PAST

THE NEWSLETTER OF THE PREHISTORIC SOCIETY

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Introducing Chickens – arrival, uptake and use in prehistoric Britain

The chicken (*Gallus gallus domesticus*) is our most widely distributed domestic animal, and occurs around the world in a broad range of ecosystems and societies. However, the chicken was a surprisingly late addition to the domestic menagerie. By combining archaeology, anthropology and scientific analyses, the AHRC-funded project "Cultural and Scientific Perceptions of Human-Chicken Interactions" has been investigating the domestication, spread, uptake and subsequent uses of chickens across time and space. Researchers based in universities at Bournemouth (Maltby, Best, Pitt, Feider), Nottingham (Sykes, Miller, Lazutkaite), Oxford (Larson, Lebrasseur), Leicester (Thomas, Fothergill, Foster), York (O'Connor, Collins, Craig, Colonese) and Roehampton (Marvin, Capponi, Ontillera, Ramasawmy, Smith, Zoubek) are involved, covering a wide range of specialist skills. Only a brief introduction to such a huge project is possible here, but more information is available online at http://scicultchickens.org.

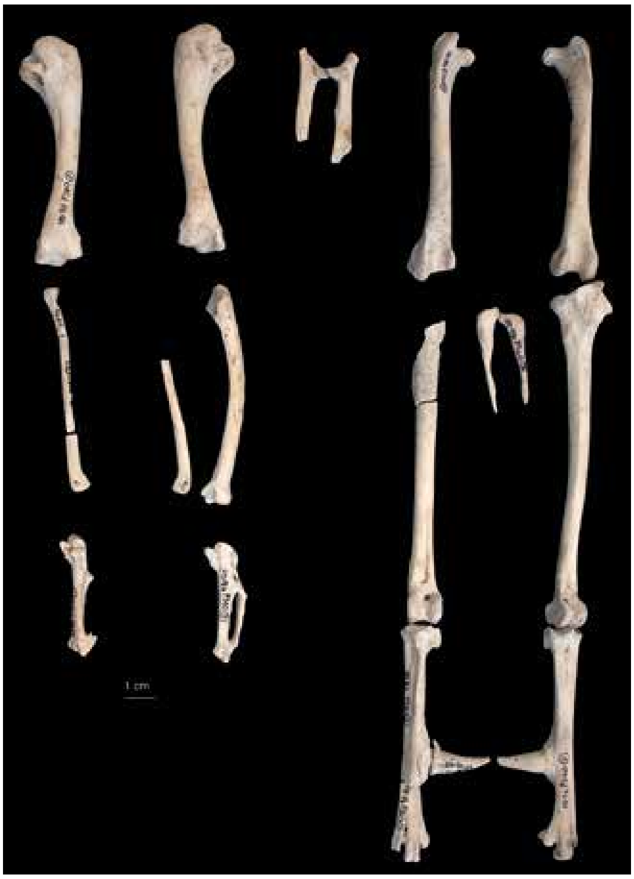
Today chickens provide a huge quantity of food, both as meat and eggs, and they are often principally thought of in this way. However, they are also valued as pets, show animals, companions and even religious sacrifices. Within our research team, one member breeds prize winning bantams, another keeps (and several others have kept) chickens for eggs and as pets, and we have worked with the Hensioners – pensioners gaining companionship and activity through poultry keeping. Chicken use today is dynamic and integral to multiple areas of culture and society.

However, archaeologically the domestication, introduction and uptake of animals such as chickens are still mainly seen in terms of food and economy. But just as today, this was not always the case. They could also be symbols of social status, exotic goods (particularly when transported over long distances), have religious connotations, or be used for sport and entertainment.

Chickens were domesticated from wild junglefowl, which are not native to Europe, but are found in South-East Asia. There are four species of junglefowl, but recent work by the project geneticists and colleagues has shown that both red and grey junglefowl contribute to our modern domestic chicken. Debate continues over the earliest domestication, with the proposed 8000 BC domestication event in China being increasingly challenged by us and other colleagues.

The earliest secure data currently appears to come from Harrapan culture sites in the Indian subcontinent dating to the 3rd millennium BC (*c.* 2500 BC). Chickens then spread slowly into Europe, mainly during the 1st millennium BC. In Britain, they are found in small numbers from *c.* 500 BC (for example at White Horse Stone in Kent) but are rare until around 100 BC (they then increase dramatically in the Roman period). Chickens may have been present before these dates; but many of the suggested earlier finds are from insecurely dated contexts or are unconfirmed identifications. This project has enabled us to date some of the earliest proposed bones of chickens from across Europe, the results

A pet chicken contemplating its origins (Photo: J. Pitt).

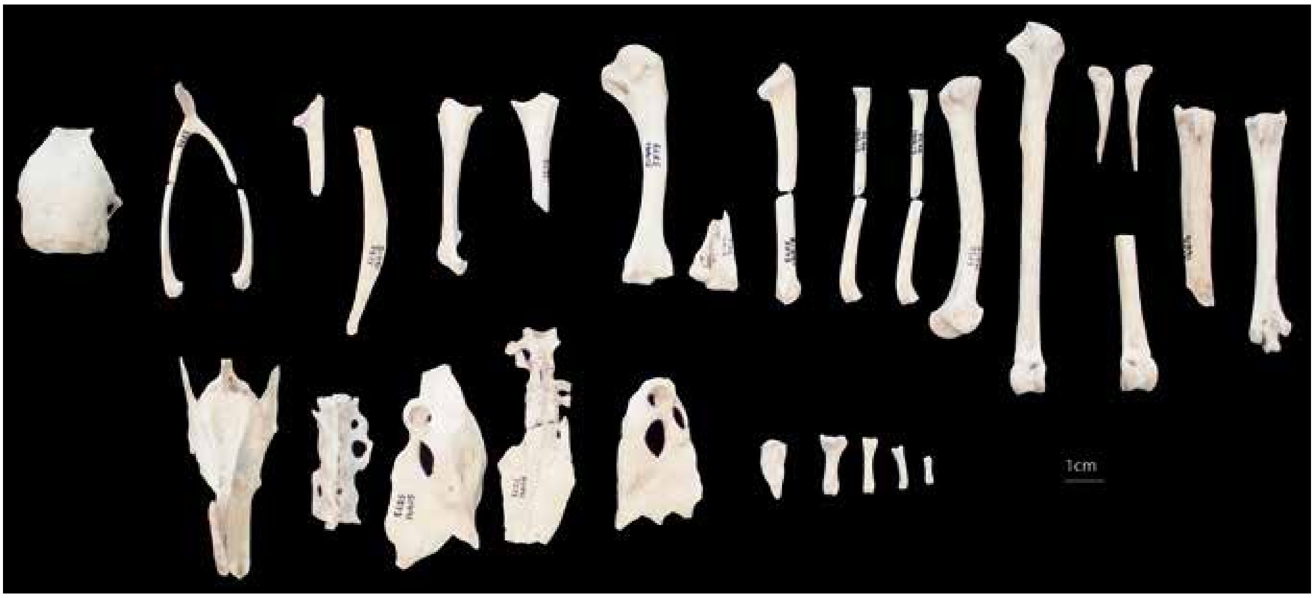


One of the articulated chickens from the Houghton Down pit deposit. Presence of spurs – seen bottom right – suggests that this is a cockerel (Photo: J. Best and G. Clark).

of which are expected imminently.

The historical and archaeological evidence suggests that although some early chickens in Europe were probably eaten, the focus was less on food and more on their other attributes. In *De Bello Gallico*, Julius Caesar infamously claims that: "The Britons consider it contrary to divine law to eat the hare, the chicken, or the goose. They raise these, however, for their own amusement and pleasure". In Britain the earliest archaeological occurrences of chickens are concentrated in southern England in areas associated with increasing continental contact and trade. Whilst the historically documented lack of consumption should be taken with a pinch of salt, many of these early chickens in Britain are found in what can be considered structured deposits, such as pits, pots and graves. Houghton Down in Hampshire potentially has the earliest known examples of chickens in Britain, with two birds (seemingly one hen and one cockerel) recovered from an Early Iron Age pit. Chicken bone from this site is now being radiocarbon dated, whilst zooarchaeological, aDNA and isotopic analyses are also being conducted. Their deposition appears intentional and potentially special which, if the date is accurate, would give information on some of the earliest human interactions with these exotic introductions in Britain.

Early chickens would have been valued animals. We can imagine that moving these birds over sea and land would have posed certain problems, and that introducing these birds to new environments and caring for them would have also created a unique set of challenges. The introduced birds would have needed careful management to thrive, and protection from predators. Evidence for care of these birds can occasionally be inferred from the archaeological record. At Weston Down, an Iron Age settlement in Hampshire, an articulated hen was found in a Middle Iron Age pit. She had a bony growth on one of her lower leg bones (tarsometatarsus), resulting from a trauma or disease. However, bone growth around the area indicates that the bird lived for some time despite this affliction, and the presence of medullary bone (a mineral deposit laid down inside the bones of laying hens to provide a rapidly mobilised calcium source) shows that she was still healthy enough to lay eggs. This specimen is also being dated and analysed genetically, zooarchaeologically and isotopically to investigate reproduction and laying profiles in this early period of chicken presence in Britain.



