



# EAC 9

*Experimental Archaeology Conference*  
**16-18 January 2015**

**University College Dublin &  
Irish National Heritage Park**





# 9th Experimental Archaeology Conference

16-18 January 2015

University College Dublin &  
Irish National Heritage Park

Dear EAC9 Conference delegates,

We warmly welcome you to Ireland for the 9th International Experimental Archaeology Conference (EAC9), co-organized by UCD School of Archaeology and the Irish National Heritage Park, and hosted at the O'Brien Science Centre East and Moore Auditorium 16-17th January and in the Irish National Heritage Park, Ferrycarrig, Co. Wexford on 18th January 2015.

This is the first time this significant conference is being held in Ireland, with over 200 registered delegates attending from up to 23 different nationalities and countries (including USA, England, Scotland, Wales, France, Canada, Germany, Belgium, The Netherlands, France, Denmark, Sweden, Norway, Switzerland, Spain, Italy, Malta, Poland, Slovakia, Latvia, Finland, Brazil, South Africa, and of course the Republic of Ireland and Northern Ireland). We will have c.50 lecture and poster presentations, and many practical demonstrations of ancient technologies, as well as a fieldtrip to the Irish National Heritage Park, Ferrycarrig, Co. Wexford.

It is a remarkably broad audience, ranging from university academics to schoolteachers from around the world, to archaeological and cultural tourism consultants, to participants in Living History and Re-enactment, and managers of Heritage Centres and Open-Air Museums. The conference is also a gathering of EXARC, the global network of Archaeological Open-Air Museums across the world, who collectively holds a significant body of knowledge on cultural tourism and public outreach

It is a good time for EAC to come to Dublin and Ireland. The last few years have seen, as Dr. Roeland Paardekooper has termed it, a "whirlwind of activity" relating to experimental archaeology in Ireland.

UCD School of Archaeology seeks to play a role in experimental archaeology internationally. We will be making a short visit on Saturday 17th January to UCD's Experimental Archaeology and Ancient Technologies research centre, newly established here on the university campus, where there will be a demonstration of Bronze Age bronze casting by *Umha Aois*, and delegates will be introduced to some of UCD School of Archaeology's ongoing experimental archaeology projects there including prehistoric and early house building, bronze casting, pottery production and firing, and various other activities. We were also delighted to be gifted by Prof John Coles his entire Experimental Archaeology archive of books, papers, notes, drawings and slides – including a very large colour transparency slide collection of experimental archaeology projects in the 1960s and 1970s, and we hope to make this available online in time. Our PhD scholars in UCD School of Archaeology have been employing experimental archaeology for some time, to investigate prehistoric weaponry and warfare, the inhabitation of early medieval houses, and the making and use of stone tools in the past, and the role of fire technologies in early medieval Ireland. Our MA in Archaeology students have also been carrying out such experimental archaeology projects, such as in 2014, the investigation of prehistoric cremation and its impact on personal ornament on corpses, the building of Mesolithic houses, and the firing of replica pottery, amongst many other projects.

Our undergraduate students in our several Experimental Archaeology and Ancient Technologies courses have also been learning how to make and use flint tools, how to tan leather, how to make and fire pottery, how to cast bronze, how to prepare ancient foods, and how to record all these activities scientifically and to interpret their results. Indeed, undergraduate students have been 'finding out' things through their own experimental archaeology projects that would be regarded as significant for our understanding of the past. At the Irish National Heritage Park, Ferrycarrig, there have also been some exciting developments with the establishment of its Experimental Archaeology Guild, and its members have plans for a range of activities and public outreach events too.



We are delighted that we have received the generous support of so many people in organizing the conference, but here we would like to particularly acknowledge the generous support of Prof. Joe Carthy, Principal of the UCD College of Science, Prof. Gabriel Cooney, Head of UCD School of Archaeology, and Jason O'Brien, of Odaios Foods Ltd. We also thank Dr. Roeland Paardekooper and the Board of EXARC, Ruth Fillery-Travis of EAC, and Dr. Billy Mag Fhloinn and his colleagues in *Umha Aois*, as well as the EAC9 Programme team, the student volunteers, and Conor McDermott and Dr. Rob Sands. We also acknowledge our colleagues' hard work at the Irish National Heritage Park, Ferrycarrig, Maura Bell and Dr. Ronan O'Flaherty, as well as John Nicholl, and we look forward to meeting them on Sunday 18th. We also look forward to Prof. Bill Schindler's keynote address and thank him, and we thank his colleagues at Washington College, Maryland, for their support to his travelling here to Dublin.

We are convinced that this will be an important and influential gathering of international expertise at UCD and the Irish National Heritage Park, Ferrycarrig with a long-term impact on experimental archaeology and its associated scientific and cultural heritage community, in Ireland and beyond. We hope very much you enjoy yourself at the conference, and look forward to meeting you again soon.

Professor Aidan O'Sullivan and Brendan O'Neill,  
UCD School of Archaeology, Dublin, January 2015.  
[experimental.archaeology@ucd.ie](mailto:experimental.archaeology@ucd.ie)

### Sponsors

The organisers would like to express their gratitude to the following bodies for financial and practical support provided:



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#### **Guest Demonstrators**

Wayne Malone, UCD Graduate (2014), pottery expert  
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John Murphy, UCD MA Graduate (2014), flint and stone expert  
Niall Inwood, UCD MA Graduate (2014), flint and stone expert

### *Umha Aois*

Dr Billy Mag Fhloinn, University of Limerick & Umha Aois, archaeologist and bronze smith

Niall O'Neill, Umha Aois, artist and bronze smith

Pádraig McGoran, Umha Aois, artist and stone carver

James Hayes, Umha Aois, Artist and bronze smith

Holger Lönze, Umha Aois, Artist and bronze smith

Giovanna Fregni, University of Sheffield & Umha Aois, Archaeologist

Alan Milligan, Umha Aois, Artist and bronze smith

Fiona Coffee, Umha Aois, Ceramic artist

Dr Cordula Hansen, Waterford IT & Umha Aois, Artist and lecturer

Ronán Ó Caoimh, Youthreach Bantry & Umha Aois, Blacksmith and tutor

Dr Triona Sørensen, Vikingskibsmuseet, Denmark & Umha Aois, archaeologist

Tom Mc Donnell, Umha Aois, Tinsmith

*Umha Aois* is an ongoing experimental project organised on a volunteer basis by a collective of archaeologists, artists and craft workers. Through research and experimentation, and academic and artistic collaboration, they attempt to rediscover Bronze Age casting and metalworking methods and technologies. The interdisciplinary nature of the project, which includes professional specialists in the field of archaeology, engineering, ceramics, copper-alloy metalworking techniques, stone carving and sculpture, allows an unprecedented accumulation of practice-based skills to be acquired and shared amongst members. The project is open-ended, and has engaged with a variety of research questions and artistic challenges over the years. Its continuous nature, which involves the participation of core members as well as an ever-rotating periphery of new participants from a variety of backgrounds, means that the skills and understanding acquired through practical engagement with the materials and processes involved become embodied in the practitioners in a very meaningful way. The creative element evident in prehistoric metalworking is also nurtured by the strong artistic ethos of the group, and imaginative new forms are as just as likely to be produced alongside slavishly accurate reproductions of ancient artefacts. The group will be demonstrating a variety of prehistoric bronze casting and sheet metal working techniques at the UCD Centre for Experimental Archaeology, and visitors are welcome at any stage.

