ERAS News

EAST RIDING ARCHAEOLOGICAL SOCIETY No. 54 MAY 2003

Ring of Brodgar, Orkney, Scotland *Photograph: K. Dennett*

Pollen Analysis • The Development of Human Diet • Stable Isotopes
Resistivity Survey • Local News • Excavation Opportunities • Quiz • Diary Dates

CONTENTS

ERAS Local News ....

ORKNEY TRIP

Preparations for Orkney are going well and the final group size is 19. We fly from Manchester to Kirkwall via Aberdeen and will be staying at a school hall of residence, in the town. (The Orkney term will just have finished by July 8th). A mini-bus and two small cars have been hired and a detailed itinerary is being planned. The group is hoping to see most of the main archaeological sites and to make a trip to Rousay. Those who have already seen Rousay and want to go somewhere else will be able to do so, depending on weather, funds and fitness. It should be an excellent trip.

HELP NEEDED- EQUIPMENT BOOK

The appeal for people to help with enveloping the newsletter was successful and those of you who volunteered will be hearing from Kate over the next few months. However we now need someone to do another specific job.

ERAS has a large amount of equipment stored in various places, either with members or in the Old British Gas Transport Depot on Clough Road. We would like one, or perhaps two persons, to take on the responsibility of keeping a record book of exactly who has what and when things are borrowed. The job would include checking the inventory of equipment initially, and then once a year (preferably in time for the AGM). The bulk of stuff is not particularly valueable but is useful. (buckets, spades, sieves, brushes, safety fencing, site planks, barrows, plastic sheeting etc. Valuable items such as the site pump, level, theodolite, computer etc are with individual members, but still need to be listed.

So if you can help, whether you are an ordinary member or a committee member, please contact Kate on 01482 445232

NEXT LECTURE SERIES

If you are new to ERAS, don't panic about the date of the next lecture series. The Autumn session always starts on the third Weds of September, with a round-up of work that has been carried out in the region during the year. The next newsletter is scheduled for August/September, but as we usually include your new membership and programme card in the mailing, it is likely to be last minute. (ie well into September). If you have paid your membership for the year you will automatically get the new card in September.

MEDIEVAL GALLERIES AT HERM

If you haven't been to Hull & East Riding Museum in High St. Hull lately, you will be in for a surprise. The new medieval displays are in place, natural history is spectacularly represented and the shiny new entrance is now around the corner, where the old No.3 store used to be. The complex now links together with Streetlife and Wilberforce House to form a comprehensive 'Museums Quarter.' The Hull and East Riding Museum always was worth a visit, but now it's even better.

KEEPER OF ARCHAEOLOGY

The new Keeper of Archaeology at Hull and East Riding Museum is Craig Barclay, who replaces Gaile Foreman. Craig is a specialist in coins and his previous job was with the Yorkshire Museum where he was Keeper of Numismatics. He is not, so far, a member of ERAS, however we hope to entice him into the society before long!

PREVIOUS ERAS NEWSLETTERS

We have a number of spare copies of previous newsletters which are available at 20p each (plus the cost of the postage) If you want to fill a gap in your collection, the following are available from Kate either by post or at meetings, but please telephone first (01482 445232) to order.

ERAS News No. 26, March 1988 2 copies
ERAS News No. 29, March 1989 3 copies
ERAS News No. 30, June 1989 7 copies
ERAS News No. 39, Feb 1993 3 copies
ERAS News No. 40, March 1994 2 copies
ERAS News No. 50, March 2001 6 copies
ERAS News No. 53, March 2003 20 copies
Index to ERAS News issues 1-49 5 copies

ERAS Shortnews No. 17, Sept. 2000 2 copies
ERAS Shortnews No. 18, July 2001 22 copies
ERAS Shortnews No. 19, Dec 2001 2 copies
ERAS Shortnews No. 20, Sept 2002 1 copy

Kate Dennett

Field Studies Group - Resistivity Survey in Beverley

Ongoing Work at Hall Garth

The survey of Hall Garth field in Beverley was the first one to be completed using the society's resistivity meter. About 15 different members helped over several weekends, supervised by Paul Brayford, Rod Mackey, Dave Clarke and Kate Dennett The results were very pleasing and a full report will eventually be published in the society's journal the East Riding Archaeologist, along with a topographical survey of the same field, carried out by Helen Fenwick of Hull University. Using a very accurate GPS system, the topographical survey took only about 4 hours (and a lot of walking). The two surveys together will make a useful contribution to the archaeological record of Beverley.