Articulated hen skeleton from Weston Down. Second bone from the right shows leg pathology (Photo: J. Best and G. Clark).

British Iron Age struck bronze coin showing cockerel (PAS CCI-3072, Oxford University & The Portable Antiquities Scheme).

The archaeological presence of chickens in British prehistory is not confined to the zooarchaeological data, but also includes imagery. A type of coin from around Chichester, similar to several from Belgic Gaul, displays an unusual image of a chicken with a human face on its crop. It appears to be a unique image form seen only on this group of struck bronze coins, which were in use during the 1st century BC, and are thus occurring at a time where bone finds are still relatively rare. The hybridisation of the chicken with a human face suggests it was more than simply decorative, and may have been a symbolic representation perhaps related to religion, combat (e.g. cockfighting), victory, maleness, exoticism or social identity.

The chicken is so common in everyday modern British life that we often forget that this bird and its ancestors were not native to the European continent. The archaeology suggests that these birds would have held varied roles in past society and culture, and they continue to do so today.

Acknowledgements

Thanks go to our funder and all colleagues in the project (AHRC; grant AH/L006979/1). Particular thanks to PI Mark Maltby for comments on the draft. Thank you to David Allen, Barry Cunliffe, Tyr Fothergill, Julie Hamilton, Sheila Hamilton-Dyer and Lorraine Mepham for consultation, specimen acquisition, and data provision. We are grateful to NERC/AHRC grant (NF/2015/2/5) and the ORAU for enabling radiocarbon dating. JB is grateful for the use of information from the following: Pitt, J. *et al.* 2016. New perspectives on the ecology of early domestic fowl: An interdisciplinary approach. *Journal of Archaeological Science* 74, 1–10. Feider, M. In prep. The chicken-folk of the north: the meaning of the cock-bronzes of Britain and Gaul.

Julia Best (bestj@bournemouth.ac.uk),
Mike Feider and Jacqueline Pitt (Bournemouth University)
on behalf of the Human-Chicken Interactions Project Team.

The Netherurd torc terminal – insights into torc technology

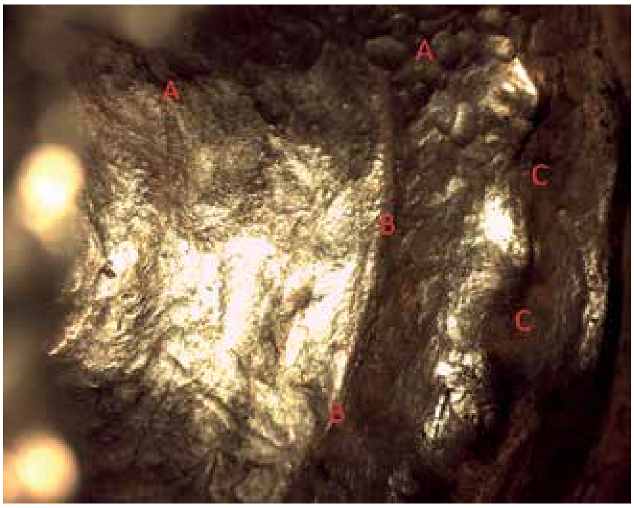
We became interested in Iron Age gold torcs when we were looking into replicating the Newark torc. Working out how to replicate it using original manufacturing techniques, it became apparent that there was a general assumption that all torc terminals were cast, using lost wax casting, directly onto the wires of the neck ring.

However, this procedure seemed risky, with a leak or fault in the casting allowing molten metal to fuse incorrectly over the wires, destroying many days' work and forcing the procedure to be started from scratch. This led us to wonder whether such terminals were lost wax cast separately and then attached using solder, thus making the process far less risky.

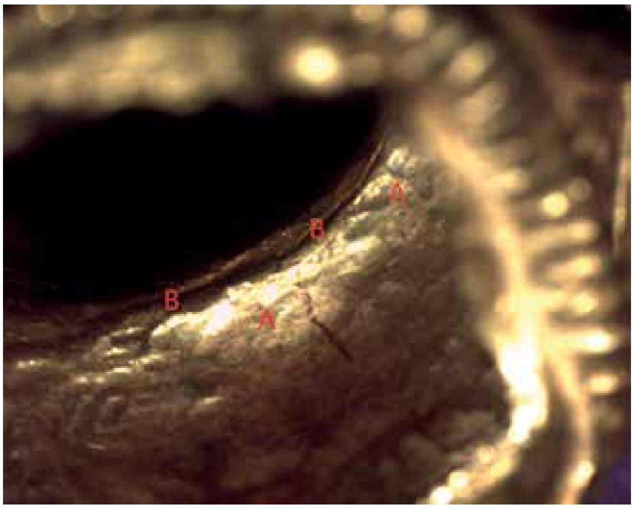
Once we started our research, a pattern emerged. Casting evidence was obvious for many of the lower gold content torcs (e.g. Sedgeford) and for many examples in silver and bronze (e.g. Snettisham). It was also present in some high gold content examples (e.g. Ipswich), but only where solid terminals were cast directly onto thick rods. However, for the high gold content electrum, hollow torus terminal torcs (e.g. Netherurd and the Snettisham Great Torc) evidence for casting was less obvious. As a detached example, the Netherurd terminal (held in the National Museum of Scotland) offered the chance to look inside.

We were hoping that the Netherurd terminal would show evidence of being cast separately and then soldered to the wires. What we actually found was more intriguing. The Netherurd terminal clearly shows evidence of tiny hammer marks across the entirety of the interior. These could be seen on the interior central core of the terminal, apparently continuing into the back, beyond reach of access through

The Netherurd terminal.



Terminal interior showing A) hammer marks; B) seam; and C) hollow relief of exterior button decoration.



Collar interior showing A) hammer marks; and B) collar seam.

the collar. There was no casting evidence such as dendrites. Also, the raised decorative motifs of the exterior could be seen in crude hollow relief within the terminal, including even smaller dots and raised buttons. More importantly, and not corresponding to the exterior decoration, are two interior and partly hammered-over "seams" running around the base and top of the central "apple core". There are no marks consistent with gold recovery or cleaning/preparation within the interior.

On the exterior face of the terminal, dents and wear damage testify to the fact that it had once been attached. However, the interior of the collar was undamaged, with no evidence of cast-on material having been removed. Small remnants of wire are apparent, but are attached only to the rim of the collar. A slight lip of material with a small area of possible solder was most likely created intentionally, to make a cleaner join against the wires. Taken as a whole, the "clean" and relatively undamaged collar interior suggests that no cast-on material was removed from the terminal and that wires had been lightly attached during the lifetime of the torc. Overall, casting-on of the terminal is unlikely to have been the method of manufacture.

Taken together, the seams, hammer marks and indentations on the interior could be seen as evidence of the terminal having been manufactured from sheet, rather than cast, gold. The absence of casting evidence and the "clean" collar also support this interpretation. If this was the case, then the apparent seams could indeed be joins in the sheet gold. Roland has created a rough model to explain this technique, whereby a flat or curved sheet of gold had the basic design hammered out, before being shaped and then fixed to a central "apple core" and the joins smoothed over. The collar would then be attached once the main torus had been assembled. After that, the exterior decoration could be chased and finished in a similar fashion to a cast example.

This scenario is still speculative, so the next step was to find parallels for this technique. Unfortunately, as a high gold content was necessary to achieve such a working method, other examples are somewhat limited. In x-ray, the Grotesque torc from Snettisham, made from sheet gold, shows a line of thickening around the top and bottom of both terminals' "apple cores", as well as a slight "shoulder" of material possibly attesting to the overlapping of the layers of sheetwork. The Snettisham Great Torc is complete, making examination of the interior of the terminals impossible. However, the decorative parallels between Netherurd and the Great Torc make it likely that these two items are in some way related. Further scientific examination will be needed to check whether the Great Torc is also a sheet gold example. Interestingly, the hollow gold bracelet (BM Ref: 1951,0402.4) found attached to the Great Torc also shows evidence of a seam. Again, the decorative parallels and crushed nature of the artefact point to construction in sheet gold.

In addition, seams can apparently be seen on the median line of the "apple cores" in both the Newark torc and a further Snettisham detached terminal (BM Ref: 1991,0501.45); both are high gold content electrum. However, in both examples casting is assumed to be the method of manufacture. Until this can be confirmed, it is uncertain whether the seam is a decorative feature or a manufacturing legacy mark. The different position of the seam in both these cases may attest to the latter. Perhaps the seam, although purely decorative, might hint at a "higher status" manufacturing technique, a mark of quality added to convince onlookers that this is a sheet gold item, even though it is not. Further investigation is necessary to provide a more secure answer.