### ***Irish National Heritage Park, Ferrycarrig, Co, Wexford***

On Sunday 18th there will be a special one day re-enactment event at the Irish National Heritage Park to coincide with the conference visit. This event, similar to the Park's regular programme of summer re-enactments will feature demonstrations of arrow-fletching (Breifne Heritage), natural dyeing and blacksmithing (Dubh Gall), leatherwork and coin-striking (Gael agus Gall), manuscript illumination (Dublin Living History Society), Crannóg Life during the Nine Years War (Claiomh) and weaving and textiles (Cork Living History Society). The re-enactors, many of whom with wide experience in Archaeology and Experimental Archaeology, have structured their demonstrations on the theme of 'Communicating Archaeology to a Popular Audience'. Many are also members of the Ferrycarrig Guild - a free association of craftworkers, re-enactors, academics and other specialists active in the field of experimental archaeology in Ireland. Other Guild members will demonstrate the use of the medieval pole-lathe, primitive technology and HEMA combat techniques. There will be a unique opportunity to taste meat cooked in a fulacht fiadh using Bronze Age hot-stone technology, while it is also hoped to have a full-scale early medieval horizontal mill in operation.

These demonstrations are being organized specifically for Conference delegates and provide a unique opportunity to discuss some of the more practical aspects of experimental archaeology with some of the leading experts in the field in Ireland, in the equally unique surroundings of The Irish National Heritage Park.

# Day 1: January 16th 2015

8:00-9:00

Registration

9:00-9:10

Opening Address: Prof. Aidan O'Sullivan

9:10-11:00

Session 1: (Re)constructing Houses and Buildings

9:10-9:30

Paper 1

**Graeme Warren & John Murphy** (University College Dublin)

"Buildingmesolithic": recent experimental reconstructions of Mesolithic houses in Ireland

9:30-9:50

Paper 2

**Aidan O'Sullivan, Brendan O'Neill and Eileen O'Reilly** (University College Dublin)

The Early Medieval and Viking House Project

9:50-10:10

Paper 3

**David Freeman & Ryan Watts** (Butser Ancient Farm)

Understanding Iron Age construction techniques through the reconstruction of 'Great' roundhouses

10:10-10:30

Paper 4

**Claudia Speciale, Alessandro Peinetti, Kati Caruso & Giorgia Aprile** (Università del Salento, Università di Montpellier, Università di Palermo & Università di Foggia)

Daub in Prehistoric Structures: first results of the Experimental Project

10:30-10:45

Posters

Poster 1

**Tim Clerbaut** (Ghent University)

Roman ceramic building materials (CBMs) as "petrified" witnesses of technical know-how: an experimental and archaeological approach.'

Poster 2

**Stephen Fox** (Independent Researcher)

Performing A Bowyer's Craft: Reflections on Craft & Community Through Living History at the Chieftain's Longhouse at Borg

Poster 3

**Paul Grigsby** (The Ancient Technology Centre)

The Demands Of The Neolithic Houses At Durrington Walls: Time, Resources And

Poster 4

**Briony Clifton** (The Ancient Technology Centre)

It's Getting Hot in Here: living conditions in a Neolithic building reconstruction

10:45-11:00

Discussion

11:00-11:30

Tea and coffee

11:30-13:00

Session 2: Daily Life , Practice and Food Technologies

11:30-11:50

Paper 5

**Ian Dennis & Clara Freer** (Cardiff University)

Viking platters and baking plates: experimental manufacture and use

11:50-12:10

Paper 6

**Cosimo D'Oronzo** (Università del Salento)

Experimental replicas of cooking platforms: hypotheses on making procedures and use

12:10-12:30

Paper 7

**Richard Fitch** (Hampton Court Palace)

Half Baked: can the experimental process help us towards a reconstruction of medieval bread?

<b>12:30-12:45</b>	<b>Posters</b>	
	<b>Poster 5</b>	<b>Riaan F Rifkin</b> (University of Bergen) Ethnographic and experimental perspectives on the efficacy of red ochre as a insect repellent
	<b>Poster 6</b>	<b>Mario Indelicato, Daniele Malfitana, Giuseppe Cacciaguerra</b> (University of Catania & Institute for Archaeological and Monumental Heritage of National Research Council) Pitch and wine in the ancient world: from Bruttium to Etna
	<b>Poster 7</b>	<b>John Bartholomew</b> (Independent Researcher) Bronze Age Alcohol Distillation
	<b>Poster 8</b>	<b>Kathryn Kamp</b> (Grinnell College, Iowa) Trash or Offering? Experiments with Maya Spindle Whorls
<b>12:45-13:00</b>	<b>Discussion</b>	
<b>13:00-14:00</b>	<b>Lunch</b>	
<b>14:00-15:30</b>	<b>Session 3: Communicating, Knowledge and Learning</b>	
<b>14:00-14:20</b>	<b>Paper 8</b>	<b>Tríona Sørensen</b> (Viking Ship Museum Roskilde) From data sets to public presentation: communicating experimental archaeology at the Viking Ship Museum
<b>14:20-14:40</b>	<b>Paper 9</b>	<b>Paola Palma, Christopher Benjamin, Franziska Conrad, Luke Winter &amp; Tom Harrison</b> (University of Bournemouth & Ancient Technology Centre) The ShipWrEx Project
<b>14:40-15:00</b>	<b>Paper 10</b>	<b>Erin McGuire &amp; Kim Gough</b> (University of Victoria & Royal British Columbia Museum) Vikings in Victoria: A merging of classroom, exhibition, and experiential learning
<b>15:00-15:15</b>	<b>Posters</b>	
	<b>Poster 9</b>	<b>Alistair Mowat &amp; Conor Whately</b> (University of Manitoba & University of Winnipeg) The Hatra Ballista: a Case Study in Experiential Learning and Experimental Archaeology at the Undergraduate Level
	<b>Poster 10</b>	<b>Andy Spencer</b> (University of Birmingham) Volunteers in the Open: Volunteer Use in the Open-Air Archaeological Museums of Europe
	<b>Poster 11</b>	<b>Gaynor Wood</b> (University of Central Lancashire) Designing a Problem Based Learning Module to Enhance Employability Skills for Undergraduate Students at UCLAN
	<b>Poster 12</b>	<b>Niall Gregory</b> (Consultant Archaeologist) Dugout Boat Reconstruction: Methods, Use and Applications of Naval Architecture
<b>15:15-15:30</b>	<b>Discussion</b>	
<b>15:30-16:00</b>	<b>Tea and coffee</b>	
<b>16:00-17:30</b>	<b>Session 4: Key Note, Posters and Demonstrations</b>	
<b>16:00-16:05</b>		<b>Welcome by Prof. Andrew J. Deeks, President University College Dublin</b>
<b>16:05-16:35</b>	<b>Key Note</b>	<b>William Schindler</b> (Washington College) Soul Authorship: experimental archaeology, and the value of authentic learning experiences in Higher Education pedagogy