The resistivity results are interesting in that they show more detail than was previously known about the former buildings on the site. To the north, the post-Medieval inn and its outbuildings are clear. The remains of this building may well be masking ecclesiastical buildings of an earlier date, or buildings associated with the Medieval Archbishop's Palace, the main part of which appears to be slightly to the south. There appears to be a narrow, linear feature, curving south-west, then south-east from this area towards the central area and it is possible that this is a curtain wall relating to the Medieval buildings.

What appears to be the main grouping of Medieval buildings is towards the centre of the present enclosure. One rectangular structure, approximately 30m in length and several smaller buildings or rooms are apparent. Further study of the results is yet to be done and more manipulation of the images with the software might result in a more detailed interpretation being made, before the survey is published. What is interesting at this stage is that two different alignments of buildings are apparent and these may represent different phases of building.

Another feature of interest is the moat, which skirts the southern boundary of the present enclosure but does not appear to show along the eastern side, although there is obvious evidence for a small stream here. It is possible that the moat was further to the east, enclosing a much larger plot than the present one.

The resistivity survey, included the turfed area adjacent to the new housing to the east of the field. After the survey, some grid pegs were left in situ along the boundary fence so the same grid could easily be re-established if necessary. The field has since grown knee deep in grass and the cattle have been returned to pasture there.

Other Work

Members are currently investigating ownership of other sites, as mentioned in the last newsletter and it is hoped arrangements can be made for another major survey this summer. In addition, Graham Evans has been using the meter to survey a small part of a scheduled site NE of Hull and will be puting in a report to English Heritage. Richard Campbell has been surveying on land at Thearne and Shiela Cadman, who is hoping to trace an early chapel at Wansford, near Driffield is asking for volunteers to help with a small survey there this summer. If you want to know more about the resistivity work contact Paul Brayford on 07768 776134 or just come along to Field Studies meetings on the first Wednesday of each month in Percy St. Hull.

Peter Bartle has, for several years now, been responsible for providing a topic for discussion or a project to work on at field studies meetings and this has been very much appreciated by members. We have had an amazing insight into many projects with which he has been professionally involved, and these have often sparked further research by members. However we are aiming to get back to the original format for meetings- ie. field work. This is partly because there is much field work to be done, partly because we now have the resistivity meter and partly because it is not fair for the responsibility for meetings to fall always on the same person.

Casual and Metal Detected Finds

Several members have recently brought along finds of metal, pottery and flint found on their own or on friends' land. Identification proved to be an interesting exercise and opinions, as might be expected, differed slightly. However, in some cases members were advised to take items along to one of the Hull and East Riding Museum's finds identification days.

K. Dennett

Ask the Expert: Stable Isotopes in Archaeology. *By Paul Brayford*

Question:
In Mandy Jay's lecture on 19th February, she talked about nitrogen and carbon stable isotope ratios. I couldn't really get my head around it! Could we have further explanation please?

The molecules that make up biological materials (biomolecules) are largely built from five elements - carbon, hydrogen, oxygen, nitrogen and sulphur. Two of these elements are of particular use if we want to look at past diets. Carbon and nitrogen each occur in two different stable isotopes. Measuring the proportion of the different carbon and nitrogen stable isotopes in biomolecules making up human bone from archaeological deposits can help us find out about the diet of the person in the period of ten years before death.

A chemical element consists of a nucleus surrounded by a cloud of electrons. The nucleus consists of two types of particle, protons and neutrons. The number of protons in the nucleus determines what the element is. For instance, carbon contains six protons, nitrogen contains seven protons and oxygen contains eight protons. Usually the nucleus contains as many neutrons as protons. The sum of the number of protons and neutrons determines the atomic mass of the element. Every element has variants in which the number of neutrons is different from the number of protons and therefore the atomic masses are different. These are known as isotopes.

For instance, the main isotope of carbon has an atomic mass of twelve (six protons and six neutrons). This isotope is known as carbon-12 (sometimes written as C^{12} or ^{12}C). This represents approximately 99% of naturally occurring carbon (in the air). An isotope with seven neutrons, known as C^{13}, exists and accounts for about 1% of naturally occurring carbon. Both of these isotopes are stable, that is, they do not change over time. The ratio of the amount of carbon-12 to the amount of carbon-13 in a molecule is known as the carbon isotope ratio.

