

5th Experimental Archaeology Conference (2011)

Paper titles and abstracts

Ferran Antolín

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Inferring taphonomical history of grain assemblages: an experimental approach

Abstract: Grain assemblages are relatively common in archaeological sites. They are reported to have a good potential of information on agricultural and gathering practices. Nevertheless, limitations on our knowledge of their taphonomical history are serious drawbacks in our final interpretations. What temperatures were the assemblage exposed to? Did all the taxa have the same possibilities of surviving? Is the assemblage really in situ? How has it been affected by post-depositional processes? An experimental plan to answer most of these questions will be presented along with the results of the first experiments.

Rowena Banerjea & Alex Brown

Dept. of Archaeology, University of Reading

Experimental geoarchaeology and urban ecology

Abstract: Recent work in geoarchaeological analysis of archaeological deposits has highlighted a series of major problems in interpretation of site-formation processes and settlement spaces in archaeological contexts. Experimental archaeology has an important role to play in understanding the taphonomy of microfossils, microstratigraphic signatures and chemical residues in modern occupation deposits to investigate traces of activities in a diverse range of archaeological settlement contexts.

The aim of this paper focuses on understanding the formation processes of occupation deposits and the spatial distribution of activities, as evident in the botanical and sedimentary records. The interim results of pollen and micromorphological analysis of control samples and occupation deposits from experimental buildings from Butser Ancient Farm, Hampshire and Lejre Historical and Archaeological Research Centre, Denmark, are presented.

At Lejre buildings include an Iron Age replica longhouse and a replica Viking Age Sunken Hut including stable areas for cattle (Iron Age zone), sheep and goat (Viking Age zone). At Buster, samples were collected from the Longbridge Deverill roundhouse including the entrance, internal eaves, hearth and hut floor. The hut floor is a compacted agricultural soil rather than a prepared surface.

Soil micromorphology and pollen analysis of occupation units and control samples will assist with understanding the depositional pathways of plant remains in these various contexts, in particular when deciphering assemblages that may consist of a mixture of residual plant remains from falling thatch, animal dung, animal fodder and crop processing activities. This research will be applied to our study of the ecology of the urban environment at Silchester Roman Town.

Martin Bell

Dept. of Archaeology, University of Reading

Experimental earthworks and the formation of the archaeological record

Abstract: TBC

Silje Bentsen

School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand

On probes and samples: an experimental framework for Middle Stone Age pyrotechnology

Abstract: A series of fire experiments was conducted to examine the technological aspects of fire use in the African Middle Stone Age. The methodological approach included the use of a thermometer with two probes in some experiments and four in others, making it possible to measure temperatures in, under and by the fire. This recording of temperatures helped identify important variables, for example, how different types of wood influence temperature in and below fires. The experimental fires were excavated in the same manner as the archaeological samples from Sibudu Cave, and ash and sediment samples were taken from all layers in the fires. A comparison of pH values showed variation between samples from different depths and also between experimental and archaeological samples. Fire experiments were also designed to identify important variables of ash dumps, including homogeneous sediment and chaotically aligned items.

Alice Choyke₁ & Paul Duffy₂

Central European University₁ & University of Michigan₂

Time and enhanced value: the use life of bone beads

Abstract: The length of time objects are used is an extremely difficult thing to measure on archaeological objects. Separating and assessing intensity of use, raw material and actual longevity of use presents serious problems. However, as has been pointed out in the literature, objects can become imbued with meaning and value that goes far beyond simple function and their straightforward economic importance in a particular cultural setting (Choyke 2006, 2009). Beads in particular have a fractal quality to them (Fowler 2004: 40–41). Necklaces or pieces of clothing decorated by beads have the potential to be broken up, added to and re-distributed. In the Final Neolithic period in Hungary there is a particular kind propeller-shaped bead given as grave-goods to women and girls as parts of hair ornaments, bracelets, girdles and necklaces that also included marble, spondylium and dentilium beads. Such ornaments may also have been worn in life but the different degrees of wear on the beads strongly suggest that these particular grave goods were

prepared for the moment of the funeral and did not necessarily belong to the deceased during her lifetime. Many beads had been apparently used over long periods by (presumably) related people in the community. Thus, these beads served to connect female members of a particular part of this community and gained value through the passage of time. An experiment is underway in which eight replicas of these propeller-shaped bone beads and several simple dog canine and round bone beads were strung onto a sinew thong. During the first year trial, we also experimented with different fibres from hemp, leather and sinew. Twisted sinew has proved by far the most durable. This necklace has now been continuously worn for over four years, dismantled only to measure what type and degree of wear has occurred on their surfaces compared to a single bead kept aside for comparison purposes. Although the authors intention is to keep using this necklace continuously for a few more years at least, the results show these beads are actually barely worn after more than four years of continuous wear.