**Candice Smith Corby & William Pettit** (Stonehill College & John Cabot University, Rome)

CookBook of Secrets: Making Color in the Studio and Through the Kitchen

**Benjamin Simao**

Archaeo-Music

**Shirley Walsh** (Leine Crafters)

A practical exercise in the construction and operation of a warp-weighted loom

**A Vassanelli, E Adami, C Petrinelli Pannocchia & N Visintin** (Università di Pisa)

From raw material to final product: Manufacturing techniques of steatite ornament production

**Holger Lönze & Billy Mag Fhloinn** (*Umha Aois*)

Prehistoric Musical Instrument Manufacture and Performance

## Day 2: January 17th 2015

9:30-11:00

### Session 5: Forged in the Fire: Aspects of Hot Technologies

9:30-9:50

Paper 11

**Tara Clarke & Niall Inwood** (University College Dublin)

Creation and Cremation: Understanding ritual use of Neolithic material culture of the Irish passage tomb tradition

9:50-10:10

Paper 12

**Giovanna Fregni** (University of Sheffield)

Inverse segregation: It's not just for artists anymore

10:10-10:30

Paper 13

**Marta Krzyżanowska & Mateusz Frankiewicz** (Adam Mickiewicz University & Experimental Archaeology Laboratory, Poland)

Production of glass beads in open hearth based on findings from Ribe (Early Medieval)

10:30-10:45

Posters

Poster 13

**Jiří Hošek, Ryszard Kaźmierczak, Paweł Kucypera & Maciej Tomaszczyk** (Nicolaus Copernicus University)

Steel carburising in a small shaft furnace. The so-called "Aristotle process" – its possibilities and limitations

Poster 14

**Jonathan Thornton** (SUNY Buffalo State)

Keeping it simple: Low technology glass bead production in the African context

Poster 15

**Padraig McGoran** (*Umha Aois*)

Casting into Open One Piece Molds: Problems and Possible Solutions

Poster 16

**Yuri Godino & Lorenzo Teppati Losè** (University of Florence)

From Galena to Silver: a first attempt at experimental archaeology

10:45-11:00

**Discussion**

11:00-11:30

**Tea and coffee**

## 11:30-13:00 Session 6: Thinking Through Methods and Approaches

- 11:30-11:50** Paper 14 **Flannery Surette** (The University of Western Ontario)  
Capturing fugitive dyes through re-creation and algorithms: a case study from the north coast of Peru
- 11:50-12:10** Paper 15 **Sabine Martin** (University of Exeter)  
Relevance of the Sequential Experimentation for Quartz Stone Tools
- 12:10-12:30** Paper 16 **Bernard Gillhooly** (University College Dublin)  
A Study of Prehistoric Irish Shale and Porcellanite Axes/Adzes through Experimentation, Quantification and Comparative Analysis
- 12:30-12:45** Posters
- Poster 17 **Justyna Orłowska** (Nicolaus Copernicus University in Toruń)  
Drilling through antler with wooden and bone drill bits – first observations and conclusions
- Poster 18 **Sebastian Teska** (Adam Mickiewicz University)  
Identification of handedness through knapping gesture in experimental studies
- Poster 19 **Concepción Torres Navas & Javier Baena Preysler** (Universidad Autónoma de Madrid)  
Who made the handaxes? An experimental approach to bifacial expertise during the Acheulian/mousterian production in Central Iberia
- Poster 20 **A Vassanelli, E Adami, C Petrinelli Pannocchia & N Visintin** (University of Pisa)  
The production of steatite ornaments during the pre-protolithic period in Tuscany
- Poster 21 **John C Whittaker** (Grinnell College, Iowa)  
Flights of Fancy: The Behavior of Atlatl Darts and the Relevance of Experiments
- 12:45-13:00** **Discussion**
- 13:00-14:00** **Lunch**

## 14:00-16:00 Session 7: Visit to UCD Centre for Experimental Archaeology

**16:00-16:30** **Tea and coffee**

## 16:00 -17:30 Session 8: Innovation and Technological Approaches

- 16:30-16:50** Paper 17 **Roksana Chowanec & Aleksander Bursche** (University of Warsaw)  
An archaeological experiment - a method of museum education or joke with science?
- 16:50-17:10** Paper 18 **Linda Hurcombe** (University of Exeter)  
Perishables, Pragmatics and Perception: the role of experiments in the interpretation, understanding, and presentation of archaeological objects
- 17:10-17:30** Paper 19 **Barry Molloy & Mariusz Wisniewski** (University College Dublin)  
Look with your eyes, not with your hands? Combining 3D visualisation and kinaesthetic methods for understanding use-wear on prehistoric metalwork
- 17:30-17:50** Paper 20 **Christine Morris, Alan Peatfield and Brendan O'Neill** (Trinity College Dublin & University College Dublin)  
Using 3D Laser Scanning and Experimental Archaeology to Understand Cretan Bronze Age Figurines

**17:50-18:10**     Posters

- Poster 22 **Sally McAleely** (University College London)  
Experimental recreation of an ancient Egyptian garland and its interpretation derived from practical knowledge and factual knowledge
- Poster 23 **Katy Whitaker** (Council for British Archaeology)  
Experimental Archaeology in the Young Archaeologists' Club
- Poster 24 **Nuala Sheils McNamee** (University College London)  
Excavating experimental archaeology: The reconstruction of education through reconstruction of the past
- Poster 25 **Tom Cassidy & Mikael Fernstrom** (Grange Stone Circle Acoustics)  
"If only those stones could speak!"
- Poster 26 **Angela Wickenden** (University of Exeter)  
Making pots that fail: The thermal resistance of large crushed angular quartz tempered pottery, with reference to the early British south west Neolithic

**18:10-18:20**     Discussion

## **Day 3: January 18th 2015**

**Visit to the Irish National Heritage Park, Ferrycarraig, Co. Wexford  
or self-guided visit to the National Museum of Ireland**

# Abstracts

## Session 1: (Re)constructing Houses and Buildings

### Understanding Iron Age construction techniques through the reconstruction of 'Great' roundhouses

David Freeman and Ryan Watts (Butser Ancient Farm)

The 'Great' roundhouses of the Wessex Culture are a short lived phenomenon found only during the middle Iron Age in Britain. These large structures are fine examples of the building abilities and technologies used by Iron Age man. It is because of this demonstration of skill that Butser Ancient Farm, Hampshire, England, has always had a reconstruction of a 'Great' roundhouse on site.