Roland's model, opened to show central "apple core" and hollow relief.

So where next? This work has clearly raised a number of questions. Can the Netherurd visual evidence be confirmed scientifically? Is Netherurd a unique, northern, example of torc manufacture? Can similar evidence be seen in other torcs (such as the Great Torc), or indeed other Iron Age gold items? If Netherurd and the supposedly early Grotesque torc use a similar manufacturing technique, does this have implications for the dating of both? What is the reason for the seams apparent in the Newark torc and the Snettisham detached terminal?

If possible, the next step will be to obtain radiographs of the Netherurd, Newark and Great Torcs, and perhaps also the bracelet found with the Great Torc, to see if our conclusions can be confirmed scientifically. It is hoped that these investigations will provide further clues to the manufacture of these intriguing items, thus adding to our knowledge of Iron Age metalworking techniques.

Acknowledgements

The authors would like to thank Fraser Hunter of the National Museum of Scotland, Julia Farley, Sue La Niece, Duncan Hook and Nigel Meeks of the British Museum, Jody Joy of the Museum of Anthropology and Archaeology at Cambridge and Glyn Hughes of Newark Museum for their help in examining artefacts and for discussions regarding our work. It should be noted, however, that the conclusions are solely those of the authors.

Tess Machling & Roland Williamson

Ilkley's Swastika Stone – the archaeology of ideas?

Ilkley and its surroundings have a wide-ranging assembly of prehistoric remains, including an incomplete circle of standing stones, the residues of burial mounds and cup and ring carvings. Of these, the most unusual is a rock carving widely known as the Swastika Stone. A replica is readily visible and draws attention away from the eroded original. While unusual, similar carvings have been reported elsewhere, for example in Valcamonica in northern Italy, and there has been much speculation as to the Swastika Stone's significance – there is too much work in it to be an idle doodle! As this carving must have been of some importance to the society that created it, it is worthwhile trying to work backwards from what they have left us, ideally on a stand-alone basis.

As a physicist, I am instinctively more interested in points – as on a graph – rather than freehand curves, no matter how artistic. A total of ten dots appear to form the skeleton of the carving and of these, nine form a cross and the tenth lies at a distance away, with no obvious relationship with the other nine. The true swastika has four equal arms, each arm being a single line, whereas the Ilkley carving has two opposing arms shorter than the other pair, the arms being loops rather than lines. Of the nine central dots, five form the major axis of the cross and the remaining four form the minor axis, centred on the mid-point of the major axis and at right angles to it. The carving occupies an area of about one square metre.

As I thought about the carving, it gradually came to me that I was on the right track in concentrating on the dots. To me, the purpose of the isolated, ringed dot may be to draw attention to the importance of all the dots; an instruction to study their arrangement relative to each other. So I did. But first, what criteria should I apply? My investigation is based on the assumption that the originator wished to record some information by means of a number of points arranged in a particular way and did this by carving some dots on a rock face. There is an important distinction here between points and dots. Thinking mathematically, a line has length but no width or depth; it is a valid concept but no physical reality. A point is defined as the place where two lines intersect; again no physical reality. When "a line is drawn" on a piece of paper it has two dimensions – actually it is a stripe representing a line, which is somewhere within the confines of the stripe. If two stripes cross, they form a dot, a representation of a point. All we know about the point is that it lies somewhere within the area of the dot, i.e. in our case an area of about 50 mm in diameter.

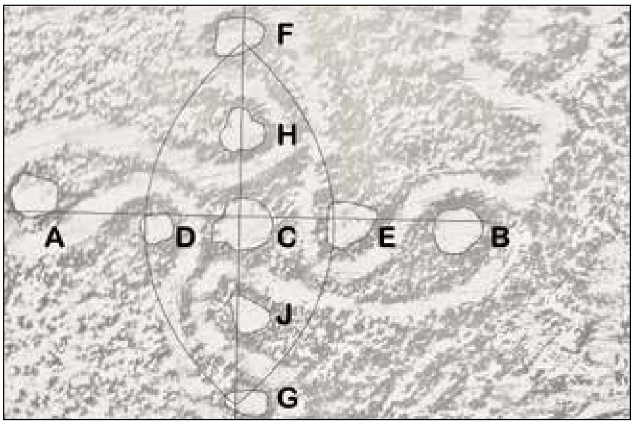
The Swastika Stone in its original setting on Ilkley Moor. The original is more faintly visible on the larger rock (centre of image), the modern replica is on the smaller rock in the right bottom corner. Photo: Rhona Finlayson.

Close-up of the modern replica.

In addition to this unavoidable uncertainty in the location of the points, we must consider the constraints upon the original draftsman. Nowadays, when doing exercises in geometry, we have the benefit of a smooth working surface, a sharp pencil, a straight edge and a pair of compasses. In stark contrast the prehistoric geometer was working on a rock face, making marks with a stone or possibly a metal tool and using for example a strip of leather to define a straight line, possibly to act in lieu of a pair of compasses and to copy, or even halve, distances. With these limitations some inaccuracy was inevitable; on the other hand this was a major project, probably carried out with all possible care. On this basis it has been assumed that the original points will lie anywhere within the finite extent of the dots as formed by the carver. Looking ahead it can be stated that within this fairly broad limit to accuracy the lines are straight, the dots equidistant as described and the orientation of the modern drawing is near to that of the original.

With these considerations in mind, I started by making some obvious measurements. I found that if the line AB is the major axis of the figure then C is the mid-way point between A and B. Likewise, D and E are the mid-points of AC and BC respectively, AD = DC = CE = EB. In the same way, C is also the mid-point of the minor axis FG and H and J are the mid-points of FC and CG, so that FH = HC = CJ = JG. In the same vein AF = FB = BG = GA and DF = FE = EG = GD. This was the "Eureka!" moment. The three points F, E and G are all the same distance from D; put another way, they all lie on the arc of a single circle centre D. Likewise the points F, D and G lie on a circle with E at its centre. This is an old friend; it is Euclid's construction for bisecting a line and also for drawing a right angle.

This unusual carving has attracted the interest of a number of workers and there is an extensive literature. Almost all of these texts discuss similarities with artefacts in other locations and cultures and there is much conjecture of possible links between them. It is also occasionally suggested that the dots are much earlier than the carved line, but this is of no great significance in the present context. The sole function of the line, whoever carved it, is to highlight the group of dots.



Arrangement of the dots free of the irregularities of the rock surface and showing the investigations undertaken for this article.

Indeed, this may even explain some minor uncertainties: dots A, B, H and J may have been added for emphasis and to add some size to the diagram; this may account for the slight mis-alignment of dot A.

As far as I am aware, there has been no previous attempt to explain – literally point by point – why this carving has precisely this shape and no other. It would be unlikely in the extreme for a random selection of dots to display this or indeed any recognisable degree of organisation. What is surprising, perhaps, is its uniqueness; geometry is equally accessible to all and it is not impossible that people in West Yorkshire in 1000 or even 2000 BC were independently aware of the beginnings of Euclidian geometry – although this would have substantial cultural implications. The combination of dots and figurative design may suggest a relationship between the two: did the dots form a grid, akin to graph paper, around which the swastika was drawn? In this case, the two elements would be near contemporary. Or were the dots, long after their creation, recognised as following a rule or possessing some unique symmetry, and were therefore embellished? Ultimately, highlighting the dots with a line appears to have been counter-productive, in that the line, rather than dots, became the focus of attention. In any case, there is clearly much scope here for re-investigating other cupmark arrangements along these lines.

Michael Shepherd, Ilkley

EUROPA 2017

University of Southampton, 23–24 June 2017

The Bronze Age as pre-modern Globalization

In honour of Prof Helle Vandkilde, Aarhus University

We are delighted to announce that the winner of the 2017 Europa prize is Prof Helle Vandkilde (Aarhus), who is well known for her work on the Bronze Age societies of Europe and the many ways in which they interacted (including violently). As has now become tradition, the Friday will be given over to papers by new researchers, while the Saturday session will feature lectures by well-known authorities personally invited by Prof Vandkilde. Speakers include Kristian Kristiansen (Gothenburg), Mads Holst (Moesgaard), Marie Louise Stig Sørensen (Cambridge), Svend Hansen (Berlin), Catherine Frieman (Canberra) and Ben Roberts (Durham). The Europa lecture itself will be titled: "Small, medium, and large: globalization perspectives on the Afro-Eurasian Bronze Age".

Along with two full days of lectures, the conference will also include exhibitors and a poster display. Those interested in displaying a poster should send a 150 word abstract to Courtney Nimura at courtneynimura@gmail.com by Sunday 21 May 2017.

Places for the Europa lecture itself are strictly limited, so early booking is advisable. Please use the form included in this issue. Full details and a booking form are also available online.

