

PAST

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A 3D view of Irish heritage: the Megalithic Art Analysis Project

The Megalithic Art Analysis Project (MAAP) at University College Dublin's School of Computer Science was the recipient of the New Interdisciplinary Initiatives Fund (NIIF), which provides seed funding for ambitious projects at UCD. The lead on the project is Dr Anthony Ventresque (School of Computer Science), with Prof. Mark Keane (School of Computer Science) and Prof. Muiris O'Sullivan (School of Archaeology) advising. The aims of the project are: 1) to explore consumer depth cameras (e.g. Microsoft Xbox Kinect) as an alternative and lower-cost method to capture 3D image data of megalithic art; 2) to evaluate annotation methods and techniques for 3D models (e.g. using augmented reality tools); and 3) to analyse semi-automatically the art on megalithic monuments (e.g. using machine learning techniques). A team of two archaeologists and four computer scientists was assembled by Ventresque to tackle the challenge.

Megalithic art is usually, although not exclusively, associated with passage tombs, which were built across western Europe by the early farming societies of the Neolithic, between approximately 4200–3000 BC. The art can be carved or painted onto the stones in the tomb.

Ireland is home to one of the largest concentrations of megalithic art, which can be divided into two distinct styles, the depictive style and the plastic style. The depictive style is the earlier of the two, as it is sometimes cross-cut by the plastic style. The motifs are placed in what appears to be a haphazard manner on the stone and are occasionally hidden once the stone is in place within the tomb. The plastic style is similar to sculpture: the art appears to fit the stone, does not occur on inaccessible surfaces and was most likely completed once the stone was in place.

Megalithic art is in danger of being lost to the elements, vandalism and in some instances overgrowth. Therefore, it is important to develop methods of data collection that are non-invasive, but also affordable and user friendly. Traditional methods of recording megalithic art involved sketching or tracing the art, and in some cases these drawings are all that remains. The most complete collection of megalithic art to date has been published by Elizabeth Shee Twohig. Recent work has moved towards digital techniques, such as photogrammetry and laser scanning, to document the art. For example, the majority of the art within Ireland has been photographed by Ken Williams, while the Discovery



Example of the plastic style in Irish megalithic art: the entrance stone at Newgrange, Co Meath.



Archaeologists scanning inside the Mound of the Hostages, Tara, Co Meath.

Programme has laser scanned some of the most intricate and recognisable pieces of art as part of their 3D Icons project. The methodology developed for MAAP presents an alternative technique for recording megalithic art and making it accessible to researchers.

The Xbox Kinect features an RGB-D camera and an infrared sensor. Both of these gather data about immediate surroundings in the device's field of view. The infrared sensor uses time-of-flight technology to create depth maps, while the RGB-D camera captures photographic image data. Kinetic Fusion, an algorithm – a process followed by a computer to make calculations – developed by Microsoft, combines the depth maps collected by the infrared sensor to create a 3D model. These models are very noisy and of poor quality, and researchers at MAAP have created algorithms to refine them to a sub-millimetre level of accuracy. They have also developed a user-friendly graphical user interface for their algorithms to make them easy to use for archaeologists.

One of the goals of this project is to use the Kinect sensor to record megalithic art from monuments across Ireland and Northern Ireland. We intended to visit all tombs with megalithic art; however, this was curtailed by the accessibility of some of the monuments. Despite this, the art from the majority of monuments outside the Brú na Bóinne complex has been recorded by MAAP.



Kinect scanning kit: laptop, Kinect, battery, LED lamp.

In order to record the art, the team carried a kit consisting of the Kinect, an Alienware laptop, a MaxOak K2 lithium-ion battery and a portable LED flood light. The Kinect is attached to the computer and the battery and operated using a custom-made application. Some of the challenges faced over the course of this project were the variable depths of the engravings and the variances in lighting from natural light and artificial light sources. Additionally, the Kinect sensor requires a distance of 0.5 m from the art in order to record it accurately, which is clearly an issue in confined areas, such as passages.

Despite these challenges, the Xbox Kinect sensor has enormous potential as a recording technique. One of the major advantages is that, unlike photogrammetry and laser scanning, this software has the capability to build 3D models of the objects being scanned in real time. This allows the user to see immediately if the quality of the data is sufficient, or if the recording should be repeated. This is also a major improvement in speed compared to photogrammetry software, which can often take several hours to process. The level of accuracy is comparable to average resolution photogrammetry. The 3D models created allow markings to be discerned that were previously invisible or only faintly visible to the naked eye.

A separate section of this project is the development of an annotation tool for use in the Microsoft HoloLens. The HoloLens is a mixed reality tool which allows users wearing the device to view holograms in their own environment. The tool currently being developed by the MAAP team, MAAP Annotate, would allow archaeologists to view 3D holograms of a stone with megalithic art in their office and to manipulate a life-size model of the stone. It is also possible to draw on the model in order to select specific symbols and add notes about the art. Users will be able to view annotations made by others. While this application is being developed for use in the HoloLens, it could easily be utilised on a computer, smartphone or tablet.

Finally, the long-term goals of this project are to create an online database of megalithic art in Ireland, enable the possibility for a global database and facilitate research such as pattern recognition. Future iterations of this project will construct the online database which will enable researchers to access the 3D models. Scans of megalithic art from other countries will also need to be collected in order to create a global database and allow further comparison of the art. Developing pattern recognition will involve computer scientists defining the machine learning problem that would set the groundwork for art detection from 3D models of stones. While there is still work to be done in developing and perfecting all the tools mentioned, it is an exciting and innovative development in the recording of megalithic art.

Jordan Young, UCD (jordan.young@ucd.ie), Patricia Kenny, UCD, Dr Anthony Ventresque, UCD (anthony.ventresque@ucd.ie), Prof. Muiris O'Sullivan, UCD, Dr Mark T. Keane, UCD, Dr Jean-Marie Normand, Ecole Centrale de Nantes (jean-marie.normand@ec-nantes.fr)

An Iron Age patchwork: new evidence on the biography of the Grimthorpe shield

The Grimthorpe shield, despite its name, is not a single object. It exists today as a group of six different objects: bronze fittings that were once attached to a wooden or leather backing to form a shield. The fittings consist of one central boss, two ribs, two crescent-shaped plaques and a single, small disc. They were excavated by John Mortimer in 1868 from a Middle Iron Age burial within the Early Iron Age hillfort of Grimthorpe in East Yorkshire, which was re-examined by Ian Stead in the 1968 edition of the Proceedings of the Prehistoric Society. The burial is one of a series of ‘warrior burials’ in East and North Yorkshire, so called because they contain young men buried with weapons. In addition to the shield fittings found within the Grimthorpe warrior’s grave, there were several iron spearheads, a sword and a number of bone points.

This short article presents new evidence for the way the Grimthorpe shield was used and argues that this object was made from parts of several other shields, which were brought together to form a new assemblage at some time before the shield’s deposition. The work presented here was carried out during AHRC-funded PhD research at the University of Southampton and the British Museum, and also represents ongoing work on the fragmentation and reassembly of Celtic art objects.

During my examination of the Grimthorpe shield at the British Museum, I found evidence of use wear, damage and repair on some of the fittings, indicating significant histories of use. As Stead reported, the two crescent-shaped

plaques had been torn in several places at the edges, and rivet holes around these tears indicate efforts to repair the damage. Roland Williamson has suggested that the distorted appearance of some of the rivet holes may indicate that these fittings were once torn from their backings, and I argue this may also be the cause of the tears. In addition, the rivet holes in the crescent-shaped plaques are numerous, unevenly spaced and of different sizes. This suggests that they were not only removed from their original backings, but reattached to multiple different backings over time. One of the crescent-shaped plaques had also sustained a substantial dent and, while this may have been made during the excavation of the shield, it is also plausible that it was made during armed combat. The remaining fittings, in contrast, show no signs of damage or repair.

The varied decorative styles on the fittings of the shield further emphasise their mismatching histories. The small disc is decorated in a typically asymmetrical, La Tène style pattern, while the crescent-shaped fittings are bordered with a stepped geometric pattern. The central boss is decorated with a finely engraved symmetrical pattern with textured infilling. The two ribs are ornamented in a similar engraved style. The varied decorative techniques and effects on these fittings may suggest these contrasting objects were brought together deliberately to create a sense of juxtaposition and emphasise their varied biographies.