The Barksbury round house built in 1972 was Peter Reynolds' and Butser Ancient Farm's first attempt at building one of these 'Great' roundhouses and was the corner stone for the first generation of roundhouse that set the standard for the methodology of round house constructions around the country. Since the construction of the Barksbury, Butser Ancient Farm has developed their methods of constructing 'Great' round houses through observation and recording of their life and death. This includes the complete methodical dismantlement of the reconstruction of the Longbridge Deverill round house which demonstrated the pros and cons of the building methods and allowed the evolution of the first generation of roundhouse reconstructions to a new second generation style roundhouse. This has included changing the type of joints used, the pitch of the roof, the placement of force and even a new way of thatching. The skills and methods developed on the construction of the 'Great' round houses can and have been applied to the smaller buildings found at Butser Ancient Farm.

Through long term experiments and observations over 42 years on the life and death of some of the largest buildings in Iron Age Britain, Butser Ancient Farm has developed our understanding of the construction methods and techniques of Iron Age man.

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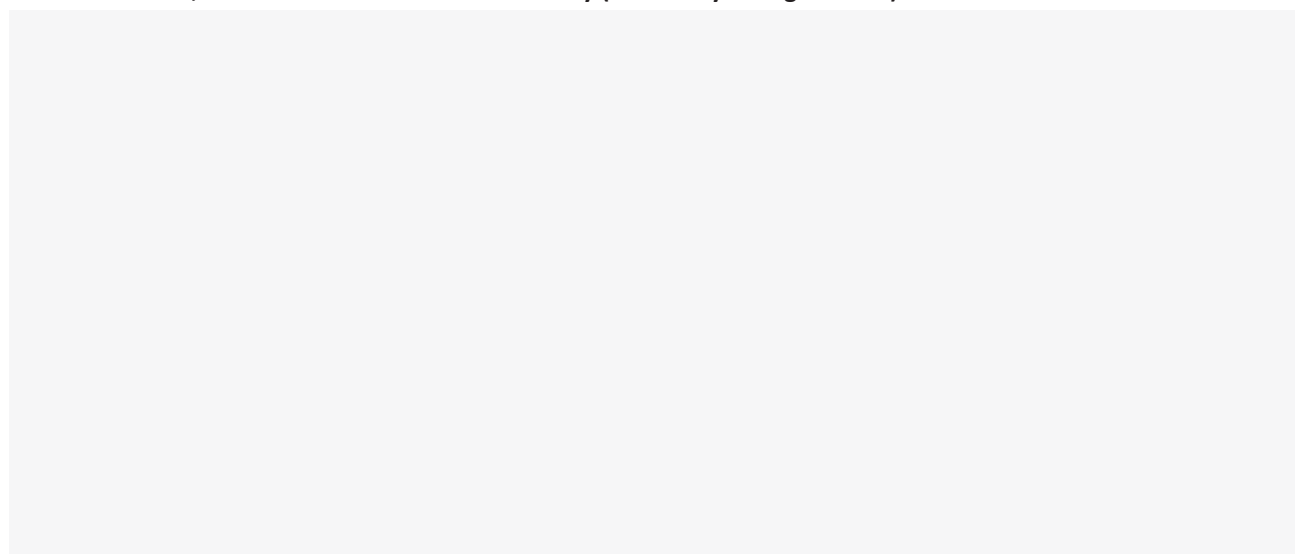
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Reynolds, P. 1975: 'The Butser Ancient Farm Project'; *Bulletin of the Birmingham Archaeological Society* 13, 36-38

Reynolds, P. (1967). 'Reconstruction of an Iron Age Hut'; *Evsham Hist. Soc Res. Papers*, 5-10

### The Early Medieval and Viking House Project

Aidan O'Sullivan, Brendan O'Neill and Eileen O'Reilly (University College Dublin)



### "buildingmesolithic": recent experimental reconstructions of Mesolithic houses in Ireland

Graeme Warren (University College Dublin) and John Murphy (University College Dublin)

This paper reviews two recent experimental archaeological reconstructions of Mesolithic houses in Ireland. Both houses were based closely on the ground plan of the first known Mesolithic site in Ireland, Mt Sandel, excavated by

Prof. Peter Woodman (Woodman 1985) and dating to shortly after 8000 cal BC. Since Woodman's excavation, more Mesolithic houses of the same era have been identified in northern Britain and reconstructions of these buildings have been robust, with heavy turf roofing (Waddington 2007). The two builds (one in summer 2013, one in summer 2014) set out to test specific hypotheses about the nature of the structure and the roofing used. We also assessed the range and diversity of materials required, labour requirements etc. The projects were both used for outreach, including social media and TV/newspaper and a short film was made in conjunction with students from the Institute of Art Design & Technology, Dun Laoghaire. Our paper will review the scientific findings, outline ongoing experiments and reflect on the media interest in our project.

#### *Bibliography*

Waddington, C. (Ed.) 2007 *Mesolithic Settlement in the North Sea Basin: a case study from Howick, North-East England*, Oxbow Books, Oxford  
 Woodman, P.C., 1985. Excavations at Mount Sandel 1973-77, County Londonderry, HMSO, Belfast

### **Daub in Prehistoric Structures: first results of the Experimental Project**

**Giorgia Aprile (Università di Foggia), Kati Caruso (Università di Palermo), Alessandro Peinetti (Università di Montpellier) & Claudia Speciale (Università del Salento)**

The experimental project, started during the spring of 2014, was born to test daub variability and to furnish diagnostic elements for its identification in the archaeological record; in particular, questions are about daub technology itself (such as the amount of sediment in terms of volume and weight; the amount of water; the different mixture techniques; the different daub installation techniques, etc.), wooden frame technology (orientation of the fragments, low number of fragments with crossing prints, identify the markers for every species, etc.), fire dynamics (colours, residual morphology, etc.).

A protocol was set as a starting point for all those who study daub technology; the experimentation on real scale houses take a large amount of time and resources and limits the possibility of testing different hypotheses; a model prototype made by portions of walls at real scale was chosen.

Our first experimental attempts are based on archeological evidences from different Italian contexts: the site of Castello di Annone, with a big amount of daub referred to the neolithic phase of the second half of 5th millennium BC; the Middle Bronze Age village of Apani; and Case Bastione, that belongs to the beginning of the Early Bronze Age (end of the III mill. BC). So far, three models were built and one of them was already burnt. The preliminary results, compared with the archaeological data, will be presented in this paper.

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 Speciale C. in cds., La capanna 1 nell'area Beta di Case Bastione (Villarosa, Enna): prime osservazioni sulle tecniche costruttive dell'età del Bronzo in Sicilia attraverso lo studio degli intonaci, V Convegno dei Giovani Archeologi (Catania), 23-26 maggio 2013

## **Session 1: Posters**

### **Roman ceramic building materials (CBMs) as “petrified” witnesses of technical know-how: an experimental and archaeological approach.'**

**Tim Clerbaut (Ghent University)**

Roman ceramic building materials (CBMs) are an important new innovation within building traditions from Roman times onward. The production, distribution and use of these ceramic materials in the Roman North is currently the subject of an ongoing PhD-research at Ghent University (Belgium).

Within this research, experimental archaeological research is a valuable source of information into the technical production of different forms of CBMs throughout the Roman period. Only by these experiments and detailed study of archaeological objects it is possible to reconstruct ancient skills and technological knowledge needed to produce these items at a large and semi-industrial way. Key in this research is to recognize different production methods based on available tool and production marks.