Europa 2016: conference report

This year's Prehistoric Society's Europa Conference, held in honour of Professor Peter Wells, demonstrated why Iron Age studies have been, and continue to be one, of the most theoretically dynamic sub-disciplines within archaeology. Fittingly entitled "Dynamics of Art, Design, and Vision in Iron Age Europe", the two-day conference covered topics ranging in geographical scope from Ulster to the Ukraine, and in chronology from the Hallstatt period to archaeology's formative years in Victorian London. Presenting on this vast range of topics were an equally eclectic variety of the old guard of academic authorities (mostly on the Saturday), and a vanguard of younger researchers from across Europe and the United States, kicking off the conference on the Friday. Following a welcome from the organising committee, the scale of the conference was set by the opening paper of Courtney Nimura and Peter Hommel examining Celtic art's links with cultures of eastern Europe and Russia. This far-reaching geographical scope was likewise a feature of James Johnson's discussion of Pontic Iron Age funerary practices and Gadea Cabanillas de la Torre's discussion of elite La Tène ceramics. David Marchant, Tim Pestell and Roland Williamson closed the first session by prompting many of us to reconsider how Iron Age people interacted with and displayed objects, having brought along some beautiful reproduction artefacts.

Following lunch, the focus moved to consider the performative and possible cosmological role of stylistic patterns, as well as new thoughts on what the deposition of such artefacts may tell us about social change, with Tanja Romankiewicz, Helen Chittock and Eric Harkleroad each offering insights into how to consider patterns on objects and patterns of deposition. This was followed by a talk by Rena Maguire, whose practical knowledge of equestrian equipment was put to great effect in an insightful paper examining horse-bits from Iron Age Ireland. An Irish flavour was maintained by Erin Crowley, who examined Early Medieval La Tène styles. Laurent Olivier provided the keynote address, a fascinating paper which considered the two-dimensional nature of La Tène artwork within the three-dimensional world. The day was brought to a close with a discussion of Paul Jacobsthal's seminal *Early Celtic Art* by the man who, alongside Otto-Herman Frey, may justifiably be called Jacobsthal's successor: Vincent Megaw.

Saturday began with Colin Haselgrove discussing his work at the oppidum of Stanwick, now published in a lavishly illustrated 530-page volume. Lotte Hedeager then provided the most northern topic of the conference, examining the use of imagery in political structures in post-Roman Scandinavia. The later morning session commenced with Julia Farley presenting an informative and entertaining paper, co-authored with J.D. Hill (sadly unable to attend), on the Witham shield and its history. Fraser Hunter then followed up with an equally thorough and engaging overview of La Tène–Roman fusion styles in Britain.

Peter Wells admiring Roland Williamson's South Cave Sword replica (Photo: T. Machling).

Following the lunch break Jody Joy offered some reflections on mirrors in the British Iron Age, whilst Simon Stoddart drew attention to parallels between the art styles of temperate and Mediterranean Europe. This year's Europa Conference was brought to a close by the man in whose honour it was held: Peter Wells. For the better part of the past twenty years, Peter Wells has been at the forefront of debates within the study of the continental European Iron Age, considering aspects of identity construction and the sensory world in which Iron Age peoples lived. Drawing on his recent, influential work concerning how Iron Age peoples perceived the visual world, he provided a thought-provoking paper, inviting those in attendance to consider the performative aspects of objects such as fibulae with mechanical parts, as well as what the placement of objects in graves might tell us about how Iron Age peoples viewed the dead. These ideas prompted much discussion during the evening wine reception which followed. Courtesy of this year's Europa Conference, attendees were also able to enjoy free entry to the critically acclaimed *Celts* exhibition, currently on display at the National Museum of Scotland, Edinburgh, where they could reflect further on how Prof Wells' ideas can be applied to the stunning objects on display.

None of the above, of course, would have been possible were it not for the flawless logistics of this year's organising committee, headed by Manuel Fernandez-Götz, Alex Gibson and Courtney Nimura, with great support from a cohort of volunteers from the University of Edinburgh. We would also like to gratefully acknowledge the sponsorship of Cambridge University Press, the School of History, Classics and Archaeology at Edinburgh University, The Society of Antiquaries of Scotland and the National Museum of Scotland, who have provided invaluable help in making this such a fun and productive event.

Andrew Lamb, University of Leicester

Ring cairns and their variants from the Cumbrian Mountains

A response to Steve Dickinson and Aaron Watson: *Patterns on the rock: an unusual cairn in the Lake District, Cumbria* (PAST 83)

Introduction

I read Dickinson's and Watson's article with interest as I had previously (March 2016) had cause to visit Scar Lathing, the location described by the authors, with a colleague. At that time, it was claimed that a possible example of prehistoric rock art had been identified in the façade of a cairn. Given that a number of new cup-marked sites have been found in the *valleys* of Lakeland over recent years, this would have been a significant find, being in an upland location. When we visited the area, however, we found the features on the rock to be the result of natural, differential weathering of some sedimentary volcanic tuff deposits as, indeed, the authors acknowledge in their PAST article. There also appeared to be no evidence that the "façade" rocks had been deliberately placed by prehistoric (or other) people and, casting our eyes about the immediate vicinity, we were unable to identify any cairns in the glacial rubble filling the runnel adjacent to this rock. This raises a number of issues regarding the identification of monuments in contexts in which these are very diverse, as discussed below.

Ring cairns

There is much tangible, well-preserved evidence for prehistoric activity in the uplands of the Cumbrian Mountains and moors, including many ring cairns. Over recent years the number of features that fit loosely under the heading of "ring cairn" has steadily increased, partly through survey activities of the Archaeology Volunteers Network set up by the Lake District National Park Authority and other interested individuals. These ring cairns range in diameter from 5–14 m and vary in form, from smaller rings of piled stones 5–8 m in diameter to larger, circular structures that may incorporate a number of upright stones within the ring. Whilst these monuments are not unique to the locale, some of the variants, such as the "boulder cairn" (see below), might be regionally specific. By bringing these variations to the attention of the PAST readership it is hoped that we can discover whether these variants might, in fact, be more widespread than is currently thought.

Variant cairns

The field trip to Scar Lathing was not in vain as, despite our disappointment with regard to the rock art and its cairn, we made our own discovery. Nearby, amongst other, "standard" cairns, we identified one of the variant examples: a prominent boulder with a penannular of smaller rocks abutting it. This is a "boulder cairn", an addition to the growing number now recorded. To date, these have only been identified in the Cumbrian Mountains at an altitude of around 400–500 m, often set in dramatic positions on the fell sides and clustered in three locales in the Central Fells: Seathwaite Tarn, Great Langdale and River Rothay watershed. They are generally associated with ring cairns or other ring-stone embanked features found locally and which could be grouped under the heading of "tor cairns" – prominent boulders surrounded by rubble banks or where stones have been cleared around a boulder in areas of block-fields.

In 2007 the "Ring Cairns to Reservoirs Project", a collaboration between the Duddon Valley Local History Group and the Lake District National Park Authority, identified more than 12 ring cairns and variant cairns around this secluded valley surrounding Seathwaite Tarn, two of which were excavated. At the head of Seathwaite Tarn, amongst the six cairns documented, three different variants are located within a few metres of each other; many others were first identified by fells-man Peter Rodgers.

Discussion

The Lakeland ring cairns fit reasonably well with Frances Lynch's 1973 typology, which was proposed prior to the identification of the Cumbrian variants and is based primarily on sites in the Welsh uplands. There are, however a number of notable differences. Lakeland monuments are generally smaller, and the larger examples are more reminiscent of her "kerb circle", although incorporating fewer upright stones. These are, perhaps, more of a "cairn circle". Other examples,

The boulder cairn built below Scar Lathing. The attached penannular in the foreground measures 2.5–3 m. Image: P. Style.

A vertical view from the boulder of the penannular arrangement abutting the Scar Lathing boulder cairn. Image: P. Style.

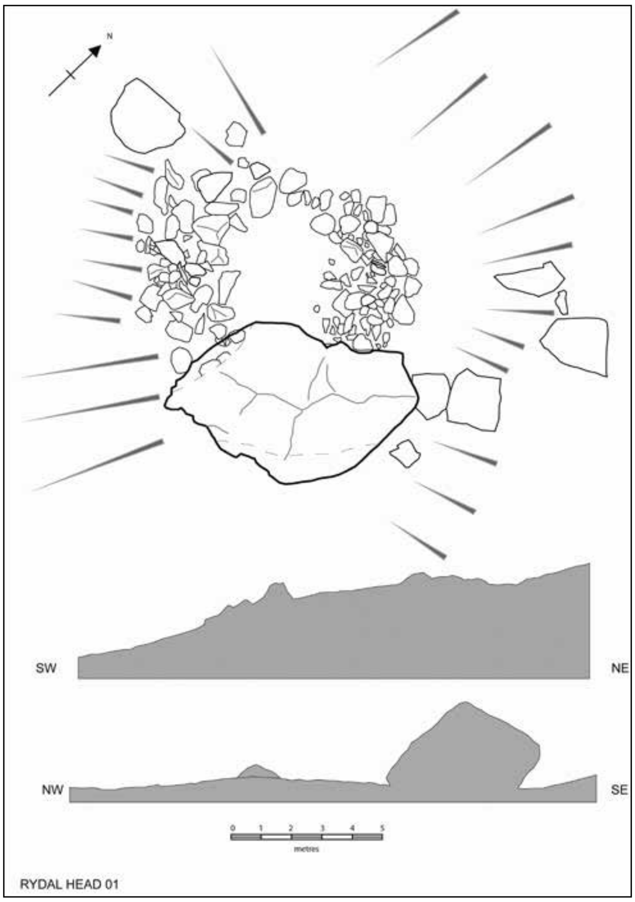
such as that found in Greenburn Bottom, Grasmere, are certainly more similar to the "embanked stone circles".