Taken, together, this evidence tells a new story about the Grimthorpe shield’s biography. Some elements are well-used



Left: The Grimthorpe shield fittings, showing an interpretation of their positioning as part of a reconstructed shield (©Trustees of the British Museum). Length of reconstructed shield: approximately 86 cm. Right, top: A repaired tear on the edges of one of the crescent-shaped plaques; bottom: Multiple rivet holes, unevenly spaced and of various sizes (H. Chittock, taken courtesy of the Trustees of the British Museum).



Details of the differing decorative styles on the fittings. Clockwise from top left: La Tène style pattern on the small disc; infilled pattern on a rib; stepped pattern on a crescent-shaped plaque; symmetrical, infilled pattern on the central boss (H. Chittock, taken courtesy of the Trustees of the British Museum).

and repaired, while others seem relatively pristine. Some elements show evidence for having been ripped from their original backing and attached to a new one, perhaps more than once. And the contrasting decorative styles of the fittings suggest they were not produced as a 'set'. The evidence suggests that, rather than being produced as a single shield, the Grimthorpe shield was made from a series of fittings recycled from other shields.

A group of enigmatic copper alloy objects from the Grimthorpe warrior burial have been categorised by the excavator as 'pins', but may, in fact, have been rivets used to attach the fittings to a wooden or leather backing, which has not survived. This would suggest that the shield was placed into the grave as a whole object, but it is also possible that the fittings were deposited as an assemblage of individual objects.

There are several potential interpretations of this 'patchwork' shield. Perhaps the fittings were recycled to save the labour and resources associated with making new ones. Thinking along the lines of traditional ideas about the warrior inside the grave, perhaps some of the shield fittings were collected as trophies from other warriors, over whom the Grimthorpe warrior had triumphed in armed combat. Setting the Grimthorpe shield within the wider assemblage of Iron Age weapons and other composite objects from East Yorkshire graves, however, suggests that other motivations lie behind this shield's biography.

Like the Grimthorpe shield, chariots and swords from East Yorkshire also show evidence for having been 'patchworks'.

Chariots found within burials were generally dismantled before deposition, but these assemblages show evidence of having been made from varied selections of old and new fittings, as Melanie Giles has discussed. Like those of the Grimthorpe shield their fittings are often decorated in variable ways, as if to emphasise varied origins. They are generally well-used and some fittings also show differential levels of use-wear. This is particularly obvious on chariots from Kirkburn and Garton Slack, reported by their excavators as having single replacement wheels. The best surviving chariot that was buried whole (Ferrybridge) was, similarly, a patchwork of fittings, with a replacement wheel and sham terrets, designed only to be used for its journey into the grave in its final configuration.

My research has also supported the idea that Iron Age swords from East Yorkshire had long and varied biographies. The Kirkburn sword is a famous example of an object with a very long history, but other swords and scabbards were also well-used and made from old and new components with contrasting decoration. The joins between components are often not concealed and, in some cases, the joins and repairs are decorative in themselves. These phenomena extend beyond East Yorkshire.

Contextualising the Grimthorpe shield within the wider assemblage of composite objects from East Yorkshire sheds new light on its function, and allows me to suggest an interpretation befitting its complex biography. I argue that the shield was part of a wider tradition of curating and modifying composite objects in ways that make their long biographies visible. Components were added and removed over time, their varied ornamentation and decorative repairs making these modifications visually apparent. The varied histories of these objects were important, and the visible biographies of the objects themselves made it possible to 'read' and remember these stories.

Acknowledgements

I am very grateful to the AHRC, the British Museum and the University of Southampton for providing the funding and support for this research. Special thanks go to my supervisors, J.D. Hill (BM), Andy Jones (University of Southampton) and Jody Joy (MAA Cambridge, formerly BM) for their advice and patience; Julia Farley (BM), who made research in the collections of the British Museum possible; and Melanie Giles (University of Manchester) for sharing her ideas about Iron Age East Yorkshire. All errors are my own.

*Helen Chittock, University of Oxford
(helen.chittock@arch.ox.ac.uk)*

Delayed delivery

Members may have noticed the substantial delay in the delivery of the spring edition of PAST, which was due to an oversight at Cambridge University Press. As overprints were delivered to the Society, we remained unaware of the problem. CUP have apologised unreservedly, and we would like to pass this on to our members. Steps have also been taken to ensure that a similar situation will not recur.

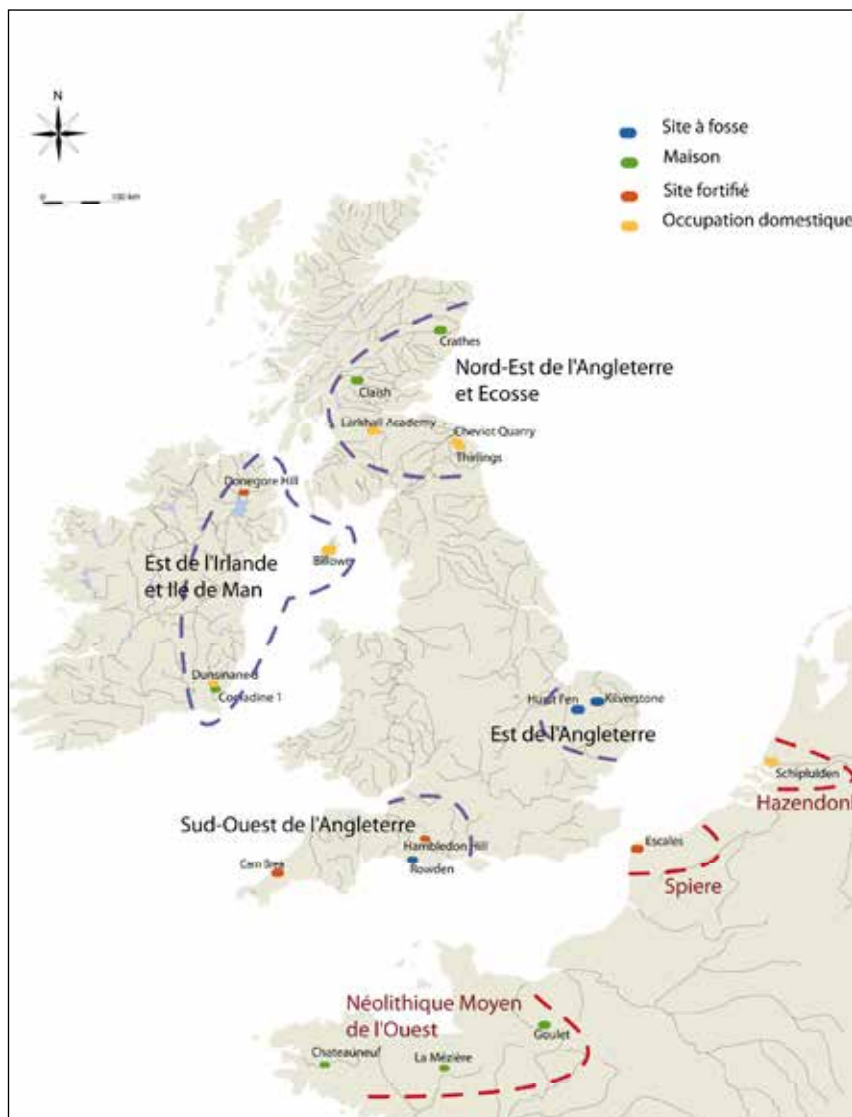
Societies and identities during the Early Neolithic of Britain and Ireland in their west European context: characterisation and comparative analyses of pottery production between Channel, Irish Sea and North Sea

The debate over the Mesolithic–Neolithic transition has been running since the beginning of the last century. In a recent PhD thesis, I decided to address this question by focusing on knowledge transfer between continental and British and Irish populations. Pottery analysis is the very core of this work, as pottery can be considered as a structured integrated system in a specific social and cultural environment. This enables us to appreciate the socio-cultural complex and its interactions with other complexes. Early Neolithic pottery, also known as Carinated Bowl, has been studied for decades, mainly for its stylistic character. Yet studying the development of pottery production in Britain and Ireland more accurately would help in understanding contacts, influences and know-how transmission networks more generally.