Other isotopes of carbon exist but are unstable or radioactive and change over time. The most long-lived of these is C^{14} (with eight neutrons), which has an important role in archaeology because, although it occurs in very small proportions (about 1 part per million of carbon-12), it changes at a known constant rate and can be used to date biological materials such as charcoal, wood, leather, grain etc.

Nitrogen has seven protons and occurs in two stable isotopes. Nitrogen-14 (N^{14}), with seven neutrons, constitutes about 99.6% of naturally occurring nitrogen (in the air) and nitrogen-15 (N^{15}), with eight neutrons, constitutes about 0.4%. The ratio of the amount of nitrogen-14 to the amount of nitrogen-15 in a molecule is known as the nitrogen isotope ratio.

The molecules that make up the tissues of a human are derived from the foods that are eaten during the lifetime of the individual. Different isotopes of the same element behave largely in the same way in reacting with other atoms so can occur in the same molecules. So, biomolecules can contain different isotopes of the same element.

One way in which different isotopes do behave differently is in the speed in which they react in chemical processes. The heavier isotopes tend to react more slowly in processes such as evaporation and digestion. This means that the ratios of stable isotopes in particular substances may be different from the overall environmental ratio. Comparing the stable isotopes of elements within a biomolecule can be a useful tool in finding out what processes the elements that make up the molecule have been through.

Both the carbon and the nitrogen isotope ratios for a range of foodstuffs are fairly well known. The carbon isotope ratio of human bone tells us about how much marine protein (e.g. fish, shellfish) there was in the diet, compared to terrestrial proteins (e.g. grains, breads, cattle meat and milk). Though there may be further change during metabolic processing of food by the consumers, the mean carbon isotope ratios of the original source can still remain visible through multiple steps of the food chain.

The nitrogen stable isotope ratio changes along the food chain so that there is a higher proportion of N^{15} at each stage. So, grazing animals show N^{15} enrichment relative to the plants they consume and predators show further N^{15} enrichment relative to their prey species. That is, the higher up the food chain an organism is, the greater the proportion of N^{15} to N^{14}. This means that the nitrogen isotope ratio tells us about how much plant food there was in the diet, compared to animal foods (like meat and milk).

For archaeologists, this means that if we can somehow measure the carbon and nitrogen stable isotope ratios for ancient man we may be able to get useful information about their diet. Since bone is the most common surviving human body tissue in archaeological deposits, we can attempt (continued on page 11)

Lecture summary: Stable Isotopes and Diet in the Archaeological Context

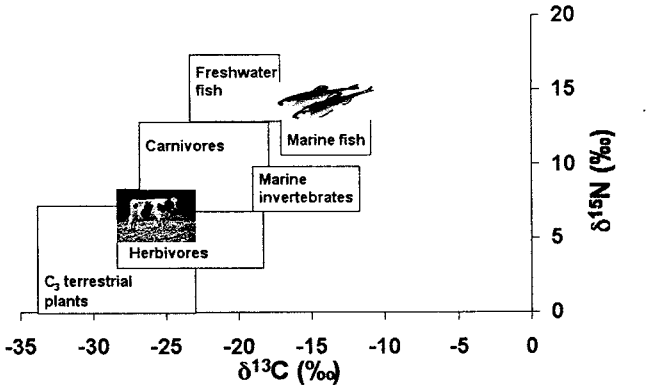
February 2003 Mandy Jay

Mandy Jay is a research student at the University of Bradford and is a member of the University's Palaeodietary Research Group.

Mandy Jay explained why archaeologists are interested in the diets of past communities. The types of food eaten by man at different times in history can tell us about methods of food procurement (hunting, gathering, farming); about social behaviour, power and wealth; about land use and water availability at the occupation site; about mobility (eg, if coastal resources are being used); about rituals such as pit deposits and animal burials; about environmental effects, including deforestation; about nutrition and health (eg, vitamin deficiencies).

The lecture had a higher scientific content than we are used to in ERAS lectures but the speaker, began with some of the basic science and Paul Brayford has expanded this (page 5) so I won't reiterate, except to summarise that stable isotope analysis provides us with an analysis of average long-term human diets, rather than the specific information which can be obtained by environmental analysis. The diagram below shows a typical distribution of isotope values for different sources of protein.