The circularity of "boulder cairns" and "tor cairns" fits with that of the majority of monumental features constructed in the Earlier Bronze Age. During their lifetimes, through use and reuse, many monuments underwent significant development and alteration, with the final form being rather different to the initial construction. Perhaps what we see in the ring cairns of the Cumbrian Mountains is a slightly different tradition whereby instead of reuse, there is successive construction of new monuments adjacent to the older ones, preserved close by. Clearly, generalisation is problematic. Here, as elsewhere in the Fells, we also have stone circles, such as those on Brats Fell in the west and Castlerigg to the north, which have apparently been used/reused as interment sites.

Given their distribution in the Cumbrian Mountains it is tempting to speculate about the siting of these monuments, although perhaps unprofitable without knowing their purpose. Yet the concentrations found around Great Langdale and the River Rothay watershed (Grasmere and Rydal), which coincide with the cluster of prehistoric cup-marked slabs, suggest that this remained a hub of prehistoric activity into the Bronze Age long after the intensive quarrying at the Neolithic stone axe factories had faded into memory or myth. The Rothay Valley leading to Dunmail Raise is also the natural pass crossing the Cumbrian Mountains linking lowlands to the north and south and was probably used at this time by seasonal pastoralists.

The case of Dickinson's and Watson's "cairn" raises concerns regarding both the identification and verification of what *may* be extremely subtle and ephemeral alterations in the landscape. Problems arise where there is no discernible structure or pattern apparent in these "stone settings" and the interpretation is wholly in the eye of the beholder; in addition to "piles of stones" we must include "propped" rocks and boulders in this group. These are notoriously difficult features to identify with any certainty, particularly when the problem is further compounded by the challenges of differentiating natural from anthropogenic features in a glaciated landscape. Perhaps prior to publication of "new" types of monuments there should be greater consultation with those charged with updating the Historic Environment Record and other parties experienced with this particular landscape, as well as ideally some form of verification by further investigation. Regarding the "boulder cairns", perhaps a programme of excavation might resolve some of the questions surrounding their chronology and use.

A boulder cairn at the head of Rydal Valley, Rydal Coombe. Image: P. Style.



Plan of the boulder cairn at Rydal Coombe. Image: P. Style.

Acknowledgements

Thanks to Kate Sharpe for her comments on this article.

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MEMBERSHIP

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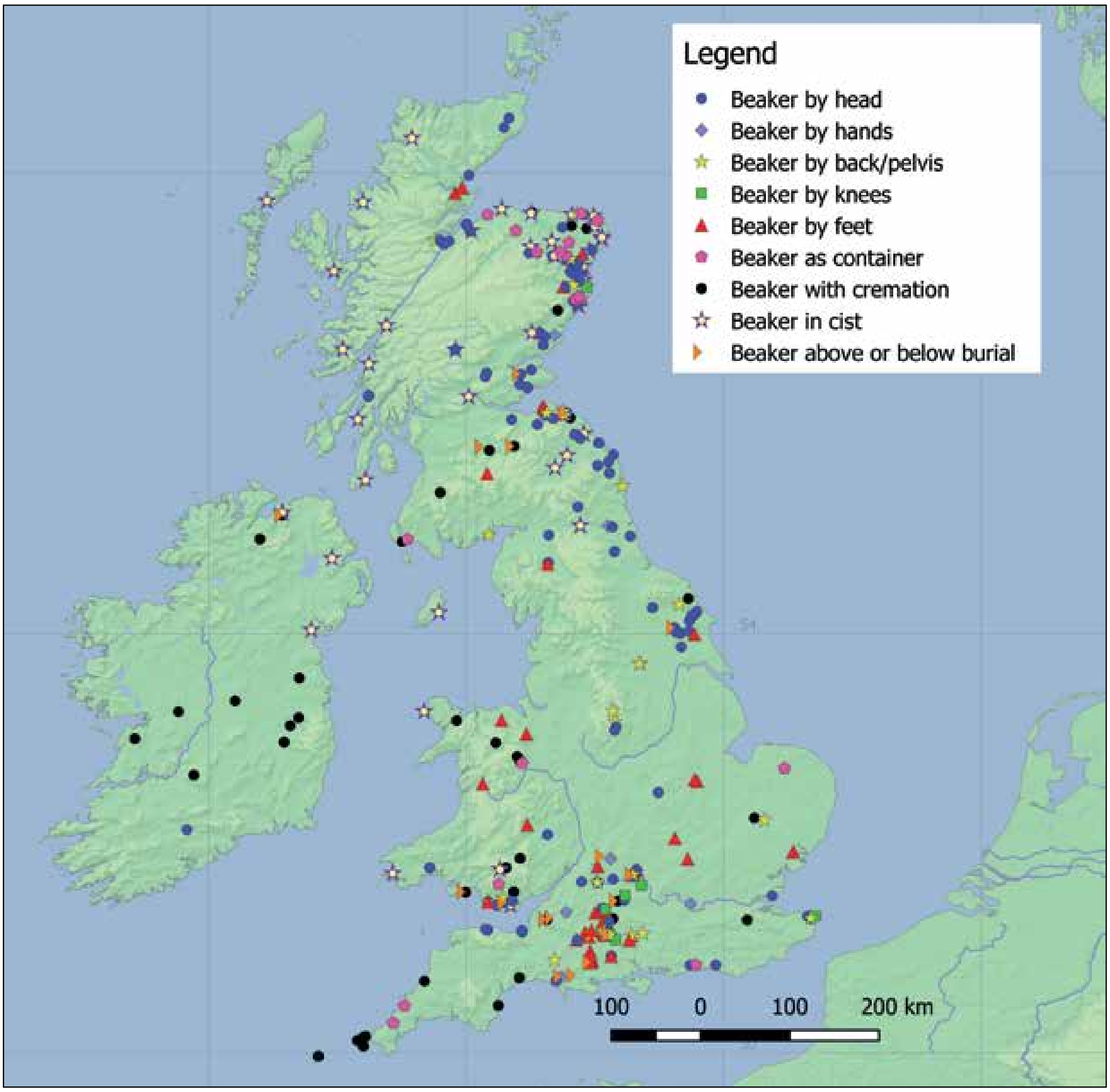
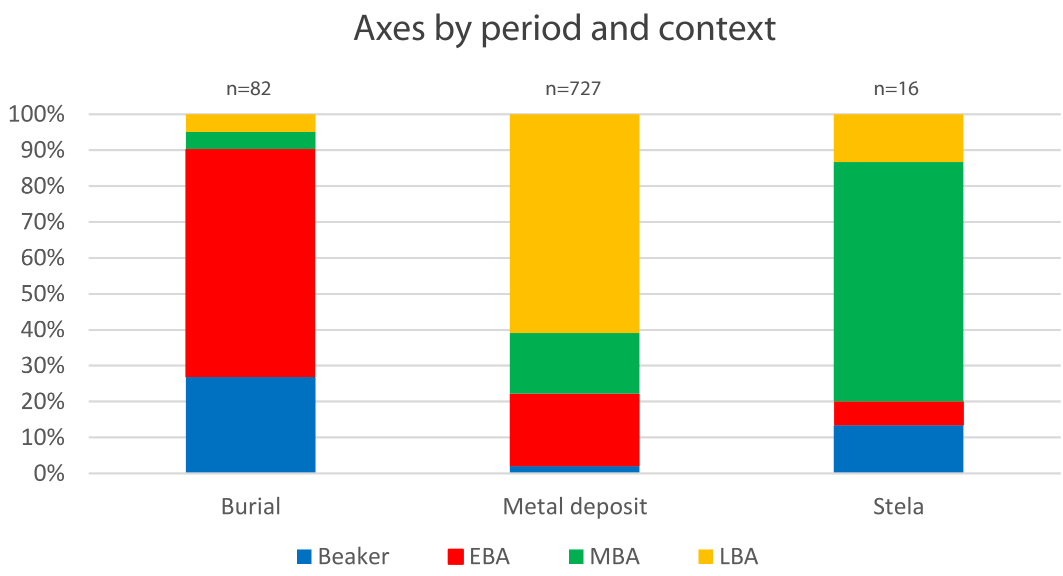
Atlantic Europe in the Metal Ages: searching and sharing data

Between 2013 and 2016 a research team of archaeologists and linguists, based at the University of Wales, the University of Oxford, and Kings College London, examined the questions of how, where and when the Proto-Celtic branch of language emerged from Proto-Indo-European. The AHRC-funded Atlantic Europe in the Metal Ages (AEMA) project used a multi-disciplinary approach to seek an archaeological context for a known historical linguistic process. To feed into this debate the linguists collated Ancient Celtic written evidence relevant to the reconstruction of Proto-Celtic and the archaeologists gathered and interpreted evidence for inter-regional connections in Ireland, Britain, Armorica and the western Iberian Peninsula during the Copper and Bronze Ages, *c*. 2900–800 BC.