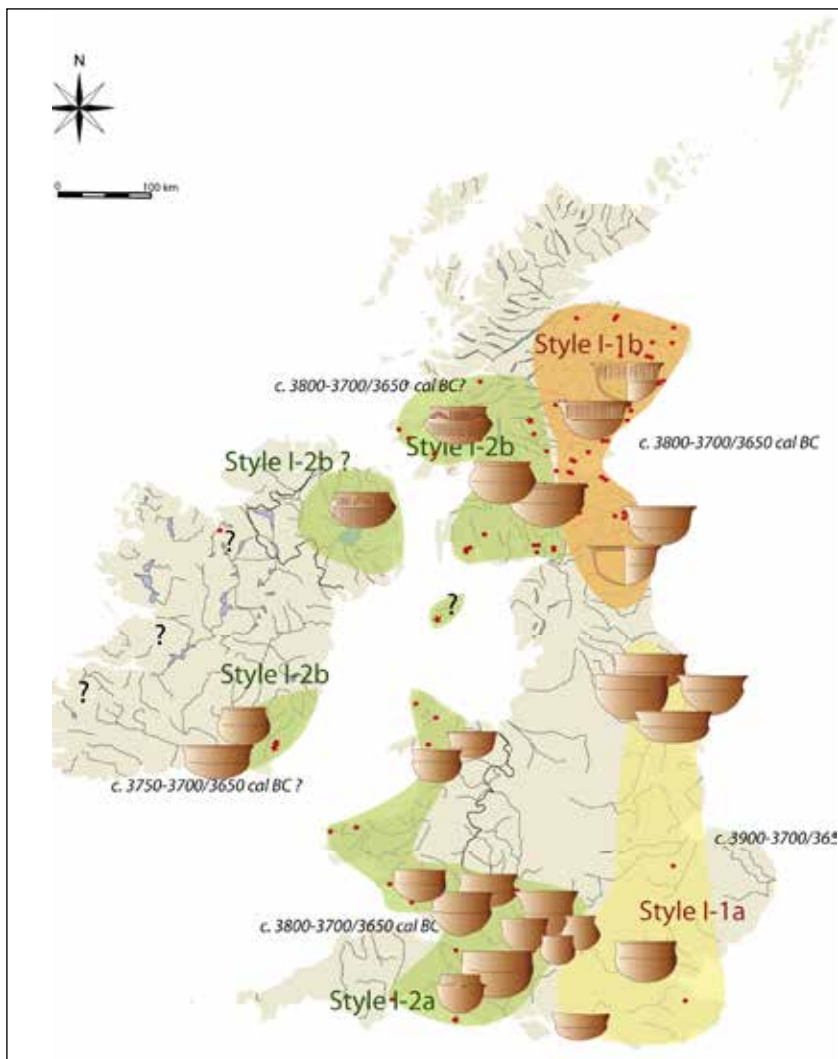
This study encompasses a wide geographical area, namely Britain, Ireland and the near Continent from Brittany to

the Netherlands. As an exhaustive study of all existing assemblages was not possible, a sample was selected, covering the geographical area homogeneously. Fifteen assemblages were chosen in Britain and Ireland and four on the Continent. All assemblages are from non-funerary sites; these were avoided as potters might have made specific stylistic or technical choices in mortuary contexts. Supplementary information was included, based on the available literature and communications from colleagues.

An integrated approach, never previously applied in the British Isles or at a European scale, was developed. It combines stylistic and technological analyses. The latter aspect is still poorly used in Britain and Ireland, perhaps partly because only small pottery fragments are generally preserved here. The present study consisted in creating an analysis grid to identify stages of *chaînes opératoires*.



Distribution of insular and continental pottery assemblages. Blue: pit sites; green: houses; red: enclosures; yellow: domestic sites (© H.Pioffet).



Distribution of insular pottery styles during the first phase (c. 3900 to 3700/3650 cal BC) (© H. Pioffet).

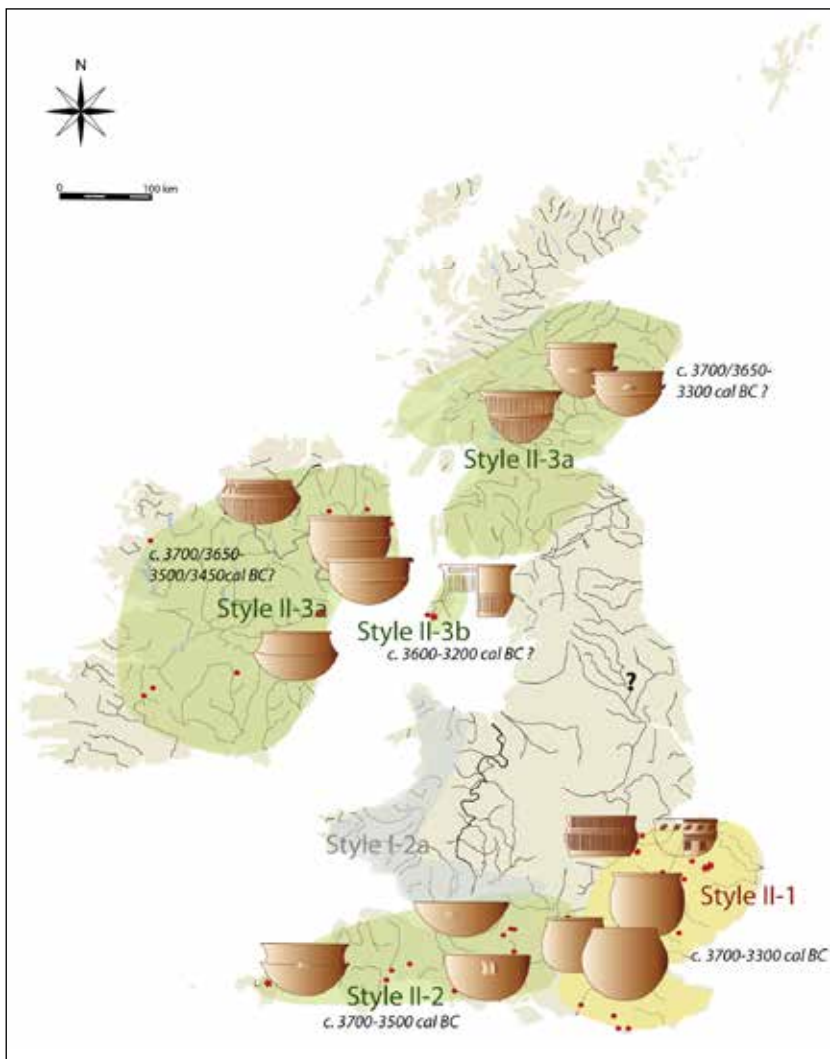
Collecting only fragments of *chaînes opératoires* is perfectly acceptable, as some unavoidable steps of the production process are in any case imperceptible archaeologically, such as clay collecting or the fuel type used for firing.

The present analysis corroborated previous observations in that a transition appears to happen through two major phases, the first one occurring between 3900 and 3700/3650 cal BC. The integrated approach enabled identification of a geographical division during this phase, between western pottery productions (including south-west England, western Scotland, eastern Ireland and the Isle of Man) on the one hand and eastern pottery productions (including East Anglia, north-east England as well as eastern Scotland) on the other. Indeed the study showed a stylistic opposition, with closed profiles only known on the western façade. The technological analysis highlighted significant variations in the techniques used in shaping the rim and the carination. It has to be underlined that occurrences are earlier on the eastern façade, with sites and material dated from c. 3900 cal BC, instead of c. 3800 cal BC on the western façade.

The geographical division is particularly significant when considering knowledge transmission processes, which seem to have been quite dissimilar. The profiles observed in south-east England are fairly close to Spiere pottery in northern France

and Belgium. Technological aspects tend to show a cognitive persistence between this continental region and the British eastern façade, particularly regarding the specific shaping of the carination. This step in the *chaîne opératoire* is usually not noticeable once the vessel is finished; yet beyond adapting to external contingencies, making pottery ultimately highlights a technical style expressed by the potter. In the present case, vessel shaping seems not to be used as a means to express the potter's specific choices to an audience, but rather shows that full information assimilation and reproduction were achieved during the process of know-how transfer. The eastern façade pottery style is represented by open carinated vessels within which sub-styles appear.