In this paper, the first promising results and methodology will be presented, focusing on the retrieved experimental data and their archaeological implications. As a case study, the production of box tiles (tubuli) will be presented in more detail.



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 Warry 2006. Tegulae, Manufacture, typology and use in Roman Britain, BAR British Series, 417, 2006, Oxford  
 Ulrich & Quenemoen 2014. A Companion to Roman Architecture, John Wiley & Sons, Blackwell Publishing

## **Performing A Bowyer's Craft: Reflections on Craft & Community Through Living History at the Chieftain's Longhouse at Borg**

**Stephen Fox, M.A (Independent Researcher)**

Living-History is often considered a valuable means for members of the public or the individual to experience what life may have been like in the past. Although it is often confined to the realms of reenactment and public education, the atmosphere created at the Lofotr Viking Museum has demonstrated to me the potential that Living-History has, when examining themes of craft and skill in experimental archaeology. This paper will demonstrate how engagement with Living-History at Lofotr, has enriched my approach to experimental archaeology, and in particular, my understanding of craft and community in the Viking-Age. Typically, I use bowmaking as a valuable way of understanding craft and skill in the Viking-Age.

This approach has allowed me to explore themes of cognition and tool-use and the dynamic relationships between craftsmen and their woodland environments. Crafts in the Viking-Age however, were communal and not the solitary processes our experiments tend to be. I was therefore previously unable to explore for example, the effect a 'group-dynamic' has on an individual craft. The environment in the longhouse at Borg however, provided this communal knowledge and interaction. Working alongside life-long blacksmiths, woodcarvers, wool-dyers and ship-builders, has revealed to me how the engagement with Living History can be utilized as a tool for accessing dynamics within a crafting community and how these interactions shape the individual's craft and skill, thereby removing them from isolation. By offering my experience as a bowmaker in the Chieftain's longhouse at Borg, this paper aims to demonstrate where Living-History can and should be taken advantage of in the field of Experimental Archaeology.

## **The Demands Of The Neolithic Houses At Durrington Walls: Time, Resources And Landscape**

**Paul Grigsby (The Ancient Technology Centre)**

Durrington Walls has been identified as the location for the homes of the builders of Stonehenge. In 2004-7 The Riverside Project unearthed the footprints of buildings which have given us an insight into the lives of the people who inhabited this part of modern day Wiltshire.

Based on the density of the buildings that were excavated it has been theorised that there could have been as many as 1000 buildings on the 17 hectare site during the approximated 15 – 45 years of occupation. This would have required an enormous amount of material sourced from the local area.

English Heritage commissioned the building of 5 reconstructed Neolithic houses based on the excavations at Durrington Walls to as part of an external gallery at the new Stonehenge Visitor Centre. Prototypes of these buildings were constructed at Old Sarum in Wiltshire in the spring of 2013. As part of this project, all aspects of the harvesting and construction process were recorded and analysed with particular emphasis being given to the time and amount of materials that would have been required for such an undertaking.

The results have shown that to create up to 1000 buildings at Durrington Walls would have required considerable planning along with a significant investment in time and resources years in advance of any occupation of the site.

## **It's Getting Hot in Here: living conditions in a Neolithic building reconstruction**

**Briony Storm Clifton (The Ancient Technology Centre)**

The reconstruction of a stake-walled Late Neolithic building by The Ancient Technology Centre and English Heritage in 2013 provided a unique opportunity to investigate the properties of these types of buildings through practical methods. One purpose of this research was to discover the thermal properties of the reconstruction. Structural design and materials are just two aspects that determine internal temperature loss or gain; therefore thermal imaging was conducted in order to establish the thermal efficiency of the building. These preliminary results revealed the differing levels of thermal efficiency in the walls and the thatched roof. When combined with digital recordings of internal temperature, the discoveries exhibited a surprising contrast. Particulates from an open fire within the reconstruction were also analysed. These air quality results, together with ethnographic information, suggest unhealthy living conditions were likely if the building was used regularly with frequent open fires.

Living experiments were also carried out over four nights with responses from four individuals, one male and three females of varying ages. The main documentation used for this experiment was feedback from the participants recorded in diary form. The diaries revealed how the participants were effected by and dealt with smoke from the

open fire, the interior temperature of the building, the use of the furniture and the characteristics of the hearth. Photographic recording was also employed with one photograph taken per minute for three days. These provided information on the participants' physical movement and their use of space within the structure, which showed a preference for certain living spaces.

This study has assisted in the enhancement of our understanding of prehistoric health and living conditions, and has helped determine that the reconstructed Late Neolithic buildings are valid structures for habitation.

## Session 2: Daily Life Practice and Food Technologies

### Viking platters and baking plates: experimental manufacture and use

Ian Dennis and Clara Freer (Cardiff University)

This paper discusses and expands, using experimental work, research by Dr. Alan Lane on Hebridean Viking/Norse ceramics, and in particular probable baking plates from the site of Bornais, South Uist, Western Isles. It has been demonstrated by Lane (2013) that the Western Isles has a unique tradition of handmade ceramic production within the British Isles, spanning from the Neolithic to the nineteenth century AD. The Viking/Late Norse levels from a number of sites in the Hebrides have revealed unique forms of ceramics including the appearance of circular pottery discs or platters. These 'platters' are thought to emulate Scandinavian Viking age steatite baking plates and are thin flat pottery discs. The platters have a variety of forms, some with finger mark depressions and occasional stab marks on their upper surface, some only with finger mark depressions, and some finger-wiped with stab marks on their upper surfaces. Many have grass/chaff marking on their basal surfaces. Until now, the nature of platter production and their use as baking plates has never been tested. Through experimental manufacture and use of platters we aim to identify their possible purposes and consider manufacturing constraints (including the amount of clay in weight used, the temper, size, styles and different forms found on the excavations). We also intend to approach questions of gendered production through an examination of the size of the finger marks found on platters from Bornais. This work was initiated at Oerlinghausen Open Air Museum with the support of Roland Paardekooper and undertaken during a 5 week field work placement of Cardiff archaeological students.

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### Experimental replicas of cooking platforms: hypotheses on making procedures and use

C. D'Oronzo (Università del Salento)

Several hearths structures – better defined as cooking platforms – were found during the archaeological investigations of Central and Southern Italian sites pertaining to the Bronze Age settlements; they were identified especially in the multi-activities open spaces and inside the huts (Cazzella, Recchia 2008). Usually, these installations have a base made from layers of stones and/or pottery fragments then covered with mud or clay (D'Oronzo, Fiorentino 2010).

Contextual analysis of pottery, stone tools and bio-archaeological remains (animal bones and vegetal remains) show a wide range of activities, while the archaeometric analyses of the structures sometimes reveal the selection of specific kinds of clay (Moffa 2002; D'Oronzo, Fiorentino 2010).

However, the high variability in cooking platforms shape and the different kind of artifacts and ecofacts associations do not allow to attribute their use neither to direct or indirect cooking food procedures, nor to other possible activities.