To successfully analyse the archaeological and linguistic data, both chronologically and geographically, the project developed an extensive GIS-enabled database. We launched this open access, fully searchable resource in London on April 6th and it is available at http://www.aemap.ac.uk/search/. It is at an advanced beta phase with more information being entered regularly. We would like to use this opportunity to highlight the value of this resource to PAST readers and we are interested in sharing data with colleagues, as well as being informed of other relevant sites that can be added to the database. In particular, we are keen to discuss its potential to be used in future projects and collaborative research. In recent decades, archaeology has witnessed an unprecedented explosion in data generation, much of it resulting from the substantial increase in developer-led excavations. The amount of archaeological evidence now available often makes it difficult to collate and query comparable datasets and hinders our ability to easily discern patterns in the data. The AEMA database has a straightforward structure that allows the user to filter the records by combining different criteria. The results are displayed on a map and listed in



Placement of Beaker pots in relation to the body (where detailed data is available).



Temporal changes in the deposition of axes throughout Atlantic Europe.

summary form in an accompanying table. The search results can then be interrogated in greater detail by clicking on the map markers to generate popups for each site and on the site name to access the detail of each entry. Furthermore, the results can be exported to a data file format known as GeoJSON, which can be opened in geographical information systems, including the free, open source QGIS.

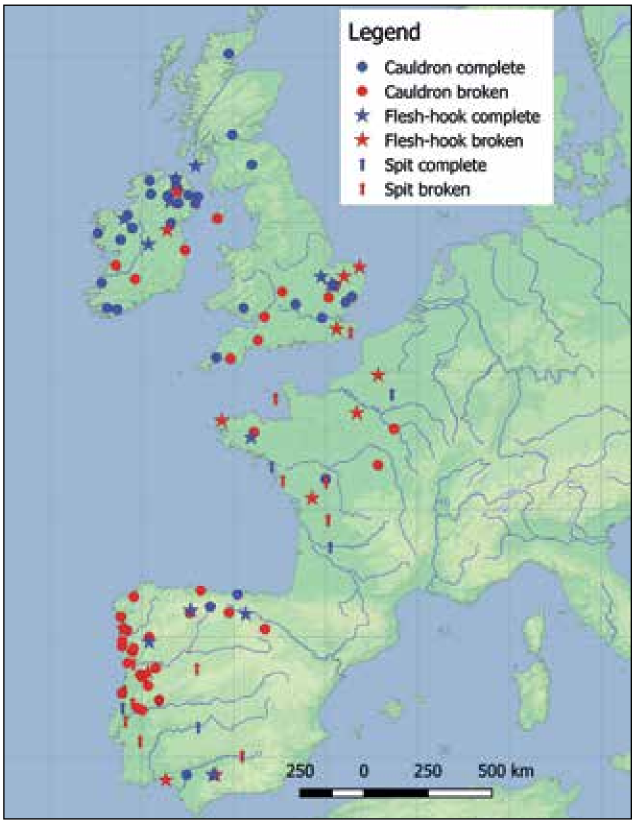
Exploring the datasets

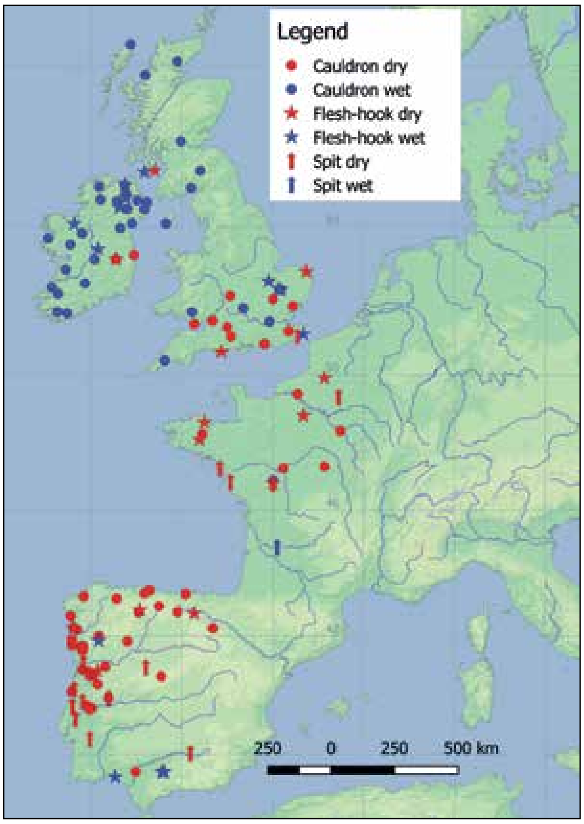
To be able to superimpose multiple types of relevant evidence not often brought together or compared, both spatially and temporally, we created seven categories: burials, metalwork, stelae, inscriptions, toponyms, settlement, and miscellaneous (e.g. field systems). The structure is now in place to expand on all these categories and enhance this robust, user-friendly research tool. The simplest way to search through the datasets is to use the three checkboxes "and", "or" and "exclude") nested under each data type heading to generate nuanced queries by specifying whether a particular facet should be present or absent from the refined selection. Not only are all categories searchable and comparable but we have also incorporated a "text search" box that enables the user to explore the free text descriptions within the database. In this way, it is for example possible to search by a regional pot type or a specific kind of sword. Once the initial query has been run, the results can be further interrogated using the built-in tools, such as "graph values" to illustrate the data in a histogram or pie chart, or the "categorise map" option to colour the map points based on a selected category. Another useful tool is the "pulse chrono", which provides a general overview of how the distributions of the selected criteria change over time.

"Burials" is currently the most developed of the datasets with an additional three sub-categories of individuals, pots and other grave goods. This allows for detailed explorations of different funerary elements, such as specific grave types, age and gender divisions, burial positions, pottery and grave goods and their placement in relation to the body, amongst others. This was also the most difficult category to create, as many burial sites comprise more than one individual and can incorporate long histories of use, such as with megalithic tombs or barrows. Thus, to achieve the maximum results from searching the data we developed a method of assigning attributes at both the site and individual levels. This nested 'Russian Doll' approach allows us to explore multiple elements of burials at both a specific and wider context basis.

While we hope that the value of the individual datasets is evident, we also want to highlight the way in which they can be integrated and superimposed. One aim of this easily-searchable database is to allow researchers to run multiple queries quickly, thus generating informative results that may highlight or prompt new lines of archaeological enquiry. It is possible, for example, to explore the occurrence of axes in burials, metalwork deposits and as graphical depictions on statute menhirs or stelae. The spatial and temporal patterns can then be compared to emphasise the different results. For instance, axes in burials are mostly Early Bronze Age in date, while the few depicted on stelae primarily date to the Middle Bronze Age and the majority of those in metalwork deposits are Late Bronze Age. By layering the data in this way, it is possible to demonstrate within seconds that while axes were always important in Atlantic Europe during the Bronze Age, their context changed through time.

We can also interrogate the data in accordance with themes, such as "feasting". Cauldrons are usually deposited complete in wet contexts in Ireland, Scotland and parts of southern Britain – mainly bogs and lakes. In Iberia, on the other hand, they are normally found in a highly fragmented state and often in dry, settlement contexts. This implies that regionally they were thought about and valued differently. The distribution patterns for cauldrons, flesh-hooks and articulated spits indicate the presence of two separate and perhaps competing Late Bronze Age feasting traditions, one that focused on stewing meat and another that revolved around roasting meat.





Distribution maps showing regional variations in (left) the condition and (right) the context of objects associated with feasting.

Looking to the future

We have provided a brief overview of the functionality of the AEMA database here, and we encourage all PAST readers to go online and explore the flexibility of this digital resource for themselves. Although the AHRC-funded project has technically come to an end, the database forms one of its legacies and remains an active tool that we continue to augment in order to explore long-range mobility, connectivity and shared cultural information. The most recent output to develop from this project is *Celtic from the West 3* (available from Oxbow Books), where several of the papers drew on the data incorporated into our database. Overall, our aim was to build a working model that can be used and further developed in the future, with the potential to incorporate other regions, periods and datasets. The framework to search and share relevant data has now been built and we hope that others engaging with this process will keep the AEMA database relevant, alive and active.