There is no denying that know-how transfers happened between northern France and southern Belgium (more specifically from the Scheldt basin) on one side and southern Britain on the other. These transfers seem to have occurred directly, which would imply that populations migrated from the near Continent to Britain; however, supplementary technological observations particularly in south-east England, which could enable us to corroborate this assumption, have yet to be undertaken. Stylistic observations reveal important indications. Even though pottery wares belong to a common stylistic background in Britain, there is a geographical trend of the profile opening more and more



Distribution of insular pottery styles during the second phase (c. 3700/3650 to 3300 cal BC) (© H. Pioffet).

as one goes up the eastern coast. This observation, combined with the fact that there were only carinated vessels, allows to suggest that the potters along the eastern façade, even though using continental techniques to make their vessels, chose to modify their style.

Looking in the other direction, strong stylistic and technical resemblance between the western British coast and the Norman and Breton assemblages were identified in the present study. Technical observations show strong links between south-west England and Breton and Norman pottery, in particular the use of horizontal coils (externally bevelled).

The more significant stylistic traits are closed, complex profiles and the fact that vessel carinations are reinforced on the internal surface. When considering additional assemblages beyond those studied here, comparisons can be made between pottery uncovered in south-west England at sites such as Coneybury Anomaly, Wiltshire, and Breton and Norman pottery. A carinated vessel with a high neck found in Coneybury Anomaly echoes Breton Castellic pottery (in particular one vessel found in Mané Hui, Carnac), although in contrast to the Coneybury example the Breton pot is copiously decorated. Hence, this similarity cannot result from direct inspiration. Other profile similarities can be suggested, for instance between pottery from the Sweet

Track (Somerset) and Soumont-Saint-Quantin, Le Mont Joly (Orne, Normandy). Finally, it is undeniable that sharply carinated vessels with upright internal neck were introduced to Britain from the west. Moreover, this profile and the corresponding building techniques seem to represent the most important influence along the western façade.

The second phase identified tends to show a common process of regionalisation along both façades, although there is cognitive continuity with the previous phase. During this phase, south-west England seems to be reached a second time by a continental influence. It can be suggested that pottery uncovered in big causewayed enclosures such as Carn Brea or Hambleton Hill echoes north Norman assemblages such as Louviers, La Villette (Seine-Maritime).

Ultimately, beyond the British and Irish Mesolithic–Neolithic transition, structural changes appear throughout western Europe at the dawn of the fourth millennium BC. One of these changes is the carinated bowl. The next step is to investigate more accurately how this kind of pottery appeared, as well as the technical and stylistic changes caused by the production of carinated vessels. This would allow to see the British and Irish situations in a new light.

*Hélène Pioffet, UMR 6566 (CREAAH), Rennes
(h.pioffet@gmail.com)*

Tracing the Lines: uncovering Grooved Ware trajectories in Neolithic Scotland

The emergence of shared practices across Britain and Ireland in the Late Neolithic has long fascinated archaeologists and has increasingly captured the attention of the broader public, as evidenced by the interest generated by several recent television documentaries. However, unravelling the processes behind the adoption of novel artefacts, monuments, art styles and types of building across the islands requires that close attention be paid to the subtleties of temporal and geographical variation. In this respect, and despite its importance for our understandings of social processes in the Late Neolithic, the timing and nature of the spread of Grooved Ware – the iconic pottery of this period – remains relatively poorly understood. The results of the recent *Times of Their Lives* project are helping to clarify certain aspects of the emergence of this style of pottery in Orkney, and it is likely that the excavations at the Ness of Brodgar will also contribute significantly over the coming years. Nevertheless, a number of important questions remain to be answered regarding the nature and timing of the spread, subsequent development and ultimate decline of Grooved Ware across Britain and Ireland beyond Orkney. Unfortunately, our understanding of such processes is presently hampered by the limited number of reliable radiocarbon dates associated with Grooved Ware, particularly in Scotland. It is with this in mind that a new one-year Historic Environment Scotland-funded project — *Tracing the Lines: Uncovering Grooved Ware Trajectories in Neolithic Scotland* — has been set up at the University of Bradford, headed by Dr Alex Gibson and Dr Mike Copper and with the close involvement of National Museums Scotland and HES. The project aims to track down datable organic material found in close association with (and preferably *on*) Grooved Ware pottery across Scotland outwith

Orkney with a view to significantly improving the number of high-quality dates available to researchers.

The adoption of Grooved Ware outside Orkney is just one aspect of the increasing inter-regional connectivity evident in the use of new types of monuments, artefacts and practices in the Late Neolithic. Stone maceheads, carved stone balls and new types of flint and stone artefacts appear or spread from their regions of origin, while at the same time the appearance of Boyne-style developed passage tombs and associated art styles as far north as Orkney illustrates that ideas did not simply move in one direction. Stone and timber circles appear at this time, including elaborate constructions such as the well-known examples from Durrington Walls, Balfarg henge and Ballynahatty that arguably may represent a monumentalisation of the idea of the house. These are accompanied by smaller buildings that, most famously at Durrington Walls, include wooden versions of structures that would not have looked out of place at Barnhouse or Skara Brae in Orkney. Whether the larger buildings represent ceremonial structures is of interest in terms of whether we are seeing the sharing of ‘institutions’ such as religious or cultic practices between communities. In this regard, it is notable that fine Grooved Ware of a style known from several sites in Orkney, as well as Knowth, Balfarg and increasingly elsewhere, is likely to be amongst the earliest in date outside Orkney itself.

Also associated with Grooved Ware – in many cases, and perhaps significantly, of the so-called Durrington Walls style – are timber palisaded enclosures. In Scotland, excavated examples include Dunragit, Forteviot, Leadketty and Blackhouse Burn, and it is of interest that all of these sites lie close to important modern routeways. Such enclosures can be very large or complex in form and are often associated with other types of monument that may be contemporary with, or pre- or post-date, the enclosures themselves.

Understanding the role of Grooved Ware in this rapidly changing Late Neolithic world is of considerable importance if we are better to comprehend the period as a whole, and dating the spread and development of this style of pottery and its various sub-styles must therefore be a priority. As such, in addition to considering both published and unpublished Grooved Ware assemblages, the *Tracing the Lines* team are keen to identify other datable material, particularly from less well-known and unpublished sites, and would be happy to hear from anyone who is aware of lesser-known finds of Scottish Grooved Ware associated with potentially datable material. If you feel that you may be able to help in this respect then please contact us.



The *Tracing the Lines* team members and expert contributors examining recently excavated Grooved Ware at National Museums Scotland's collections. From left to right: Dr Derek Hamilton (SUERC); Dr Mike Copper (University of Bradford); Dr Alison Sheridan (National Museums Scotland); Dr Alex Gibson (University of Bradford); Dr Ann MacSween (Historic Environment Scotland)



Mike Copper, University of Bradford
(m.copper1@bradford.ac.uk)

EUROPA 2018

University of York, 22–23 June 2018

Coastal Colonisation in Prehistory; in honour of Prof. Geoff Bailey, University of York

We are delighted to announce that the winner of the 2018 Europa prize is Prof. Geoff Bailey, who is well known for his work on coastal archaeology in Europe and further afield, concerning especially the early colonisation of islands and coastal regions. 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 Bailey. Speakers include Chris Stringer (Natural History Museum), Vince Gaffney (University of Bradford), Clive Gamble and Helen Farr (University of Southampton), Nena Galanidou (University of Crete) and Hein Bjerk (University of Trondheim). The Europa lecture itself will be titled: 'Between the devil and the deep blue sea: the archaeology of prehistoric coastlines'.

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 Annabell Zander at az661@york.ac.uk by Sunday 20 May 2018. 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.

Prehistoric Society 2017 Europa conference: The Bronze Age as pre-modern globalisation

This year's Prehistoric Society Europa conference, held 23–24 June at the University of Southampton, celebrated the achievements of Prof. Helle Vandkilde of the University of Aarhus, whose work on the European Bronze Age, and particularly the idea of 'bronzization', provided great inspiration to many of the presenters.