Pascal Flohr

Dept. of Archaeology, University of Reading

Stable isotope analyses of ancient cereal grains for environmental reconstruction: using experimental archaeology to improve existing methodology

Abstract: Carbon and nitrogen stable isotope analysis of ancient cereal grains is a promising new method to reconstruct the environment and ancient agricultural practices such as irrigation. However, while the main principles underlying the method are well established in modern plant sciences, there are still a number of questions relating to the viability of its application to archaeological samples. This research aims to address these issues and improve the existing methodology through experimental archaeology. In order to investigate the relationship between plant stable isotope ratios, water availability and other environmental variables, isotope analysis is being conducted on experimentally grown cereal crops cultivated at three different sites in Jordan. Wheat, barley and sorghum were grown for three years under different amounts of irrigation, ranging from 0% (rainfall only) to 120% of the plants' optimum water requirements. Environmental factors, such as rainfall and temperature, were closely monitored. To research the viability of the method for archaeological samples which have been buried for long periods of time and are often charred, experimental charring of grains was carried out and samples buried at sites in Jordan and the United Kingdom. The results of this research and the implications for the use of the method within archaeology will be discussed in this paper.

Jodi Flores

Dept. of Archaeology, University of Exeter

Experimental archaeology as scientific practice: 1796 to present

Abstract: This paper discusses how experimentation in archaeology rose in popularity as the wider discipline became more systematic and science oriented, and how the popularity of experimental archaeology has fluctuated several times as archaeology tried to find its own place within the realms of the sciences and the humanities. This will be done by analysing primary sources, starting with George Pearson's experiments on the composition of bronze artefacts from 1796 and ending with recent works that discuss the nature of experimentation in archaeology. I will also include the results of current research into the publication rates of actualistic experiments over the previous decades, some of the techniques that they employ (scientific and otherwise), and interviews with archaeologists who employ experimentation in their research. I will aim to discuss how a scientific methodology like experimental archaeology has fared at times when humanistic approaches were more popular within archaeology, how archaeological experiments utilised new scientific techniques and ideas, and how this has affected how experimental archaeology is approached in current archaeology.

Emma Jenkins

Centre for Archaeology, Anthropology & Heritage, Bournemouth University

Experimental crop growing, Jordan (full title TBC)

Abstract: TBC

Harry Lerner

Dept. of Anthropology, Brandon University

Raw material inter- and intra-type variability as a factor in use-wear formation: an experimental example from north-western New Mexico

Abstract: Quantitative approaches to archaeological use-wear analysis have been around for almost fifty years. During this time at least two general truths have come to light: there is an omnipresent need for greater methodological rigor and use-wear formation is a highly complex process that is still poorly understood. Two separate analytical approaches are being used in this study to evaluate different yet related aspects of wear formation. Image analysis is used to assess the horizontal distribution of wear and GIS is used to measure changes in surface microtopography due to wear formation.

Many kinds of lithic raw materials were used during the Late Archaic of northern New Mexico. Two of the more commonly used ones, Yellow Silicified Wood (YSW) and San Juan Fossiliferous chert (SJF), are used to conduct two series of dry hide scraping experiments designed to measure variations in rates of use-wear formation both within and between raw material types. The first series of experiments demonstrates that YSW accrued wear more quickly and more homogeneously than did SJF. The second reveals that YSW exhibited a greater range of variation in use-wear formation rates than did SJF. These findings have significant implications for how we interpret archaeological wear traces.

Wendy Matthews

Dept. of Archaeology, University of Reading

Ethnoarchaeology: a comparison to experimental archaeology and a critical evaluation of its application in Neolithic studies in central Turkey and the Zagros, Iran

Abstract: The first aim of this paper is to examine the aims, methods and applications of ethnoarchaeology and to compare these to current approaches in experimental archaeology. The second aim is to evaluate the application of ethnoarchaeology in studies of early Neolithic ecology and settlement in the Near East, with particular focus on Çatalhöyük, Turkey and the Zagros, Iran. It will briefly examine new approaches in multi-sited ethnographies.

Dawn Mooney₁, Nikola Trbojevic₂ and Aidan Bell₂

University of Aberdeen₁ and University of Iceland₂

Firewood in Viking age Iceland: an experimental approach

Abstract: This paper presents the results of one of the first archaeological experiments to be carried out in Iceland, which aims to clarify the use of birch as firewood in the Viking Age longhouses of Iceland. Although more than a century of academic research on the subject of Landnám deforestation has confirmed that the Icelandic birch woodlands declined significantly after the Viking colonisation of the island around 870 AD, it has failed to offer a detailed account of

the deforestation process and particularly to quantify the impacts made on woodlands in order to meet the requirements of households for firewood.