CARBON & NITROGEN STABLE ISOTOPES



One possible source of confusion when looking at a graph like this is that the values for the carbon isotope ratio are negative. This means that, whereas nitrogen ratios become more positive higher up the food chain, the carbon isotope ratios are less negative (and less negative to a greater degree with a more marine diet). The negative state of the carbon ratio is simply a result of the relationship to the standard. For those of a mathematical disposition, the actual formula for calculating the carbon ratio is:

$$\delta^{13}C = \left[\frac{(^{13}C/^{12}C)_{sample}}{(^{13}C/^{12}C)_{standard}}\right] - 1 \times 1000$$

Having discussed the technique, Mandy Jay then described case studies showing how the stable isotope method has been used to look at different problems. Richards et al. measured the isotope ratios of Neanderthal bone from Vinija (Croatia) and the Czech Republic. The nitrogen isotope values are quite high, indicating a largely meat -based diet, similar to wolves and other carnivores. Animal bone was also assayed, including deer, wolf, fox, cave bear and mammoth. There are some as yet unexplained levels among the animals: the mammoths lie higher on the scale for $\delta^{15}N$ than would be expected for a herbivore, whereas the cave bears are very low on the $\delta^{15}N$ scale. The high values for mammoth bone collagen (also found at other sites) might be a result of a high proportion of a single plant species in the diet. Animal bone data, preferably from the same area and time period, is needed for this sort of work to provide a baseline.

The Mesolithic/Neolithic transition in coastal areas has been studied by a number of workers attempting to look for changes in diet across the transition. In Portugal Lubell et al. found that the Neolithic samples had $\delta^{13}C$ values which were more negative than those of the Mesolithic samples, indicating the abandonment of a marine diet with the introduction of Neolithic culture.

Mandy Jay's next example involved plants. Plants can be described as C_3 or C_4, a distinction that has no direct connection with carbon isotopes, but reflects their different biochemical pathways. However, C_3 plants, when consumed, produce $\delta^{13}C$ values at the more negative end of the scale, whereas C_4 plants, which are found in more tropical climates and include maize or corn, lie at the less negative end of the scale. This separation of isotope ratios has been utilised by Lynott and co-workers to determine the introduction of maize into human diets in Arkansas and Missouri. The less negative $\delta^{13}C$ values, indicating consumption of maize, start to appear at about 1000 AD.

Stable isotope analysis of material from Poundbury in Dorset suggests that higher status people within that Late Roman site enjoyed a diet higher in marine protein (Richards et al. 1998). The spread of data shows that burial in lead coffins was associated with $\delta^{13}C$ values that were less negative than those obtained from burials in wooden coffins. The high status of people who were buried in a mausoleum was also reflected in less negative $\delta^{13}C$ values. The isotope values for two individuals were low on the nitrogen scale but fairly high (less negative) on the carbon scale, suggesting

their diet was rather different from the rest of the population. They may have been recent immigrants from a warmer climate. Samples taken from both the middle and end of a femur from a child burial gave two quite different carbon ratio values. Since the turnover of collagen is faster in a child, it is suggested that the different values reflect a change in diet when the child moved from, say, Greece to Dorset.

Because of the date and state of the burials at Poundbury it was possible to determine the sex of some individuals. When this information was matched with the isotope values the results suggested that the men were getting a higher protein diet than the women.

Mandy Jay's last study compared her own research data from Wetwang with Roman Poundbury. At Wetwang and Garton Slacks more than 450 La Tène inhumations of 4th - 3rd century BC have been found. Some of the burials are covered with barrows and some are famously associated with 'chariots'. The large sample size should allow measurements of the relationships of diet with gender, age and status. Some of the burials contain animal bones that could be interpreted as the result of feasting and it was hoped to find out if this represented a 'one-off' ritual or reflected a lifetime dietary habit.

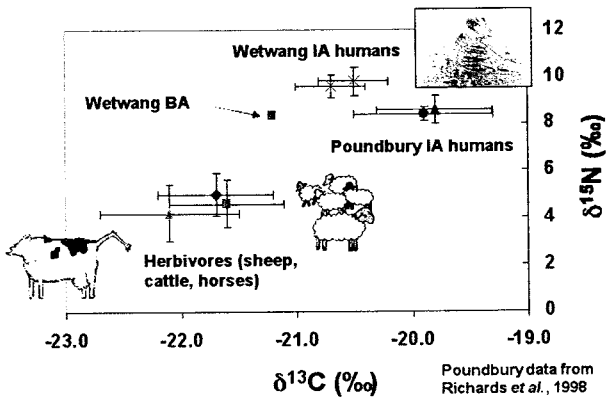
From the isotope values it seems that the Wetwang diet was high in protein. The graph (right) shows the results relative to the Poundbury data (from Richards et al. 1998). Unfortunately, Wetwang does not have the animal data that Poundbury has. The Bronze Age is represented by one individual from Wetwang. No differences in diet were found between males and females. Despite Wetwang's proximity to the coast, the results do not suggest that the population's diet was high in marine foods.