After the Society's president formally opened proceedings, Dr Thor McVeigh (Galway) considered the role of cultic practices in the emergence of new identities in the Late Neolithic and Early Bronze Age. Switching to the Mediterranean, Cezary Namirski (Durham) presented his recent work on regionality in Bronze Age Sardinia, which indicates considerable variability in settlement patterns relating to the well-known nuraghi in two parts of eastern Sardinia. Claire Copper (Bradford) followed with a discussion of Early Bronze Age funerary cups from southern Britain, presenting a compelling argument for their origins in Beaker practices, potentially deliberate spoilage during manufacture and their possible role as accompaniments for problematic or 'special' individuals. Moving further afield, Bronze Age metallurgy in

central Asia provided the context for Dr Miljana Radivojević's (Cambridge) discussion of networks and innovation in Bronze Age Kazakhstan. This considered the adoption and transmission of metalworking knowledge beyond the core areas of innovation across the Eurasian steppe, driven by the complex interconnectivity of pastoralist communities.

After lunch, we were treated to a review of recent work by Drs Mateusz Jaeger, Nicole Taylor and Robert Staniuk (Poznań and Kiel) on 'non-global aspects of globalisation' and in particular the role of relatively mundane economic activities in driving social development in the Carpathian Basin. The extent to which the zooarchaeological record can inform our understandings of animal symbolism was then considered by Jacob Kveiborg (Aarhus), who argued that this provides an important adjunct to pictographic evidence for belief systems in the Nordic Bronze Age. Staying in Scandinavia, Prof. Karin Margarita Frei (Copenhagen) presented a fascinating consideration of female mobility in the Bronze Age, drawing extensively on evidence from Denmark's well-known oak-coffin burials. This was followed



Europa Prize winner Helle Vandkilde (10th from the left) surrounded by the speakers of this year's conference (photo: Alex Gibson/Neil Wilkin)

by Prof. Philipp Stockhammer (Munich) reporting on a major interdisciplinary study of Late Neolithic and Early Bronze Age burials in the Lech valley, Bavaria. The emergent complex narrative illustrates the high degree of resolution that can be attained when sufficient resources are brought to bear. Profs Johan Ling (Gothenburg) and Lene Melheim (Oslo) addressed 'hyper-scaled connectivity' and bronzization in Scandinavia. There, metal arrived as ingots of bronze, copper and tin before being cast into local forms, reflecting how large-scale processes may play out differently between regions. The day was rounded off by Dr Joanna Sofaer's (Southampton) presentation on encrusted pottery, with particular reference to the use of inlays and the manipulation of their various optical effects.

Day two began with a consideration by Prof. Kristian Kristiansen (Gothenburg) of the implications of estimating population numbers in Middle Bronze Age Denmark. He proposed that different burial rites for elites and commoners provide evidence for social differentiation linked to the control of the amber and metal trades. Indeed, Bronze Age society in this region may, in certain key respects, have foreshadowed Viking social organisation. This was followed by Dr Alex Gibson (Bradford), who argued that Early Bronze Age practices in Britain may have drawn on Middle Neolithic precedents, including the use of materials such as jet and certain artefactual forms, to create a form of re-invented tradition. Returning to the theme of local versus global, Prof. Marie Louise Stig Sørensen (Cambridge) then considered how local routine interactions may affect the nature of cultural expression, focusing on gender relations in the light of variation between Scandinavian bronze belt boxes. Prof. Svend Hansen (Berlin) reflected on how the diffusion of new objects and techniques, particularly relating to warfare and conflict, could illuminate inter-regional connections

in the 16th century BC, emphasising that Bronze Age globalisation will have affected different social groups in very different ways. Focusing on the 'dagger idea' through time, Dr Catherine Frieman (Canberra) then discussed the social and technological processes underlying the intensification of inter-regional connections from the third millennium BC onwards. Finally, Dr Ben Roberts (Durham) presented a fascinating evaluation of the nature of 'bronzization' across three continents.

The Society's AGM then followed, including the presentation of the Baguley Prize to Prof. Richard Bradley and his team (Alice Rogers, Prof. Fraser Sturt, Dr Aaron Watson, Diana Coles, Dr Julie Gardiner and Dr Ronnie Scott) for their article on *Maritime Havens in Earlier Prehistoric Britain*.

Following the AGM, delegates gathered to witness the awarding of the Europa Prize to Prof. Vandkilde, who developed the main theme of the conference in her Europa lecture by considering the diversity and multi-scalar nature of bronzization across Afro-Eurasia, drawing on evidence from prehistoric Scania and contemporary Papua New Guinea. Afterwards, attendees were treated to a convivial wine reception generously sponsored by Cambridge University Press.

As usual, the conference provided a fascinating and eclectic range of presentations, with many drawing on Prof. Vandkilde's concept of 'bronzization'. We would like to thank all involved in the organisation of the conference, ably coordinated Drs Alex Gibson, Courtney Nimura and Joanna Sofaer with the help of numerous other council members and staff. We would also like to extend our thanks to the University of Southampton for hosting this year's event.

*Mike Copper, University of Bradford
(m.copper1@bradford.ac.uk)*

Current Final Palaeolithic, Mesolithic and Early Neolithic research in north-western Europe

The 26th annual conference of the German Mesolithic Workgroup was held in Wuppertal from 10–12 March 2017. The conference was organised and hosted by Annabell Zander, University of York, and Birgit Gehlen, University of Cologne. The programme included 24 academic talks and ten poster presentations held throughout Friday and Saturday and dealing with regional and international themes surrounding the Final Palaeolithic, Mesolithic and Early Neolithic.

The first session, chaired by Mikkel Sørensen (University of Copenhagen), concentrated on Final Palaeolithic and Early Mesolithic research across north-western Europe and included presentations on environment, fauna and technology of an Ahrensburgian site near Lake Itzstedt, Germany (Sascha Krüger and Markus Wild, ZBSA), a new Long Blade site at Dormagen-Nievenheim, Germany (Martin Heinen, artemus GmbH) and Mørke Enge, an excavated fishing area from the Preboreal of Sjælland, Denmark

(Erik Brinch Petersen, University of Copenhagen). This was rounded off by the presentation of the posters, which ranged from bead working at Star Carr (Andy Needham and colleagues, York University) to the issue of complex foragers in Northern Europe (Sonja Grimm and colleagues, ZBSA).

The next session focused on Final Palaeolithic and Early Mesolithic research and was chaired by Martin Street (Monrepos). It included talks on Final Palaeolithic finds from the Trebbin area in Germany (Stefan Pratsch, County Teltow-Fläming) and rescue excavations of the Late Palaeolithic and Mesolithic site of Tašovice 2 in western Bohemia, Czech Republic (Jan Eigner and colleagues, University of Brno).

The afternoon session dealt with the use of fire in the Mesolithic and was chaired by Sonja Grimm. Presentations addressed how to illuminate the prehistory of northern Europe through lipid residue analysis of putative oil lamps



The attendees of the 26th Mesolithic Conference in front of the venue in the Botanic Garden, Hardt Park, Wuppertal (Photograph: M. Koke).

(presented by Harry Robson, University of York, on behalf of an international team) and new results from the well-known site of Jühnsdorf 8 in Germany (Erwin Czesla, Martin Wurzel Archäologie GmbH).

A workshop entitled ‘How do we define the Mesolithic today?’ took place later on Friday afternoon and was chaired by Annabell Zander. This workshop dealt with a critical evaluation of the division between the Palaeolithic, Mesolithic and Neolithic. The main conclusion was that cultural change does not necessarily align with climate change, as Final Palaeolithic traditions extended into the Early Holocene in certain regions. This means that the Mesolithic must be understood as a regionally defined phenomenon.