Acknowledgements

We are most grateful to Neil Jakeman at KCL for database implementation.

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Neolithic cheese making: experimental archaeology and public engagement with replica vessels

Ceramic "sieves" are a characteristic pottery form in European prehistory, found from the early Neolithic onwards. Typologically defined as possible "cheese strainers", this interpretation has been confirmed in a 2013 *Nature* paper by Melanie Salque and a team of researchers from the University of Bristol through the detection of dairy lipids (fats) in organic residues from perforated sieve sherds from the *Linearbandkeramik* (LBK, 5500–5000 cal BC). To explore the feasibility of cheese making in such vessels, we manufactured four replica ceramic vessels and used them to strain acid- and rennet-coagulated cheeses. We then utilised these vessels for a public engagement event, providing a tangible way to discuss the cultural origins and biological impact of prehistoric diets.

Vessel manufacturing

Replicas were made by Mike Copper, based on fragments

Replica ceramic sieves. Photo: Mike Copper.

Sophy Charlton (left) and Penny Bickle (right) demonstrating the replica vessels at Yornight. Photo: Colleen Morgan, CC-BY.

of pierced pottery recovered from LBK culture sites and ethnographic examples of perforated vessels used for cheese making. Two vessels were constructed with perforated solid bases, as for instance found at sites such as Ditzingen-Schockingen, and another two were constructed in the typical LBK funnel-like stylistic form. Holes were pierced into the vessels by inserting pieces of dry straw from the inside to the outside of the pot once it was formed. The vessels were allowed to dry with the straw in place, then fired. Lipids derived from beeswax have also been detected on many vessels of this type. Beeswax may have given the vessel a waterproof coating, could have made it easier to turn out cheese from the mould, or perhaps resulted from the straining of honey from comb. To investigate a possible function related to cheese making, the inner walls of two of the replica vessels (one of each type) were lined with a beeswax coating while the pot was still warm. This allowed easier application and ensured the wax penetrated the vessel walls.

Cheese making

We made simple, soft cheese from unpasteurised organic milk from pasture-fed (C_3) UK cows. The milk was coagulated using two different methods, a commercially available rennet and a citric acid, in order to compare the performance of the two vessel types with these different processes. First, the milk was warmed to *c.* 37°C in stainless steel pans, and the rennet/citric acid added. After coagulation and warming, the curds were cut into one-inch pieces to enable further separation of the whey and curds. The curd pieces were then transferred to the ceramic vessels for straining.

We found that our replica vessels were able to effectively drain the whey from the curds. Comparing the acid- and rennet-coagulated cheeses, we observed that the former appeared to drain more efficiently, as the small holes became less clogged, possibly because of the way that the acid-coagulated curds "clumped" together. We did not observe any clear differences in straining or removing the curd between the vessels coated with beeswax and the untreated pottery. However, repeated use may help to reveal the advantages or disadvantages of the beeswax coating, for example if the wax coating minimises the penetration of water into the vessel wall, increasing the vessel's longevity.

We also made a number of additional observations which led us to think about the contextual use of these vessels. Firstly, we had to place the sieves within a larger bowl to prevent the whey from flowing everywhere and the sieves from falling over. Where would the whey have drained to, was it held in another vessel and was the whey utilised? Secondly, although we found that the large hole in the base of the funnel-like forms did eventually become clogged with coagulated cheese, it would have been more efficient not to have such a large hole. Was there some kind of plug made from ceramic or organic material, which was then removed when the cheese had formed a solid mass to enable further drainage? Thirdly, we found that the small holes within the sieves often became clogged with coagulated cheese, preventing efficient drainage. In contemporary cheese making, a fine fabric mesh is often placed within the sieve. Was there a Neolithic equivalent of this, which was placed within vessels to prevent the holes becoming blocked?

Public Engagement

After experimenting with cheese making, we demonstrated the use of the vessels at "Yornight" (http://yornight.com/2015/),

Straining the whey from the rennet-coagulated curds in the ceramic sieves. Photos: Sophy Charlton.

the University of York's contribution to the European Researchers' Night, an EU initiative to present university research to the public. We demonstrated our cheese-making experiment and discussed the biological and European cultural origins of cheese making with members of the public. There is growing public interest in the diets of past populations as a result of the prevailing popular idea (whether correct or not) that "ancient diets" may represent healthier food choices – a key example of this being the increasingly popular "Paleo Diet", which excludes dairy products. Cheese making proved a very engaging route into discussing what constitutes a "natural" diet. We debated with all age groups about the impact of domestication on our food cultures and health, as well as the impact of milk consumption on the genetics of present-day populations (i.e. the prevalence of lactase persistence).

Children and adults were equally interested in the antiquity of dairy consumption, but also in how people may have made cheese in the past. The presence of the sieves provided a very tangible way for people to appreciate ancient food preparation technology, and the visual similarity of these vessels to contemporary strainers easily demonstrated the continuity of this dairy processing technique across millennia. As a part of our activity, we also asked members of the public to note down what they believed the purpose of the large hole at the bottom of the funnel-shaped vessels may have been. People suggested that this may have made it easier to collect the whey, that the cheese product was extruded out of the hole, or that the two vessel types produced different cheeses. Further experimentation may provide new insight into this matter.

Conclusion

We found that making cheese with replica vessels was an informative (and fun!) tool for exploring prehistoric cheese making, and an effective way to discuss prehistoric foodstuffs with the public. The replica vessels were certainly able to strain cheese and remove the whey, although we also observed that some aspects of the technique were fairly inefficient. Of course, it is easy for us to comment on the inefficiency of the method, since we have the insight from working with modern equipment which took millennia to develop. Our experiments also led us to consider other aspects of dairy processing, in particular what other equipment may have been used alongside the sieves. In future work, we hope to experiment further with replica vessels in order to provide additional insights into prehistoric cheese making, as well as to utilise these replicas to explore lipid and protein preservation in archaeological ceramic vessels.

Jessica Hendy, Penny Bickle (University of York), Mike Copper (University of Bradford) and Sophy Charlton (Natural History Museum and University College London)

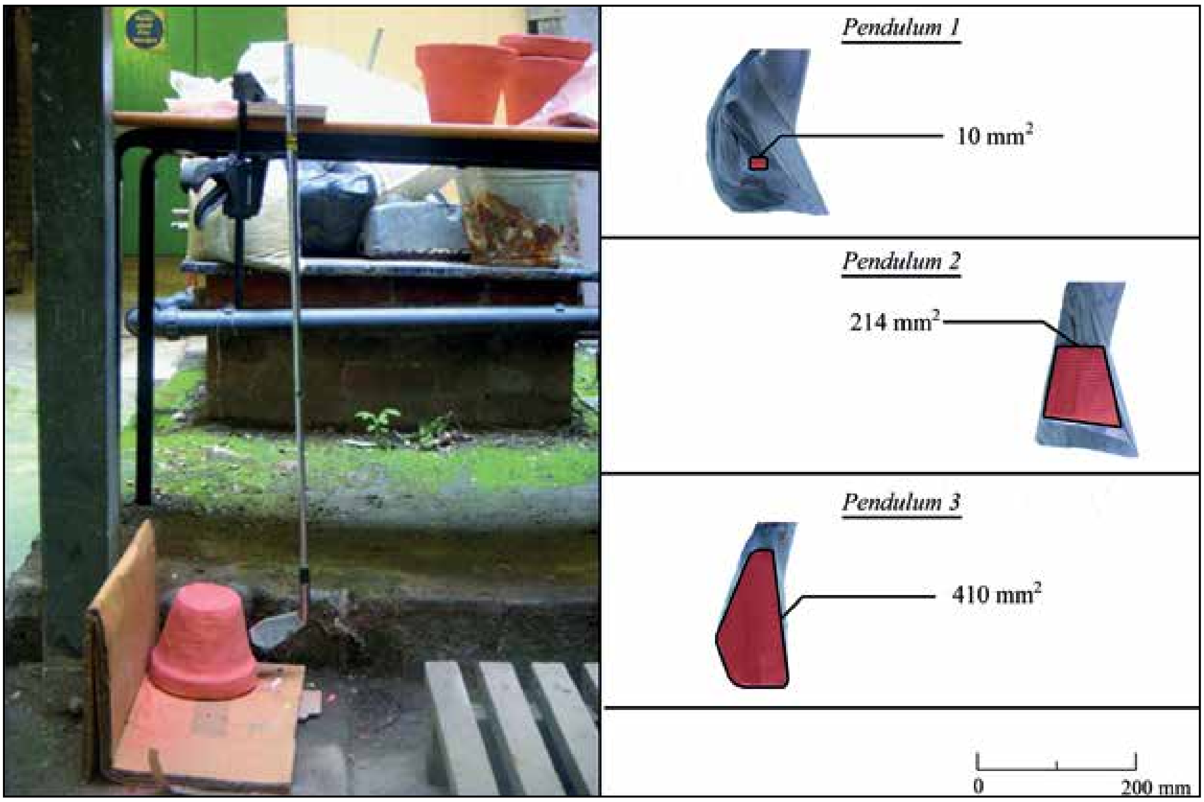
Understanding pottery breakage through an experimental approach: preliminary results

In the last two decades, the intentional breakage of pottery has become a widely discussed phenomenon in European prehistory. These recent discussions have emphasized, against common conceptions of breakage as mostly an unwanted outcome, that fragments can be considered active participants in the shaping of social relations. In this way, "deliberate" fragmentation becomes an important process in which people, objects and places were articulated in the past. This argument has now been made for cases ranging from Bronze Age Britain to Neolithic and Chalcolithic Iberia or the deliberate fragmentation of figurines and vessels in the Balkans. Moreover, the intentional breakage of pottery has also been ethnographically documented as a very powerful event in funeral processions, for instance among the Gurensi of Ghana, studied by Smith in 1989. For this reason, the study of pottery breakage and fragmentation can be highly informative of how these meaningfully charged practices might have unfolded in the past.