Using the presence of chariots and grave goods as indicators of high status, a relationship between status and diet was looked for, but none was found, nor was any relationship found between burial phase and diet. Though the cemetery was in use for about a century, and differences in diet might be expected if, for example, the early burials were of immigrants, it seems that the population was actually both homogenous and local.

A study of the teeth of some of the Wetwang population has begun. The degree of wear suggests that grain (with grit) was being consumed, in addition to the animal protein. Four toothless individuals have been found and, in the one already studied, bone has grown over the area of tooth loss. This overgrowth should provide a sample from the last years of life, whereas an area of mid-femur would reflect the earliest available, as this collagen has the slowest turnover.

Three suckling pigs were found in graves and their isotope values were also measured. Their nitrogen isotope values would be higher than those of their mothers as a result of a diet of their mothers' milk. It is possible that some of the rather high $\delta^{15}N$ value of human bone collagen at Wetwang might be attributable to the regular consumption of pig meat, particularly of young pig.

Isotope Values



In conclusion, the data from Wetwang seem to indicate an apparently egalitarian diet and a remarkably stable and homogenous population. Though obviously less exciting than a list of strange differences, the results show how the stable isotope technique is able to add more information about this important site on our doorstep and we thank Mandy Jay for introducing what, to many of us, is a new tool in archaeological investigation. She is very willing to discuss her results with anyone who is especially interested or to answer questions, which can be passed on to her through the editor.

Summary: V. J. Fairhurst

References

Lubell D, et al. (1994) The Mesolithic-Neolithic transition in Portugal: Isotopic and dental evidence of diet. Journal of Archaeological Science 21: 201-216

Richards M P, et al (1998) Stable isotope analysis reveals variations in human diet at the Poundbury Camp Cemetery site. Journal of Archaeological Science 25: 1247-1252

The images used in this article were adapted from those kindly supplied by Mandy Jay.

See page 11 of this newsletter for a website containing further information.

Lecture Summary: Pollen Analysis in Scotland

January 2003 Dr. M. J Bunting

Initially planning to be a physicist, Jane Bunting gained an undergraduate degree in Natural Sciences then went on to do a PhD in the Sub-Department of Quaternary Research at Cambridge on 'Environmental History and Human Impact in Orkney, Scotland'. This was followed by several years of post-doctoral work in Southern Ontario, Canada, Sheffield and Stirling, doing a variety of environmental archaeology projects. Five years ago, she became a lecturer at the University of Hull, where she continues to develop her research and teaching interests in environmental change and the impact of human activity on landscapes.

Pollen analysis is a valuable tool in the armoury of the archaeologist . Especially so, if the archaeologist is interested in the landscape and context of human activity as well as the artefacts and structures left behind by past cultural groups. Dr Bunting talked about the different methods of pollen analysis and classification and in terms of presentation, acknowledged that many non-specialists do find pollen diagrams very difficult to interpret. She pointed out how pollen analysis can contribute to archaeological thinking by looking at some of the work she had done in Orkney. (Everyone agreed that this was also a good excuse to show some slides of a fascinating place with a rich and varied archaeological record!).

Dr Bunting discussed the basic principles and problems of pollen analysis. As any hayfever sufferer knows, pollen grains are produced in large quantities and are very well dispersed into the atmosphere. Essentially, pollen grains are 'plant sperm', and as the plant can't travel around and find a partner, the pollen has to do the moving. The vast majority of pollen grains don't reach female flowers, but are transported and deposited across the landscape.

Grains that land in waterlogged environments where sediments are accumulating steadily, such as peat bogs and lakes, can be preserved for millennia. To dig down into a lake bed or peat bog is to go back in time, and by analysing the pollen assemblages found in different layers of the sediment, it is possible to reconstruct past vegetation and landscapes, and thus find out about the context of human activity, and the effects of this activity on the environment. Pollen can also be preserved in non-sedimentary environments, such as buried soil surfaces, cooking residues in pots, and a range of other archaeological contexts including coprolites and the grease trapped between the plates of Roman armour. Archaeologically speaking, the latter are usually referred to as 'on-site' records and the former as 'off-site' records.

