and are very accessible

to enzyme digestion (relative to their chain structure). Once water infiltrates the starch structure, enzymes have access and begin to break the starch down at a fairly constant rate. Below 80°C, however, the granules are much harder to infiltrate and thus to hydrate and gelatinise. Preserved starch grains, often found as residues on pottery and in dental calculus, are a new and exciting way of ascertaining past diet (Collins, 2012).

In conjunction with this, Matthew also stressed the importance of calculus. Not merely a home for starch grains, it also contains a wealth of biomolecular markers which all represent components of ancient diet. Bacterial DNA and gut flora all flourish in the nourishing, warm environment of our mouths. Their residue, like starch, can also be analysed. *Helicobacter Pylori*, a stomach bacteria associated with stomach ulcers, has been subjected to an innovative study using proteomics and DNA analysis; tracking its development and spread within past populations, allowing experts to infer geographic and migratory pathways of movement. Matthew presented a versatile and engaging overview of several of the most recent and exciting innovations in bioarchaeological analysis. There is no denying we all finished the talk feeling somewhat more intimate with the ecology of our mouths! (Collins, 2012)

After a coffee break, Dr. Kieran McNulty of the University of Minnesota, currently a Leverhulme fellow of Durham University, discussed his on-going research at Rusinga Island. He outlined the vast amount of fossilised hominids, dating 18-20ma, found on the island due to the deep sediments created by the frequently erupting volcano less than 1km away. Previous research from the 1940s and 1950s collated approximately eighty-five species of mammal. More recently there have been around 700 new fossil species discovered, including fifty new primate species, highlighting the importance of this island for the study of the Miocene and human evolution. McNulty touched upon a new area of Rusinga Island, R3, where the project has been surveying a palaeosol. Experts have identified a fossilised interconnecting root system in the short stratigraphy, along with fossil trees dating 18ma. At least four species of *Dendropithecus* have been identified around the trees, showing catarrhines were living in forest areas. This exciting research area is giving a huge insight into very early hominids and their environment during the Miocene, including the remarkable fact that both flora and fauna were able to survive the harsh volcanic conditions nearby (McNulty, 2012).

This was followed by the University of York's Professor Michael Hofreiter who presented an overview of his recent research paper; written with Professor Terry O'Connor of the University of York, and others, on the domestication of horses and how this can be seen through the genetic phenotype of colour. He highlighted how domestic horse species show more variation from human selective breeding programmes, thus we should be able to see the beginnings of domestication with a change in phenotype variation. Pleistocene horses are a very uniform bay species, but by 5,000 years ago they became much more varied with bay, black, grey and white species. However, spotted horses were being depicted in Pleistocene cave paintings 25,000 years ago, suggesting phenotype variation pre-domestication. Hofreiter explained that despite the large variation of contemporary horse phenotypes, all are identical in their Y-chromosome and this was not lost in early horse domestication. Wild mares were perhaps easier to domesticate and this could be what caused the diversity in horse species when added to the breeding pool (Hofreiter, 2012).

A short panel session chaired by Dr. Gillian Taylor of Teesside University allowed the audience to put their questions to the first four speakers before breaking for lunch. Here we had the opportunity to mingle with other students and academics.

The afternoon session resumed with Teesside PhD student Claudia Garrido-Varas talking about her research in bilateral asymmetry and sexual dimorphism, and how this is used to pair up bones in the context of mass graves. She gave an example of how she had done this using the humerus in a modern Chilean population. The humerus is diverse and can be used to age, sex and determine the stature in individuals. Garrido-Varas explained how she measured the maximum length, the vertical diameter of the head and the width of the distal end which show differences between males and females and are all population specific. The lengths surprisingly showed the right side was always slightly longer than the left, but it would be hard to match pairs based on this alone. Instead, she used geometric morphometrics to scale and find the best fit for bone shapes. Procrustes superimposition determined if the bones were roughly the same shape and belonged to the same individual (Garrido-Varas, 2012).

Dr. Janet Montgomery of Durham University discussed her research as part of the Beaker People Project, with an isotopic study of burials in Britain. Her aim was "to reassess the dates, osteology, diet and mobility of 250 burials in Britain and to interpret the context of current theory and material culture". The 250 individuals were investigated using strontium (Sr) and oxygen (O) isotopes on the 2nd molar to assess mobility, and carbon (C), nitrogen (N) and sulphur (S) on root dentine to assess diet. However, Montgomery explains how her results were extremely un-diagnostic. The Sr results were mostly <0.710 which is expected for any geological location in the UK. Likewise, the C and N values were all in a tight cluster suggesting a very uniform diet across the UK. The O results appeared to be normally distributed with a very large range. One interesting point was when the burials were plotted onto a geological map. Montgomery was quite surprised to find that most of the burials appeared to be on the border of the same two types of geology. Montgomery's research highlighted the uses of isotopic analysis but how it can also be very un-diagnostic. The Sr results, for example, could suggest an individual originated from a band of geology in Scandinavia, but very similar results will also put that person in an area of the UK (Montgomery, 2012).

The final talk was by Durham University PhD student Julie Peacock whose research is aiming to prove through British skeletal remains the presence of disability and traumatic brain injury after sustaining head injury. Understandably not every head wound would result in a brain injury, but her ongoing research is looking at individuals from London, Norwich and York to try and determine secondary symptoms, such as disabilities and co-morbidity, that might be a result of a previous head wound and subsequent brain injury. These might appear as defects on the C3 and C4 vertebrae, osteophytes on the T4-T8 vertebrae and scoliosis associated with gait problems (Peacock, 2012).

The day was rounded up with a second panel also chaired by Dr. Gillian Taylor to put questions to the final three speakers, followed by some closing words from Dr. Tim Thompson. The conference was well structured and presented a wide range of exciting and interesting research fields. It was a great opportunity to learn first-hand about the new areas of bioarchaeological

research currently being undertaken in the field; and was in general an enjoyable and academically stimulating day.

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