For this reason, experimental replicas were made, establishing an experimental protocol in order to understand making procedures and functioning of the cooking platforms (Fiorentino, D'Oronzo 2010).

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## **Half Baked: can the experimental process help us towards a reconstruction of medieval bread?**

**Richard Fitch (Historic Kitchens Coordinator, Hampton Court Palace)**

For over 20 years now Historic Royal Palaces have been at the forefront of historic food reconstruction with their historic cookery events at Hampton Court Palace. As with many similar projects and re-enactments across the country, recipes from the past are reconstructed in front of the public, to learn about historical cooking techniques, ingredients and processes as well as to gain a better understanding of how food shaped the lives of people and places in the past.

What happens though when a written recipe doesn't exist? In the world of historic food reconstruction, the written recipe is king; followed, investigated and used as the primary, and too often the only evidence from which to work. We have no surviving English recipe for bread that dates to the medieval period, the closest comes from the mid sixteenth century, yet we know that bread was baked, sold and consumed; what was it like and would having an actual recipe help or hinder us to understand it more?

I propose that the experimental process is the best way to gain a better understanding of what bread was like for our medieval forebears and how it compared to the bread that we eat today?

This paper documents some of the initial work into this subject, looking at the principals and methodology required to produce a loaf of bread that would be as recognisable to a medieval Londoner as a loaf of sliced white is to a modern one.

## **Session 2: Posters**

### **EthnOGRAPHIC and experimental perspectives on the efficacy of RED ochre as an INSECT repellent**

**Riaan F. Rifkin (University of Bergen, Norway; University of the Witwatersrand, South Africa)**

The habitual exploitation of red ochre during the African Middle Stone Age (MSA) has been interpreted as a proxy for the origin of language, as evidence for colour symbolism and as a key element of modern and symbolic human behaviour. From at least 100 000 years ago, red ochre features prominently in human artistic expression and technological ingenuity. Evolutionary hypotheses generally agree that ochre played a role in the adaptive strategies of *Homo sapiens*, but they differ widely in the functions they assign to it. That red ochre may have been used as an insect repellent is an enduring but unsubstantiated hypothesis for its exploitation. Ethnographic interviews conducted amongst the Ovahimba of the Kunene Region, Namibia, indicate that, besides the intrinsic symbolic significance of red ochre, it fulfils several functional roles, including that as an insect repellent. This paper presents the results of controlled in vivo and in vitro laboratory experiments designed to evaluate the efficacy of ochre as a mosquito repellent. It is demonstrated that certain types of ochre, mixed with clarified butter, provides a sufficient degree of protection from mosquitoes. It is concluded that, although the increase in the habitual exploitation of red ochre during the southern African MSA in all probability reflects a technologically mediated response to progressively more complex social circumstances, it may also represent an adaptive response to changing environments and increasing susceptibility to mosquito-borne diseases.

### **Pitch and wine in the ancient world: from Bruttium to Etna**

**Mario Indelicato (University of Catania ), Daniele Malfitana (Institute for Archaeological and Monumental Heritage of National Research Council ), Giuseppe Cacciaguerra (Institute for Archaeological and Monumental Heritage of National Research Council)**

The project we intend to present is a spin-off of the project "Archaeology of wine: a Sicilian experiment" and it will try to provide archaeologists with a clear picture of the various bituminous or resinous substances, vegetable or mineral, used in antiquity for multiple purposes: from the preparation of adhesives to

medicaments production for human and animal use; in particular, we will focus on the use as a sealant for containers used to carry wine, especially in Roman times.

Famous and prized in the ancient world was the so-called produced “pex Bruttia”, that is, in the mountains of Regio III Lucania et Bruttii (modern Calabria) i.e. the Silae Silva (now Sila) rich in tree species naturally endowed with abundant resin (mainly *Pinus nigra* laricio) and exploited up to our times. However, in all places with woods or forests with trees suitable for the extraction of resin or pitch existed in the Mediterranean area local productions, abundant or less abundant; from ancient and modern sources we know that even the woods of Etna were a district for the production of these substances.

Using as fundamental support latin written sources, but also an important ethnographic and scientific aid, our aim is, therefore, to perform a small production of “pitch” coming from woods of Etna. We will use it then to make the wine vats waterproof. These vats will be used for the first “roman harvest”, core of this project.

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## **Bronze Age Alcohol Distillation**

**John Bartholomew (Independent Researcher)**

Experimental copies of two artefacts from the Bronze Age have been shown to work as alcohol stills. Both can produce a spirit of around 35% proof from a 12% alcohol fermentation. My aim is to promote the re-examination and possible reinterpretation of objects in existing collections.

The first reported by Jozef Batora is dated to 1400BC. It consists of a ceramic bowl, 250mm in diameter, with a semi hemispherical lid, 220mm in diameter, which sits in a groove on the bowl. Vapour from the heated fermentation condenses on the inside of the lid (the condenser) and flows down into the groove on the bowl where it can drip out of a small spout built to one side. This liquid is then collected by a suitably placed receptacle. Batora suggest the possibility of this apparatus having been used to distil for aromatics or tastes. Lavender oil production is a possibility.

The second artefact is Hittite, dated to around 1800 BC. It is more complex being in appearance a lidless ‘teapot’ with a spout and handle and a further inverted spout protruding into it from underneath. Vapours pass up this spout and condense and collect in the ‘teapot’ from where the distillate can be poured out. The Bogazkoy Museum describes this as a ‘ritual’ object not a still!

Could alcohol distillation have been fairly widespread in the Bronze Age?

## **Trash or Offering? Experiments with Maya Spindle Whorls**

**Kathryn Kamp**

Experiments replicating and breaking limestone spindle whorls provide the necessary evidence for interpreting a large deposit of broken whorls discovered at the Maya site of El Pilar. Given the difficulty of breaking the whorls, intentional destruction rather than accidental breakage in use or manufacture is indicated.

## Session 3: Communicating Knowledge and Learning

### From data sets to public presentation: communicating experimental archaeology at the Viking Ship Museum

**Dr. Triona Sørensen, Vikingskibsmuseet, Roskilde, Denmark.**

Archaeological research generally involves the collection and analysis of large amounts of data concerning past peoples and technologies. This data is essential to us as researchers, but can present a challenge in terms of how we communicate the results of our work to a wider audience. Unless we wish to work in academic isolation, complex technical processes and conclusions must be transformed into understandable and engaging narratives; the leap must be made from data set to public presentation.

How this process evolves during the course of an archaeological experiment is one of the key aspects that sets experimental archaeology apart from traditional methodologies. The physical processes involved in the execution of archaeological experiments, be they experiments concerning the sailing of ships, the production of flint tools or the reconstruction and use of dwellings, creates a dialogue between the participants and the audience which can serve to elevate an archaeological experiment beyond raw data to a concept that is not just relatable but also interesting – a fundamental goal in the presentation of any research project.