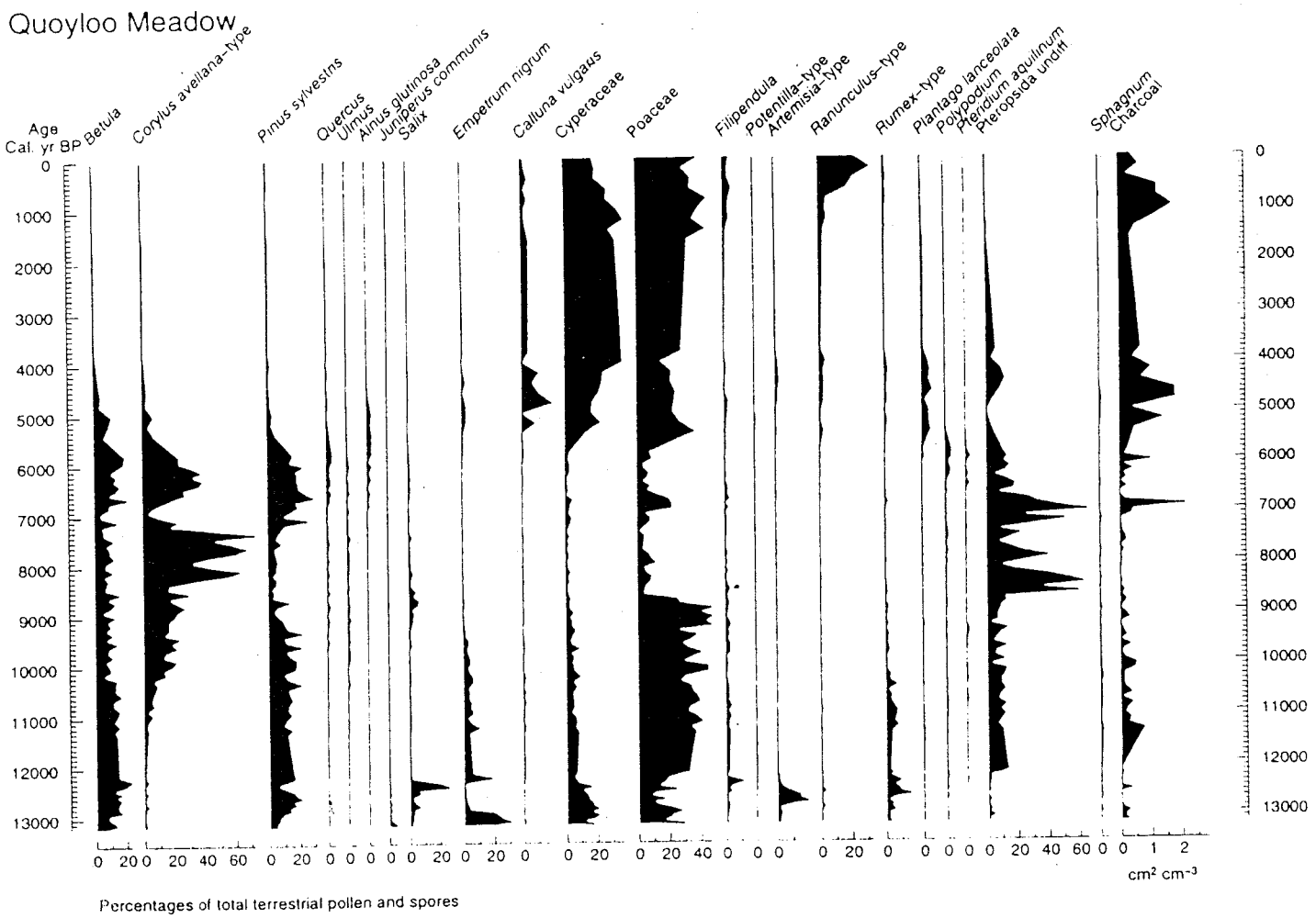
As an example of the use of 'off-site' records Dr Bunting talked about her work in Orkney, beginning with a series of slides to introduce the landscapes, the archaeological record (often said to be the richest in northern Europe), and the sites and techniques used in the study. When she began work in Orkney in 1990, there was no concrete evidence for a Mesolithic presence in the islands, and there were also many questions about the status of woodland; had the islands ever been tree covered? When and why did the trees disappear? What was the environment encountered by the Neolithic settlers?

Results of the work on pollen analysis showed that woodland had once been widespread, although it was already in decline at the start of the Neolithic, and most of the tree cover had gone by the mid-Neolithic. Dr Bunting also found clear signs of woodland disturbance over several hundred years during the Mesolithic, implying human presence (supported by Caroline Wickham-Jones' re-analysis of lithics collections held in the Orkney Museum, which identified at least seven different locations with Mesolithic elements).