The second day began with the theme of subsistence and mobility among Mesolithic hunter-gatherers, chaired by Erik Brinch Petersen. Presentations included reconstructing the rationality of Mesolithic hunting (Elisabeth Noack, Morepos) and mobility in Mesolithic north-western Germany (Svea Mahlstedt, NIhK). The following session focused on Mesolithic deposition and caching and was chaired by Elisabeth Noack. New results were presented on the skull nests from Große Ofnet cave (Jörg Orschiedt, Curt-Engelhorn-Zentrum Archäometrie GmbH on behalf of a larger team) and the under-recognised phenomenon of caching in Europe (Mathias Jensen, Aarhus University).

Moving on from the international character of the previous sessions, the next set of papers focused on regional Mesolithic studies in Germany and was chaired by Julia Goldhammer (Bohusläns Museum). Presentations centred on selected Mesolithic surface sites in Mecklenburg-Vorpommern (Felicita Faasch, Hamburg University) and rescue excavations of the Late Mesolithic site Satrup LA2 (Sönke Hartz and Mirjam Briel, Stiftung Schleswig-Holsteinische Landesmuseen). The final session focused on Late Mesolithic and Early Neolithic themes and was chaired by Erwin Czesla. Talks included an insight into a new project on subsistence strategies, settlement structure and communication in the Terminal Mesolithic in Kiel Bay (presented by Julia

Goldhammer on behalf of the wider team) and a survey of the inland Ertebølle in Schleswig-Holstein (Ann-Katrin Meyer, Hamburg University). The final session was followed by a short presentation on a few exceptional Stone Age finds from the Dutch North Sea (Marcel Niekus, Stichting STONE, and co-authors). After the presentations on Saturday, Erich Claßen (Amt für Bodendenkmalpflege im Rheinland) and Jörg Orschiedt delivered a public talk on the region’s Stone Age points of interest.

On a sunny Sunday morning, the excursion started at the famous Blätterhöhle cave in Hagen, where the oldest human fossils in Westphalia have been found. Jörg Orschiedt and Wolfgang Heuschen (RGZM Mainz) offered a guided tour of the area of excavation in front of the cave entrance and inside the cave itself. We then headed to Monrepos in Neuwied, where Elisabeth Noack and Martin Street guided us through the Archaeological Research Centre and Museum for Human Behavioural Evolution.

In sum, this international conference was an engaging and inspiring meeting with over 70 attendees from eight different countries, including Germany, the Benelux countries, Britain and Scandinavia. The international character of this meeting was reflected in the wide variety of themes presented during the conference. The various presentations inspired interesting discussions, specifically revolving around how humans responded to climate change in north-western Europe, including during the Palaeolithic–Mesolithic transition and the transformation from hunter-gatherers to farmers. These different themes will be explored in more detail in the conference proceedings, which will be published in the summer of 2018.

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Annabell Zander, University of York (az661@york.ac.uk)

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Grave goods: objects and death in later prehistoric Britain

Britain is internationally renowned for the high quality and exquisite crafting of its later prehistoric grave goods. Objects from burials are central to how archaeologists interpret society at that time. Interred with both inhumations and cremations, they provide some of the best-preserved insights into personal identity and the prehistoric life-course, yet they also speak of the care shown to the dead, and of people's relationships with 'things'. Objects matter.

The 'Grave Goods' project – a research collaboration between the Universities of Reading and Manchester and the British Museum, funded by the Arts and Humanities Research Council – seeks to transform current understandings of mortuary practice and material culture in later prehistoric Britain.

British prehistorians already have an approximate idea of how grave goods changed through time: during the Neolithic, burials were only rarely associated with material culture; the Early Bronze Age saw a dramatic rise in the quantity (and arguably significance) of grave goods; the Iron Age witnessed the introduction of new and more varied classes of objects, but also has blank spots where burial is invisible. The Grave Goods project aims to move this impressionistic, broad-brush sequence onto a solid, empirical basis.

We will do this by constructing a database of *all* material culture found in formal mortuary contexts during the Neolithic, Bronze Age and Iron Age within six case study regions. Once mapped and analysed, this information will

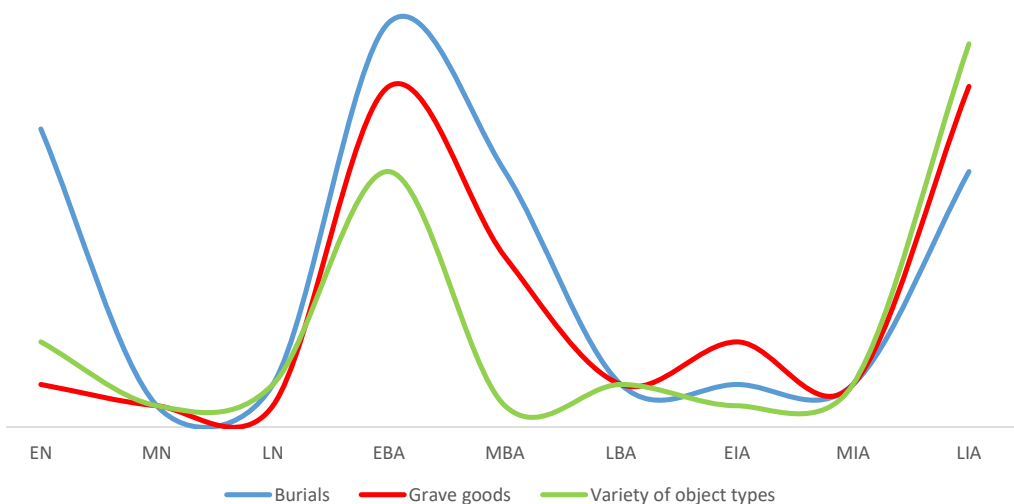
enable a new level of understanding of burial practice, and the ebbs and flows of material culture change, over that period.

The Grave Goods project is conducting its analysis at multiple scales, ranging from macro-scale patterning across Britain, to regional explorations of continuity and change, to site-specific histories of practice, to micro-scale analysis of specific graves and the individual objects (and people) within them. Whilst the project's primary focus is on Britain, we will also be investigating the varied, often long-term links with continental Europe (and beyond) that grave goods can reveal.

The project's fundamental research questions are:

- What do archaeologists mean by 'grave goods'? How have they used this concept, and can we formulate a more nuanced understanding of this key category of material culture?
- What kinds of objects did people put in graves in later prehistoric Britain? How did these change through time and vary across space within our case study regions in contrastive areas of Britain?
- What did 'grave goods' mean to people in the prehistoric past? Why were certain items selected for deposition with the dead, and not others? How might grave goods and the 'performance' of burial have helped people deal with the often complex emotions and politics of death?

As part of the project, we will organise two conferences in June 2018 and summer 2019. The first will take place in Manchester, bringing together scholars working on



An initial 'guesstimation' by the project team of the relative numbers of burials, and quantity and variety of grave goods deposited, throughout later prehistory in Britain. By the end of the project we will be able to reproduce this graph (for the six case study regions) on the basis of quantitative knowledge rather than guesstwork.



Location map of the study areas.