However, there are as yet very few investigations attempting to understand the manner in which pottery breakage occurs in intentional scenarios. As a consequence, often many assumptions are made on the formation of breakage patterns and features, without prior assessment of how these different types of applied stresses can affect the particular microstructure of a (pre)historic ceramic vessel. To help archaeologists link fragments and partially refitted pots to their causes of breakage, and particularly to identify intentional breakage, a set of experiments were designed with the purpose of differentiating traces of intentional and accidental impacts on archaeological ceramics. Some preliminary results are presented below.

The experimental approach

The experiments consisted in submitting two types of vessels, i.e. high-fired and low-fired, to two impact procedures designed to simulate accidental and intentional actions. The first consisted of dropping vessels sideways from three different heights (100, 150 and 200 cm), while in the latter procedure vessels were hit with three pendulums of different head sizes (10, 214 and 410 mm^2). In the drop procedure, the variable studied was energy input expressed in increasing drop height, and the pendulum-impact procedure focused on the influence of the impact area (which relates to the size of the impactor). Dropped vessels were recorded with



Left: example of one of the pendulums designed for the experiments. The modified golf club was filed down to possess an impact area of 214 mm^2. Right: all three pendulum head sizes used.

a 50 fps camera to assess which portion of the vessel had hit the ground first.

The vessels were manufactured taking into account porosity, amount and type of temper, method of manufacture and the thickness of the vessels. These are considered the main microstructural factors contributing to fracture formation in multi-phased ceramics. The high-fired vessels used were commercial machine-made terracotta pots with around 15% fine (<500μm) mineral inclusions and fired between 980 and 1150 ^{0}C; this resulted in a relatively low porosity, around 0.6%. Low-fired vessels were hand-made using one of the commercial pots as a mould and were composed of around 25% semi-coarse (<1mm) sand temper fired at 800 ^{0}C for one hour; as a result porosity was relatively high, i.e. around 4%. The two types of vessels thus represent two ends of a spectrum; on the one side, a more resistant highly fired and less porous type and, on the other side, a less resistant low-fired and highly porous type. The percentages of porosity were estimated through image analysis of photomicrographs of blue-dyed thin-sections.

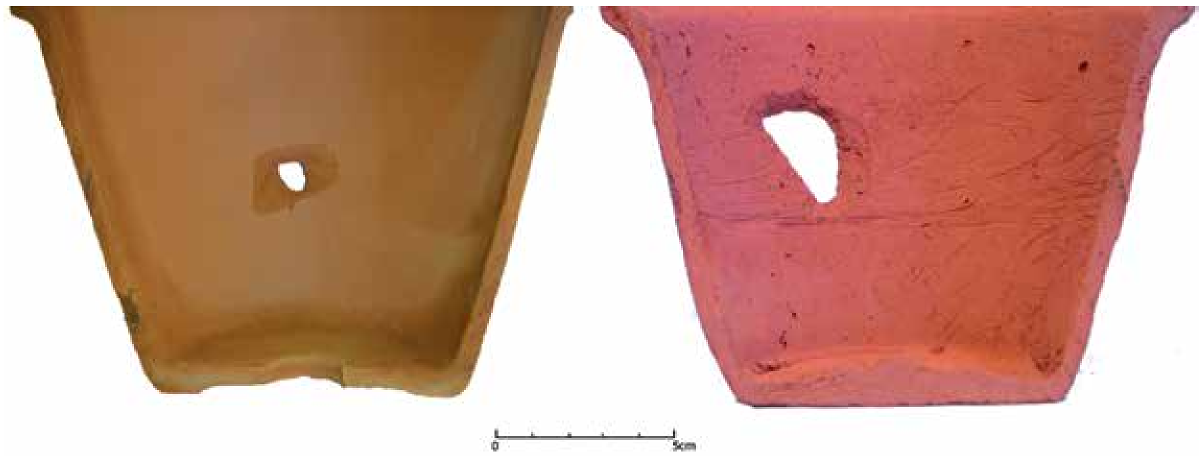
Pendulums were manufactured from commercial golf clubs and were then filed down to the corresponding head sizes. The weight of pendulums was maintained constant at 365 g.

The sample consisted of a total of 90 pots, of which 45 were high-fired and 45 low-fired. From this sample, ten vessels were used in each of the three dropping procedures, and five pots for each of the impact procedures. The reasons for choosing a smaller sample size for pendulum-impact experiments was because of the controlled nature of the blow in this operation, which would allow for less variation to occur than for vessels hitting the ground as they were dropped. This was confirmed by the results. Finally, after the breakage procedure, 60% of the dropped and 100% of the pendulum-impacted vessels were refitted for breakage pattern recognition.

Some results and a brief discussion

Results showed that both energy input and impact area are contributing factors in fragment formation. Among the diagnostic features observed, cone-shaped fractures at the point of impact (i.e. Hertzian cones) appeared in both types of vessels and both breakage procedures. The mayor difference between the procedures is the recurrent formation (86% of the vessels) of cone-shaped features in specimens that were submitted to a pendulum-impact. The size and shape of these features varied depending on the type of impactor, and as the impact area increased these formations were less frequent. Although 67% of dropped vessels presented some kind of cone-shaped fractures, most of them (i.e. 83.4 %) were of a different nature, as they were produced by the contact of the vessels' inflexion points with the ground at a sharp angle. This was confirmed by reviewing the video recordings in a frame-by-frame mode.

For this reason, it was concluded that if cone-shaped fractures occur in areas where vessels do not possess any inflexion



The interior sides of a high-fired (left) and a low-fired (right) flowerpot struck from the outside with a sharp pendulum (i.e. small impact area). Both show a cone-shaped fracture at the point of impact.

Some selected frames from the videos of dropped pots.

points, then it is more likely that they were produced as the result of a vessel being struck with a sharp instrument, rather than of the vessel hitting the ground. Moreover, if vessels in an assemblage consistently show traces of these features, then one might also argue for a tool-inflicted blow. Most importantly, if well preserved, cone-shaped fractures could not only be diagnostic elements of intentionally struck vessels, but also a potentially useful way to identify the object used to strike the vessel. This latter aspect forms part of another ongoing project.

Although the present study does not include all the possible ways of destroying vessels accidentally or intentionally, the results have suggested a way of differentiating dropped from tool-impacted vessels, regardless of their porosity differences. Thus, an interpretation of these practices can be attained through the analysis of the fractures and features formed on impact, specifically of Hertzian cone formations. Scenarios where tools are employed to strike vessels may be varied in prehistory, e.g. mortuary practices, feasting activities, sacrificial offerings, conflict scenarios, abandonment practices and all kinds of ceremonies. Hence, this type of analysis allows considering pottery breakage as an intended phenomenon in a diverse set of social practices, where value and meaning can be most manifest.

Acknowledgements

I would like to thank the Prehistoric Society for the funding and support on this project. I also thank the Institute of Archaeology London (UCL) for allowing me to access the equipment required for the experimental work. Lastly, I would like to thank Ulrike Sommer and Bill Sillar for their comments and suggestions.

Bruno Vindrola-Padrós (University College London)

The copy date for PAST 85 is the 3rd of February 2017. Contributions to Editor, Daniela Hofmann, Archäologisches Institut, Universität Hamburg, Germany. Email: daniela.hofmann@uni-hamburg.de. Contributions on disc or as e-mail attachments are preferred (either Word or rtf files) but hardcopy is also accepted. Illustrations can be sent as drawings, prints, tif or jpeg files. The book reviews editor is Pippa Bradley, c/o Wessex Archaeology, Portway House, Old Sarum Park, Salisbury, Wiltshire, SP4 6EB, email: p.bradley@wessexarch.co.uk. Queries over subscriptions and membership should go to the Society administrator Tessa Machling at the London address on page 1.