For an example of on-site pollen analysis Dr Bunting talked about work she had carried out in collaboration with ARCUS, the archaeology unit at Sheffield University, at an Orcadian Bronze Age cemetery at Linga Fiold on Mainland (*Mainland, confusingly, being the largest of the Orkney Isles. Ed.*) Here, careful sample analysis from a range of contexts within individual burials showed the inclusion of flowering plant material with the burial, dominated by the somewhat unprepossessing plant Ribwort Plantain (Plantago lanceolata). A possible 'ritual' explanation

for this plant inclusion was suggested, since although it does not have attractive flowers, a strong scent, or any significant traditional medicinal use, it is a weedy plant very strongly associated with pastoral agriculture. Also showed, was an example from the work of Ciara Clark on another Bronze Age burial, where it appeared that different flowers were associated with different parts of the corpse. Mapping the distribution of floral offerings in Scottish Bronze Age burials appears to suggest that strong regional differences existed.

Summary and diagram- M.J Bunting



This simple version of a pollen diagram shows results from Quoyloo Meadow, Orkney. Abundances of principal pollen and spore types and charcoal are plotted as percentages, against sediment age in calendar years before present.

Latin names translate as follows

Trees and shrubs

Betula	Birch
Corylus avellana-type	Hazel
Pinus sylvestris	Scots Pine
Quercus	Oak
Ulmus	Elm
Alnus glutinosa	Alder
Juniperus communis	Juniper
Salix	Willow

Heaths and herbs

Empetrum nigrum	Crowberry
Calluna vulgaris	Ling Heather
Cyperaceae	Sedge family
Poaceae	Grass family
Filipendula	Meadowsweet
Potentilla-type	Tormentil group
Artemisia-type	Wormwood group
Ranunculus-type	Buttercups
Rumex-type	Docks
Plantago lanceolata	Ribwort Plantain

Ferns and mosses

Polypodium	Polypody fern
Pteridium aquilinium	Bracken
Pteropsida undif.	Other ferns
Sphagnum	Bog Moss

Answers to Quiz (page 10)

1. EBVRACVM, 2. PETVARIA, 3. RATAE, 4. CRVNIVM, 5. LINDVM, 6. EXETER, 7. ST. ALBANS, 8. WROXETER, 9. CHESTER, 10. COLCHESTER

Volunteer Opportunities, Summer 2003

SUTTON COMMON

Members are invited to take part in the English Heritage funded excavations at Sutton Common near Doncaster. The excavations are concentrating on the larger of two Iron Age enclosures. Volunteers can join the excavations between 3rd July and 8th August, Monday to Friday, 9am to 5pm. There will also be a large public open day on 3rd August.

To reach the site, travel along the M62 to junction 34. Take the A19 to Askern. Drive through Askern and the traffic lights. After you have exited the town and passed the national speed limit sign, the entrance to the site is the second track on the left. If you reach a Tom Cobley pub on your right, you have gone too far. Travel down the track until you reach the huts. If you would like more information then please contact Helen Fenwick on (01482 465543/470303) or
email h.fenwick@hull.ac.uk before 30th June

NORTH CAVE

Members can also take part in the Humber Field Archaeology excavations at North Cave between 30th June and 18th July investigating Iron Age/Romano British settlement. Work is undertaken Monday-Thursday 8:30-4:30 and Friday 8:30-4:00. The site is located off Newport Road, North Cave. If you go via the A63, leave the A63 at the North Cave junction, the site is accessed by taking the first right heading into North Cave (West Common Lane) and parking is at the rear of Ryecroft Farm. Or going from North Cave village, head out towards the A63 and take the last turning on the right before the junction.

Anyone wishing to attend the N. Cave excavations must contact Trevor Brigham to inform him when you will be attending (01482 217466 or Trevor.Brigham@hullcc.gov.uk)

It is better, for your experience and for site organisation, if you can do consecutive rather than dispersed days. You do not need to have any experience and you will be shown what to do. Please wear strong footwear (safety boots if you have them), take warm clothes, waterproofs and a packed lunch. If you are a paid up member, you are covered under the ERAS insurance scheme but please check with your GP that your anti-tetanus jab is up to date. Anyone who would like a copy of ERAS's Beginner's leaflet, 'Tips from the Trench Mouth', can get one from the secretary Rose Nicholson, (01430 441278 or 07770 470443)

If you are volunteering and are willing to offer transport to anyone else, please let Rose know your phone number and the dates you will be going. If you need transport, ring Rose and she might be able to put you in touch with a volunteer who has transport.