This experiment, carried out in the reconstructed Viking Age house at Eiríksstaðir in western Iceland, demonstrates the amount of wood required for interior heating and cooking facilities, and therefore enables us to postulate the degree of impact on woodlands of the basic needs of early Icelandic households. Furthermore, the results of this experiment have implications for archaeological interpretations of the daily life of Viking Age people and the spatial organisation of Viking Age longhouses.

Amy Poole

Dept. of Archaeology, University of Reading

Chemical analysis of buried soils from experimental earthworks with comparison to archaeological case studies

Abstract: Soils and sediments buried and preserved beneath archaeological monuments are a valuable archaeological and palaeoenvironmental resource. The study of these buried environments can provide information for reconstructing site formation processes. However, the chemical, physical and biological nature of the soil is altered by burial. Studying the soil for both pre- and post-burial change can lead to information on soil formation processes, past land use, burial environment, monument construction and preservation.

The main focus for this research has been three experimental earthwork sites: two octagonal earthworks built by Dr Peter Reynolds between 1986-1991, at Butser Ancient Farm in Hampshire and on the site of Fishbourne Roman Palace in Sussex; and the earthwork bank surrounding the Celtic village at St Fagans National Museum in Cardiff, constructed in 1992. Archaeological sites selected for comparison are: the Scottish Henge sites of Broomend of Crichton, Aberdeenshire and Pullyhour, Caithness, both excavated by Professor Richard Bradley; Silbury Hill in Wiltshire, the focus of a recent research and conservation project by English Heritage; and Bartlow Barrow complex in Cambridgeshire, a Romano-British site. These sites provide a variety of different soil types and geological locations within the British Isles.

Soils from each site have been examined using a range of analytical techniques in the hope of answering specific questions about pre- and post-burial change, adding to the knowledge on experimental earthworks and site formation processes in the archaeological record.

David Sim

Reconstruction of ancient armour: a scientific approach

Abstract: This paper deals with the scientific examination of Roman scale armour made of iron. The objective of this research was to determine the microstructure and the defensive index of this type of armour. In order to determine the defensive index of an armour it is necessary to know the precise material it was made from and this can only be revealed by metallography. The metallography that was conducted on these Roman originals made it possible to reconstruct the armour using modern metal with an almost identical microstructure. This copy was then tested to destruction using laboratory examination and field trials. The macro examination had revealed burrs on the inner face of each scale. This was initially thought to be poor workmanship but reconstruction and subsequent field trials showed that it was in fact a vital element ensuring the flexibility of this type of armour. This paper demonstrates the need for both laboratory testing and field trials in the reconstruction of ancient armour.

Geoff M. Smith

Institute of Archaeology, University College London

The efficiency of wooden projectiles: experimental observations and archaeological implications

Abstract: The recovery of wooden implements from sites such as Clacton and Schöningen have increased interest into how these implements were created and how effective they were. This paper details ongoing experimental research into the role and efficiency of wooden spears as hunting projectiles. The experiments used wooden spears based on the dimensions of archaeological specimens recovered at Schöningen; a professional javelin thrower was used to see how effectively these spears performed as javelins and what type of damage was caused to the carcass and skeleton. This research provides both experimental and archaeological evidence to suggest that wooden implements, like those from Schöningen and Clacton, were used as wooden projectiles. The data from the experiment demonstrated that these implements cause a high level of damage and certainly would have caused massive internal injury. These experiments illustrated the effectiveness and durability of these spears as hunting implements and provide insight regarding the tools, technology and subsistence strategy of Middle/Late Pleistocene hominid populations.

Conference Workshops

Rowena Banerjea

Dept. of Archaeology, University of Reading

Micromorphology and Experimental Archaeology (Researching Archaeological Formation and Post-depositional Processes using Micromorphology at Experimental Sites)

Abstract: A key advantage of experimental sites for the micromorphologist is to use these sites to understand further the depositional and post-depositional processes that take place in the archaeological record. The aim of this workshop is to pull together micromorphologists and other geoarchaeologists working on archaeological deposits to: a) share the outcomes and experiences of their experimental research; b) observe micromorphological thin-sections from a range of experimental archaeological contexts including experimental hut floors, buried soils and experimental earthworks; and c) discuss research objectives and potential guidelines for experimental centres concerning micromorphological research at these sites.