Taking this dialogue as a starting point, this paper will explore the communication of experimental archaeology at the Viking Ship Museum, Roskilde, where more than fifty years of research with Viking ship finds, experimental reconstruction and analysis has resulted in massive volumes of data, which is successfully communicated to a wide audience via exhibitions, publications and, most importantly, encounters and interactions with sailing reconstructions of Viking ships. These encounters and interactions have in turn begun to create their own narratives, as the bodily encounters people have with ships such as Sea Stallion from Glendalough generate a sense of connection and ownership with a project, underlining the importance of experimental archaeology as a method of communicating the stories of our past.

### The ShipWrEx Project

**Paola Palma (Bournemouth University), Christopher Benjamin (Bournemouth University), Franziska Conrad (Bournemouth University), Luke Winter (Ancient Technology Centre, Dorset) & Tom Harrison (Bournemouth University)**

The ShipWrEx Project was developed in an attempt to follow in the footsteps of Ancient Iron Age boat builders in the Mediterranean style. The focus is on trying to build a section of a boat in a similar style to the 5th Century BC Gela wreck from Sicily. This experimental archaeology project aims to provide a practical understanding of the development of ship-building techniques using four distinct building methods, using multiple building styles to represent a nautical vessel during a transitional period. The project has been set up by Bournemouth University across a number of departments in conjunction with the Ancient Technology Centre (ATC) located in Cranborne, Dorset. The ATC provided the expertise in ancient tool use and the materials that the project volunteers needed to create the first section of this boat in June 2014. By combining the efforts and skills of Bournemouth University students from different disciplines, such as Maritime Archaeology, Design, Engineering, Computing and Media and drawing on the skills of the ancient technologists, the aim is to further understanding of ship-building methods. In return inter-disciplinary co-operation is promoted and provides each group with the opportunity to apply the knowledge and skills they have acquired to a realistic project scenario. The valuable core collaborative element of the project gives academia the opportunity to explore a practical approach to discovering the technical prowess of ship builders in the past and inform our understanding of the underlying reasons for the techniques and materials they used.

The Project is led by Paola Palma, Programme Leader for MSc Maritime Archaeology, she has 25 years experience in archaeology and her specific focus is monitoring the degradation and preservation of underwater cultural heritage, although her recent projects have explored the communication of Maritime Archaeology to marginalised audiences.

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## **Vikings in Victoria: A merging of classroom, exhibition, and experiential learning**

**Erin McGuir (University of Victoria) & Kim Gough (Royal British Columbia Museum)**

Between May and November of 2014, the Royal BC Museum hosted Vikings: Lives beyond the Legends, a travelling exhibition from the Swedish History Museum. While the Vikings never sailed to the west coast of Canada, interest in them as explorers and heroes is high enough that the exhibition has drawn visitors from across the world. At the University of Victoria, where students can take courses in Old Norse language, Sagas and literature, and Viking archaeology, this interest has been observed for a long time. Erin's Anthropology 398: Life and Death in the Viking World is an archaeology course that requires students to delve into Viking life through experimental archaeology projects. Students have worked to produce glass beads, test navigational tools, carve game pieces and boards, etc.

Beginning in 2013, Kim and Erin came together to find ways to make formal and informal learning connections with Erin's teaching and the exhibition. The partnership that emerged was diverse and rewarding on many levels. Students who took Anth398 before the exhibition arrived put on an experimental archaeology research fair, attended by members of the university community and the museum. Some of the projects demonstrated led to volunteer opportunities for students, who later created activities for children and/or adults, taught skills such as nålbinding (a type of Viking needlework) to docents and the general public, and organised events as part of the exhibition. A modified version of the course was offered during the summer of 2014, based at the museum and bringing together traditional university students with members of the general public for a two-week period. During this time, we engaged in a combination of traditional lectures and hands-on workshops led by re-enactors, fellow students, and museum staff.

This may seem like a lot of work for a relatively short-term project. The exhibition moves on and it may be a long time before Vikings return to Victoria. In this talk, we'd like to share our experiences and insights on what we learned. One of the greatest gains we've made is the awareness that each new exhibition brings new opportunities. The trick is to be open to them.

## **Session 3: Posters**

### **The Hatra Ballista: a Case Study in Experiential Learning and Experimental Archaeology at the Undergraduate Level**

**Alistair Mowat (University of Manitoba) & Conor Whately (University of Winnipeg)**

The pedagogical value of experiential learning is well-established, and has long been embraced in any number of academic fields, though rarely in Classics or Classical Archaeology as taught in the classroom. In the broader realm of archaeology, however, it is a cornerstone of the discipline and fundamental to its training; innumerable excavation and survey projects boast undergraduate level field-schools, and laboratory experience is essential to students of bioarchaeology, zooarchaeology, and many other sub-disciplines. Classical archaeology students in North America have limited access to material evidence and study collections, but experimental archaeology can help provide experiential learning opportunities in this field without necessitating international travel. Nevertheless, courses offered in experimental archaeology at the undergraduate level are comparatively rare, and rarer still in the context of Classical Studies. And yet, experimental archaeology can provide an effective framework for intensive undergraduate research.

The case study presented here focuses on an undergraduate thesis that involved constructing a large scale model of the Hatra Ballista, a 3rd century CE piece of stone-throwing torsion artillery excavated at Hatra, in modern day Iraq. In spite of the limitations of scope, funding, and time inherent to an undergraduate project, the experimental approach enabled a suitably narrow focus and a clear definition of purpose of the sort frequently lacking in research at this level. Furthermore, the undertaking of this sizeable reconstruction project furnished considerable insight into the problems of expert craftsmanship, manpower organization, and especially resource management and procurement in the ancient world. In terms of pedagogical benefit, the student also gained experience in grant application writing, accounting, curation, wood and metal working, 3D modelling, academic presentation, and public outreach.

### **Volunteers in the Open: Volunteer Use in the Open-Air Archaeological Museums of Europe**

**Andy Spencer (University of Birmingham)**

In the last thirty years there has been an exponential growth in the number of archaeological open-air museums (AOAMs) and yet, even with their growth in popularity, these heritage institutions continue to face challenges to their long-term fiscal sustainability (Paardekooper, 2012) and staffing levels remain critically compromised (Ambrose and Paine, 2012). Only through the dedicated use of volunteers can AOAMs hope to satisfy the popular demand for this brand of heritage.

Using the network of EXARC-member archaeological open-air museums (AOAMs) the author critically evaluates the methodologies in which volunteers are currently deployed within this unique and vibrant form of heritage institution.

Additionally the author reviews the institutional benefits of enhancing volunteer programs and offers recommendations to sustain and strengthen AOAM volunteer programs. Utilising a survey methodology the author collated 32 completed survey responses from EXARC members who self-identify as archaeological open-air museums (AOAMs). While the author's survey was Europe-wide and represents a prosaic range of attitudes to volunteering, a number of critical themes are illuminated including: the challenges of recruitment, training and retention; and the rationale behind devoting the meagre resources to initiate and sustain volunteer programs.

The author demonstrates that volunteers are utilised in over 90% of the responding EXARC institutions and 17% of the responding sites being completely volunteer run. According to the author's research volunteers provide the equivalent of an average of 1 fulltime staff person per year and provide significant contributions in many areas of operation including living history; tour guiding and interpretation; presentation of prehistoric crafts and techniques; and building reconstruction. As such, volunteers are essential for the long-term sustainability of these organisations.