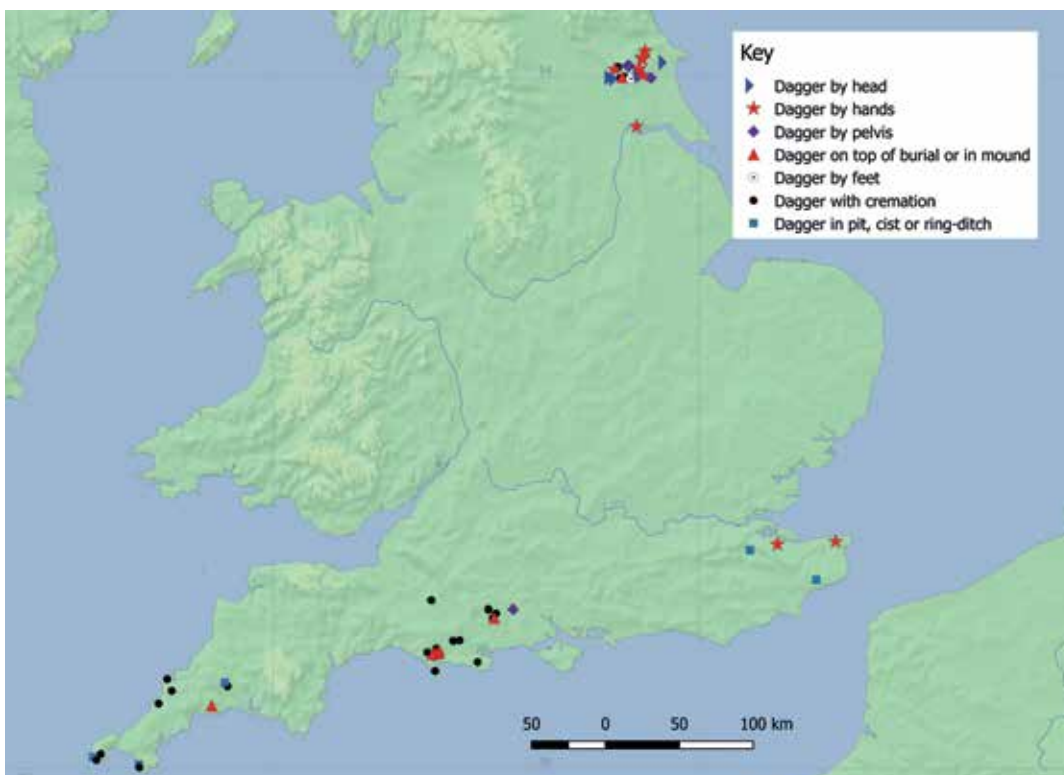
related themes across Europe to talk about grave goods. The second will be held at the British Museum, aimed at a wide audience and free to all; its aim is to explore objects and burial in prehistoric *and* contemporary Britain from a multi-disciplinary perspective.

We will also redesign key elements of the relevant British Museum galleries, whose displays contain numerous grave goods. In addition, we will produce a schools information pack focused on prehistoric burial to help teachers teach prehistory to primary age children in their region. Free to download, these will include specially commissioned poems by internationally renowned children's poet Michael Rosen, as well as brand new reconstruction images. The

basic information for our database was obtained from Historic Environment Records; we are also hoping to feed our 'enhanced' data back into those HERs, improving these vital records for future use.

The Grave Goods project started in August 2016 and will run until February 2020. We have focused our efforts so far mainly on data gathering. Based on current estimates, the database will ultimately include information about 6000 objects.

After just over a year of work, some initial patterns have begun to emerge (please note that these are provisional, as data collection is not yet complete). For example, while dagger graves form one of the 'classic' burial types of the Beaker/Early Bronze Age period, these were not universally adopted throughout Britain. They are well-represented in Cornwall, Dorset and Yorkshire, but only a few are known in Kent, and none in Orkney or the Outer Hebrides. Although a dagger is often considered to signify a higher status burial, in several cases this weapon is seemingly the only grave good, and sometimes it is worn or fragmentary. With the more lavishly furnished burials, patterns in associated grave good selection can be discerned. In Yorkshire and Cornwall, daggers were paired with whetstones, beads, maceheads, axeheads and in particular strike-a-lights – perhaps these dagger-adorned individuals were also fire-starters?! In Yorkshire, daggers were often placed at the hands or pelvises of crouched inhumations, in an active repose that could symbolise a readiness to fight or defend; two of the Kent examples were also found near the hands. In Dorset and Cornwall, they more commonly accompanied cremation burials (occasionally set directly on top of the cremated remains), or were placed above the burial in the mound, possibly as more passive protective devices.



Dagger burials entered into the database so far.



One of the 'wonky' pots associated with cremation burials at Swarling, Kent (© Trustees of the British Museum).

Almost half (just under 90) of the Iron Age sites in the database are located in Kent, including a small but significant rise in formal Middle Iron Age burials with grave goods excavated since the advent of developer-funded archaeology. Stand-out examples include an urned cremation with a set of metal tools and whetstone from White Horse Stone, Aylesford, and two child burials with horse from Thanet. We have noted with interest the number of roughly-made or broken objects (not clearly deliberately damaged for the funerary process) that have cropped up within Late Iron Age cremation burials in Kent. It is certainly possible that, at this time, in this region, it was considered more important to include objects of a certain kind (wheel-turned pots, mirrors, buckets etc.) than it was to obtain pristine items.

The project is already benefitting from rubbing shoulders with anthropologists, sociologists and contemporary 'death-

workers', helping us to rethink the ways in which artefacts helped negotiate the 'continuing bonds' that the living had with the dead, as well as the special mortuary roles that some objects may have played in funerary contexts. Some of these were no doubt to commemorate, celebrate and foster familial and local relations, whilst others spoke of powerful connections with more distant peoples and places. We are examining how the substance and symbolism of craft and design may relate to ideologies of regeneration and new life, whilst exploring the performative aspects of a good 'send-off' which could be touchingly intimate as well as spectacularly memorable. Thus, our grave goods will be re-situated within the complex necro-politics of death and burial amongst prehistoric communities.

These are just some of the patterns to have emerged so far, and we hope to uncover many more. At the end, we will produce the first ever long-term, book-length narrative focusing on grave goods in later prehistoric Britain, while the database will be a rich resource for other researchers. In the meantime, if you would like to find out more, please visit the website: www.gravegoodsproject.org.

Anwen Cooper, University of Manchester, Duncan Garrow, University of Reading (d.j.garrow@reading.ac.uk), Catriona Gibson, University of Reading, Melanie Giles, University of Manchester and Neil Wilkin, British Museum

Pitchstone from radiocarbon-dated pits – an update

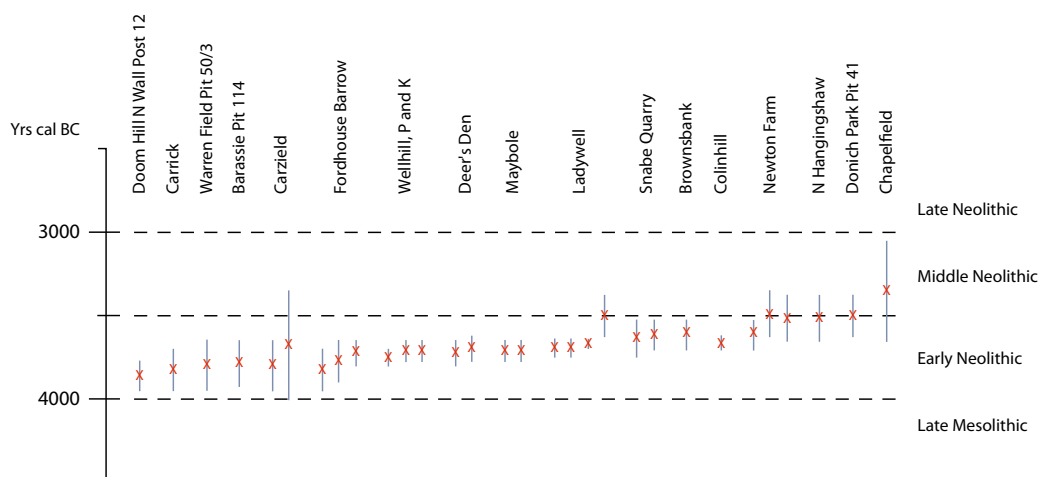
In 2015, I published a paper in *Journal of Lithic Studies* which discussed pitchstone artefacts from radiocarbon-dated pits, and in particular the date of the northern British pitchstone exchange network, which linked sources on the Isle of Arran to northern Britain and parts of the Irish Sea, from Dublin, the Isle of Man and Northumberland in the south to Orkney in the north. On the basis of those pits, as well as pitchstone found in other contexts, it is possible to conclude the following:

- Although pitchstone was used extensively on Arran from the Early Mesolithic to the Early Bronze Age, no pitchstone artefact found off Arran has so far been dated to the Mesolithic.
- The *systematic* exchange of pitchstone raw material and/or artefacts is a post-Mesolithic, mostly Early Neolithic, phenomenon.
- In southern, central and eastern Scotland, pitchstone seems to have been exchanged almost exclusively during the Early Neolithic, with only two chisel-shaped arrowheads made from poorer-quality porphyritic pitchstone dated to the earliest part of the Middle Neolithic (c. 3500–3000 BC). The Early Neolithic pitchstone exchange network appears to disintegrate at the time when a significant flow of Yorkshire flint begins arriving in this region, along with the Levallois-like knapping technique and distinct later Neolithic lithic types.