WALKINGTON HENGE RESISTIVITY SURVEY

PhD student, Jeremy Webster who surveyed at Rudston last year is hoping to survey Walkington Henge on Friday 19th - Monday 22nd September. We haven't yet got the necessary permissions but are hoping it will go ahead. If you would like to help for a half or full day, please ring Kate on 01482 445232 for details.

ERAS RESISTIVITY SURVEYS

See page 4 for details of how you can take part in the surveys planned for summer, using ERAS's own meter. These surveys provide a good chance for you to get involved in the planning and setting out of a survey.

COAST AND FORESHORE

It is always useful for members to keep an eye on the low eroding cliffs of S. Holderness and on the Humber foreshore, so do let someone know if you spot anything interesting. You could be the finder of the next boat!

QUIZ - ROMAN TOWNS *(By Peter Walker)*

For questions 1-5, give the Roman name of the English town and for questions 6-10, give the English name.

1. YORK
2. BROUGH
3. LEICESTER
4. CIRENCESTER
5. LINCOLN
6. ISCA
7. VERVLAMIVM
8. VIRVCONIVM
9. DEVA
10. CAMVLODVNVM

Dates for your Diary

Sat 14 June	Debating Late Antiquity in Britain AD300-700. A 2 day conference, hosted by the Archaeology Dept. at York University, aimed at bringing together researchers of the period AD300-700 in lively debate. Details from James Gerrard, email jfg101@york.ac.uk
Sat 21 June	Guided tour of Kirkstall Abbey ruins, Leeds. See parts of the abbey not normally open to the public. Booking essential. £3/£2/£1, Phone: Bryan Sitch, 0113 2305492 or email abbeyhouse.museum@virgin.net
Mon 30 June	Start of excavations at North Cave, see previous page
Wed 2 July	**ERAS Field Studies meeting**, 7.30pm Friends Meeting House, Percy St. Hull
Thur 3 July	Start of excavations at Sutton Common, near Doncaster, see previous page
Sat 5 July	Guided tour of Kirkstall Abbey, as above
Sat 2 Aug	Guided tour of Kirkstall Abbey as above
Wed 6 Aug	**ERAS Field Studies meeting,** as above
Wed 3 Sept	**ERAS Field Studies meeting** as above
Sat 6 Sept	The Archaeology of Yorkshire. The launch of a major YAS publication. Tempest Anderson Hall, Museum Gardens, York 12am-5pm. (further details, programme- Terry Manby (01430 873147)
Wed 17 Sept	**ERAS Reports Meeting.** The first of the Autumn lecture series. Wilberforce Building, room S1, Hull University. 7.30pm. details of speakers in next newsletter. Members free, visitors £1
Fri 19 Sept	Resistivity survey, Walkington, see previous page
Sun 21 Sept	Past, Present and Future Redundant Churches- A full day YAS walking tour of York with Peter Addyman. Booking essential. YAS Members £10, non-members £12, £5/£6 7-16 year olds. (No dogs) Bookings with cheque (to YAS) to Janet Senior, YAS 23 Clarendon Rd, Leeds LS2 9NZ

Ask the Expert *(continued from page 5)*

to extract the protein portion of the bone, the collagen, analyse its nitrogen and carbon stable isotope ratios and get information about the diet of the individual.

Bone collagen isotope values probably reflect only the protein part of our diets. In adults, the collagen in our bones is constantly being replaced, and it takes about ten years for all of the collagen in a long bone such as a femur to be replaced, or 'turned-over'. Therefore, adult human bone collagen provides an average record of all of the protein that has been eaten by a person over about a ten-year period.

The great advantage of stable isotope analysis is that it gives us a direct measure of long-term human diets, whereas more traditional methods of diet reconstruction from environmental archaeology, such floral and faunal analyses, give us information about specific foods eaten, and may only reflect single or special meals. However, the questions asked by stable isotope researchers are generally the same as asked by all researchers exploring past human diets.

For this article, reference was made to the following website
http://www.staff.brad.ac.uk/mprichar/PRGMain.html

Paul Brayford

Question for next month:
Can we have more details about pollen diagrams, please? Eg.How many samples are needed, to be sure results are typical of the area and what is the relevance of the various species. Some diagrams are far more complex than others. Can you explain how to 'read' the more complex ones?