This 90 minute workshop will be structured as follows:

- Introduction to the theme (5 minutes): Researching archaeological formation and post-depositional processes using micromorphology at experimental sites.
- Short introductory talks (4 x 5 minutes). Theme: Researching archaeological formation and post-depositional processes using micromorphology at experimental sites. If you would like to present a short 5 minute paper for this theme, please email an abstract (200 words maximum) to Wei Chu (w.chu@reading.ac.uk) by October 16th 2010.
- Microscope time (50 minutes): you are invited to bring any relevant thin-sections to this workshop. Cards will be provided for you to identify your thin-sections and to provide information on the site and key sediment features of interest.
- Discussion (20 minutes): concerning the interactive relationships between micromorphologists

(and other integrated analyses) and experimental centres. What are our research objectives? What potential guidelines can we provide for experimental centres concerning micromorphological research (and other integrated analyses) at these sites?

Bruce Bradley & Ann Oldroyd

Dept. of Archaeology, University of Exeter

Recording a flaked stone experiment

Abstract: This session will demonstrate both the replication of lithic technology and appropriate methods and techniques for the recording of a replication experiment (e.g. documentation, bagging, labelling, photography etc). Participants will also have the opportunity to examine equivalent replicated pieces, along with the analytical results associated with those previously made pieces.

Inés López López-Dóriga

Universidad de Cantabria

Plant-related experiments

Abstract: This workshop session is specially focused on the presentation and discussion of specific methodologies to investigate the exploitation of vegetable resources by past societies, both through the direct study of botanical remains and indirectly from other kind of materials from archaeological sites (e.g. lithics, metalwork).

There will be 20 minutes per experiment: in the first 10 minutes, the researcher or research group should explain the objectives, methodology and results of the experiment; in the next 10 minutes, the experimental and/or archaeological materials will be displayed while discussions of the details of the experiment are held. While photographs are acceptable when it is not possible to present the experimental materials, it is strongly preferable that the latter are brought to display.

If you wish to participate in this workshop, please contact Inés López López-Dóriga (email: lopezli@unican.es). The deadline for applications is October 20th 2010. Applications must contain the following details:

- Author(s).
- Title, specifying the material(s) studied and field of research are specified.
- Specific laboratory equipment required for the presentation (if any).

Conference Posters

Katherine Brown

Dept. of Chemistry, University of Reading

Chemical Analysis of a Reconstructed Hut Floor in the “Celtic” Village at St. Fagans, Wales

Abstract: This investigation into the chemistry of a reconstructed Iron Age Round House floor (the Moel-y-Gaer Roundhouse, St. Fagans, Cardiff) in 2009/10 utilised a range of analytical techniques: X-Ray Florescence, X-Ray Diffraction, and Inductively Coupled Plasma Mass Spectrometry. The

aim was to discover whether chemical traces left by activities carried out on site could be identified, with particular reference to: the Phosphorus levels on site; distinguishing between layers observed in a hearth; whether woollen items (stored or excavated) could be detected using Sulphur concentrations and whether lime wash decoration traces could be detected in the soil near the walls.

The tests revealed lower levels of Phosphorus on site (in comparison to the immediate surroundings), almost certainly as a result of pre-excavation conditions. Higher levels of Calcium and Magnesium were detected as a result of the decoration of the hut, while Potassium and Sodium levels clearly demonstrated the area and layers of the hearth. Sulphur concentrations did appear to be higher in areas where wool was found as a small find, but not in areas where wool had been stored. Possible locations of a quern and two cauldrons were revealed through concentrations of Iron and Copper. This initial work highlights the potential of chemical analysis, both on reconstructed and original sites, to contribute to understanding of the Iron Age.

Danielle Davies

Dept. of Archaeology, University of Exeter

The science of projectile points: an experimental investigation into the classification of dart and arrow points in prehistoric North America

Abstract: The classification of dart and arrow points in North American archaeology has fuelled considerable debate regarding the application of functional typologies to isolated stone projectiles. Poor preservation of associated shaft components has led such typologies to rely upon dualistic metrical classification parameters, often overlooking the presence of technological diversity within the archaeological record. Investigation into the theoretical approach has, however, highlighted several problems with attempting to derive functional behaviour and active use from analysis of the static object alone.

The study outlined in this poster intends to emphasise the importance of the scientific approach through the active testing of projectile point capabilities. The science of projectile aerodynamics may be used to imply weight as the primary indicator of functional performance, with lighter arrow points used with the bow demonstrating a flatter trajectory than typically heavier dart points used with the atlatl. An archery-based experiment using replicated dart and arrow points from the Southwest allowed this concept to be tested, providing a valuable preliminary report concerning the usefulness of the scientific approach, as well as an assessment of deterministic theoretical approaches that have tended to overlook the possibility of types adopted throughout periods of technological transition, appropriate for use with either weapon.