- In Argyll and Bute, pitchstone has been found in Late Neolithic domestic (e.g. Blackpark Plantation East) and Early Bronze Age burial contexts (e.g. one of the three cists at Monybachach). Arran, Bute and southern Argyll may have formed part of the same social territory (or a close alliance of territories), explaining why pitchstone was used in this part of Scotland after the Early Neolithic.
- On Orkney, higher than expected numbers of pitchstone artefacts have been recovered (given the distance from Arran), many from central Mainland, particularly the 'village' of Barnhouse and the ceremonial complex of Ness of Brodgar. Alison Sheridan has suggested that its presence may relate to the reciprocal movement of ideas and items during the initial southerly spread of Grooved Ware and of the practice of building stone circles – a phenomenon also attested at Machrie Moor on Arran.

Since the publication of my 2015 paper, a number of new dates have been obtained on material from pits.

They indicate that the earliest dated pit depositions of pitchstone occur around 3900 cal BC, with two of the three oldest dates relating to postholes and pits in large timber houses or 'halls' (Doon Hill, East Lothian, and Warren Field, Aberdeenshire). Pitchstone has also been found in pits/postholes of other timber 'halls' which unfortunately did not provide radiocarbon dates (e.g. Claish, Stirlingshire, and



Left: Pitchstone artefacts from radiocarbon-dated pits. Right: Conical pitchstone core from Colinhill, South Lanarkshire (courtesy of GUARD Archaeology; photo: Beverly Ballin Smith).

Balfarg, Fife). The pitchstone artefacts from the timber ‘halls’ were recovered from the fills of inner and outer postholes, as well as from internal pits.

This demonstrates knowledge of the raw material and the early establishment of an extensive network of contacts among the early farming communities. The find contexts also suggest that pitchstone artefacts off Arran were perceived as ‘special’ in some sense: at Fordhouse Barrow in Angus, for example, pitchstone microblades were knapped straight into a possibly ritual pit (as indicated by refits) just prior to the erection of a long barrow.

The practice of depositing pitchstone in pits continues right up to the Early to Middle Neolithic transition, when fundamental changes occurred. The flow of Arran pitchstone from the west came to an almost complete halt shortly after 3500 cal BC and significant amounts of Yorkshire flint began flowing into southern and central Scotland. Where in the inner parts of this region, chert had made up 90–100% of all lithic raw material, Yorkshire flint now became dominant, possibly covering *c.* 90% of all lithic raw material reduced here (e.g. at Airhouse and Overhowden in the Scottish Borders). With Yorkshire flint came the sophisticated Levallois-like technique, which required larger nodules than those available along the Scottish shores and allowed larger implements to be produced.

Although in southern and central Scotland, systematic exchange of pitchstone probably ended at the Early/Middle Neolithic transition, pitchstone was still considered ‘special’ much later. At Colinhill, South Lanarkshire, excavated by GUARD Archaeology Ltd., an Early Neolithic conical microblade core had been found by Middle Bronze Age settlers, curated and subsequently deposited in an entrance posthole of a roundhouse, dated to 1442–1290 cal BC (SUERC-67770). This may represent a form of ‘cornerstone ritual’.

Although a few extra dates were added to the diagram published in 2015, it is almost certain that I have missed some. It would be a great help to the research into pitchstone exchange if colleagues would contact me with information on pitchstone from radiocarbon-dated pits not included here.

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*Torben Bjarke Ballin (lithicresearch@btinternet.com),
LITHIC RESEARCH, Stirlingshire,
Honorary Research Fellow, University of Bradford*

Isotope analysis reveals that feasts at Navan Fort, Ulster, drew people and animals from across Ireland

Relatively little is known about ordinary settlement sites in Iron Age Ireland. Instead, the period is characterised by large regional ceremonial centres, which in later mythology were identified as the capitals of the ancient provinces of Ireland. Excavation has shown that these were not settlement sites, as was the case with contemporary hillforts in England, but rather central gathering places that were only periodically populated.

Navan Fort, the ancient capital of Ulster, was dominated by a large circular building 40 m in diameter, fit for hosting ceremonies for substantial numbers of people. Large gatherings necessitated the consumption of food and it can be assumed that feasting was an essential part of the activities that occurred at the site. Later mythology indicates that the pig, rather than the more common domesticates of cattle and sheep, was considered the appropriate food of the east



Aerial photo of Navan Fort, viewed from the east (Photo: QUB).



Artist's impression of the 40 m diameter timber building, comprising five concentric rings of oak posts at site B, Navan (© QUB).

of Ireland, a feature also supported in the medieval Book of Leinster.

McCormick's analysis of the animal bones from Navan Fort supports this assertion. Pigs comprised about 60% of the faunal remains, the highest figure recorded on an Iron Age site in Ireland. Sites of other periods in the same area are dominated by cattle, so the high incidence of pig cannot be attributed to environmental reasons. It was a deliberate choice to select pig for consumption at Navan and this conforms to the culture of feasting recorded in mythological texts. Pigs are well suited to feasting, as they can be culled in number without harming an economy that relies on milk or wool. In addition, they gain weight rapidly and have large litters, meaning they are ideal for maximising meat production.

As there is no evidence for domestic occupation in the vicinity of Navan, it is unclear where people came from to engage in these feasts. The site is famed for the recovery of a Barbary ape cranium, providing clear evidence for long-distance contact, albeit perhaps indirect. It is clear that the site was high status and its catchment may have been wide. In the absence of human remains, scientific analysis of faunal material provides the best proxy for human movement. However, pigs are poorly suited to movement over distance and therefore may have been raised locally, even if the feasting participants derived from further afield.

New strontium ($^{87}\text{Sr}/^{86}\text{Sr}$) and sulphur ($\delta^{34}\text{S}$) isotope analysis of animals, partly funded by the Prehistoric Society, has

shed some light on this issue. Both methods are useful for exploring the scale and volume of movement, with strontium providing a signal relating to geology and sulphur reflecting coastal proximity and geology. Thirty-five animals were analysed, the majority of which (24) were pigs. The strontium isotope results were very diverse, ranging from 0.707 to 0.715, which could cover the full range of geological variation for Ireland, from Cenozoic basalts to much older Precambrian gneiss. The range of strontium isotope variation across Ireland is yet to be fully defined, but the lithological spectrum is comparable to Britain, where more research on bioavailable strontium has been undertaken. The range of animal values accounts for all biosphere packages in Britain (which range from 0.707 to 0.713+), following the map of 'packages' of similar isotope ratios available to organisms in a given environment, devised by Jane Evans and colleagues. It is unlikely that animals were brought from beyond Ireland, but the results strongly suggest that they came from various locations across Ireland, with few being locally raised. Although the pig dataset is the largest, it might have been expected to show less variation, as moving pigs over any distance is notoriously challenging. However, pigs show the full gamut of variation and clearly have wide-ranging origins.

Sulphur isotope results were less informative. The range of results (13–17‰) is small, as terrestrial animals can yield results ranging from negative values to close to the seawater value of +20.3‰. The relatively high values are broadly indicative of animals coming from close to the coast. Based on bioavailable sulphur research by Zazzo and colleagues, the animals are more likely to have come from the west coast of Ireland, where higher values are common due to prevailing winds bringing marine sulphur inland.

Establishing precise locations of origin remains very difficult, particularly in Ireland, where biosphere mapping work is ongoing. However, the results indicate that animals (and thus humans) came to Navan Fort from across Ireland and the west coast is likely to represent one area of origin. The results suggest that feasts were not supported by regional production centres, but rather that participants came from far and wide, bringing animals on the hoof as a contribution. Moving pigs in this way would have posed a real challenge. Pigs were a minor domesticate in Iron Age Ireland, yet great effort was invested in transporting them to Navan Fort, perhaps suggesting that they were raised specifically to be contributed to the feasts. The scale and volume of movement suggests that Navan Fort had a wide sphere of influence, with feasts drawing in participants from well beyond Ulster.

Richard Madgwick, Cardiff University (Madgwickrd3@cardiff.ac.uk); Vaughan Grimes, Memorial University, Newfoundland; Angela Lamb, NERC Isotope Geosciences Facility; Finbar McCormick, Queen's University Belfast

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