The author posits that a strong volunteer program can maximize interpretive potential and strengthen engagement with the community which in turn can positively affect tourist engagement and increase revenues.

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## **Designing a Problem Based Learning Module to Enhance Employability Skills for Undergraduate Students at UCLAN**

**Gaynor Wood**

There is little published on either the teaching of experimental archaeology or its potential link to developing employability skills in students. However, there is considerable literature on employability generally.

Employability has become an important issue within the Higher Education sector. For students now entering into Higher Education a degree is certainly not enough to ensure a job or occupation at the end of the course. In the highly competitive world of employment effective graduates are able to demonstrate to potential employer a wide range of skills, e.g. communication, problem solving, team working and behaviours such as "a can do attitude", confidence, and resourcefulness. The new "oven ready" graduate is able to slot into a company or organisation from day one, immediately able to contribute to its aims and objectives, and to those of the economy in general, because they are commercially aware and trained to meet the requirements of the employer (Atkins, 1999). Most Higher Education Institutions are now focussing on this agenda; preparing graduates who can swiftly contribute to general society (citizenship) and to the UK economy (employable).

Opportunities for an archaeology department to embed employability within and outside the taught curriculum are varied. For example, this can be through: excavation and field experience, Personal and Professional Development modules which discuss professional standards and requirements, and encourage personal reflection and career development learning, employment or placement opportunities within the archaeological and heritage sectors, community development projects and work placement or realistic work environment modules. However, it is also the use of creative and challenging teaching methods which develop a variety of skills and behaviours.

One of these is the Problem Based Learning (PBL) technique (Barrett and Cashman, 2010) which has been used in several UK universities to teach archaeology and its sister discipline, experimental archaeology. In this paper PBL will be explored using case studies from within the context of archaeology teaching, and a proposed module to be taught at the University of Central Lancashire. It is argued that using an experimental archaeology problem and teaching through PBL is an innovative and effective way to develop students' employability skills.

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## **Dugout Boat Reconstruction: Methods, Use and Applications of Naval Architecture**

**Dr. Niall Gregory**

Available evidence shows that Ireland has one of the largest catalogues of dugout boats in Europe. The pedigree of their use in Ireland extends continuously from the Neolithic Period to documented accounts at the end of the 18th Century AD. Their prolific use, differing hull forms or shapes and circumstances of discovery reflect other boat types contemporaneously in use, which do not survive in the archaeological record due to their composite nature. Within

the general scope of travel and communication, these large artefacts served multiple functions evidenced by their size and distinguishing hull forms.

Methods of construction followed standard techniques as evidenced by experiments in reconstruction. This conversely demonstrates that hull form and hull size, determined the intended environment of use and purpose for which each boat was designed.

Experimental use of dugout boats demonstrates their abilities as well as their limitations. This has proven successful in determining the validity of previous theoretical interpretations and whether theory stands up to the scrutiny of actual practise. For example, dugout boats were not sea-going as they were easily swamped in comparison to other boat types. Equally, sailed dugout boats – an apparently unique design of dugout boat in Europe – could be successfully used without the aid of keels, keelsons, outriggers or any stabilising element.

Applications of naval architecture to dugout boats, while remaining in its infancy demonstrates the complexity of dugout boat design and thus a complex knowledge of the interaction of hull and water to differing environments of water bodies, whether they are rivers, lakes, estuarine conditions, etc. Furthermore application of naval architecture enables assessment and determination of dugout boat performance capabilities through hull measurements. In the absence of reconstruction and experimental work, performance capabilities would solely have remained as unsubstantiated theories. Experimental work enabled verification and eligibility of applied naval architecture.

## Session 4: Key Note Posters and Demonstrations

### Key Note

#### Experimental archaeology, and the value of authentic learning experiences in

#### Higher Education pedagogy

Bill Schindler, Ph.D. (Washington College, Chestertown)

University classroom instruction has traditionally relied upon static teaching and learning strategies where students remain seated and are expected to “absorb” information. Students are then assessed through exams where they regurgitate information in a written format. Engaging, out of the box activities in these settings take the form of in-class discussions or debates that allow students to “further explore” the material. This type of teaching is no longer acceptable.

Recently, new teaching and learning initiatives have set the bar higher. Innovative buzzwords in progressive pedagogy include: whole body, project-based, hands-on learning. While faculty scramble to find ways of meeting these new expectations in their teaching, it turns out that, as in many aspects of modern life, lessons from the past can inform us how to do, what we are currently doing, better. Humans have always learned best while using all of their senses and engaging their entire bodies to solve real problems. In fact, these pedagogical strategies are most meaningful when engaging students in projects entirely from the beginning to end – where nothing is shielded from them. This approach, also known as “soul authorship,” provides much more authentic learning experiences.

This presentation will demonstrate how incorporating experimental archaeology and primitive technology in the higher educational classroom provides a natural fit for meeting the demands of these novel pedagogical demands. Case studies will highlight examples where “soul authorship” teaching and learning, utilizing experimental archaeology and primitive technology, provided students with entirely new levels of investment and understanding.

### Poster Session Only

#### An Experimental Archaeology Project Examining the Manufacture and Efficacy of Iron Age Bone Spearheads

Yvonne Inall (University of Hull) & Naomi Sewpaul (University of Bradford)

In Britain bone spearheads were in use from the Palaeolithic until at least the Iron Age (IA). This prolonged usage indicates these were effective weapons and form part of the equipment of British IA warriors. They have been found at over 40 IA sites. The types of context in which they are found include burials, votive deposits and settlement sites.

The River Witham, near Fiskerton in Lincolnshire was a focus for deposition of bone spearheads and other weapons throughout the Late Iron Age, and into the Romano-British Period. Over 50 bone spearheads are preserved from the site.

The prevalence of bone spears from IA contexts in Britain suggests that they were frequently used. Many examples show damage to their tips indicative of contact with hard surfaces. Faunal analysis indicates that hunting did not form a significant part of the diet of IA communities in Britain. Thus, it appears that bone spears were constructed for use against other human beings in interpersonal violence.

The construction of bone spearheads would have been largely seasonal. Spearheads made from bone would have been more economical to produce compared to metal spearheads.

We propose a number of experiments; firstly the manufacture of spearheads from tibiae of Soay sheep (the closest species to that utilised in the Iron Age) and spear shafts from hazel (*Corylus* sp.). We shall test the spearheads against moving and stationary targets (to simulate battlefield conditions), with a view to record all of these processes as an accessible archive.

These experiments will ascertain the efficacy and durability of bone spears as weapons, and highlight the human biomechanics of their use, through motion capture technology. The experiments will explore whether bone spears are better suited to being thrown, or the delivery of thrusting blows, and if thrown, what distances are achievable.

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## **Demonstrations**

### **CookBook of Secrets: Making Color in the Studio and Through the Kitchen**

**Candice Smith Corby (Stonehill College) & William Pettit (John Cabot University, Rome)**

Our proposal takes into consideration the combined interest of the origin of natural pigments and their connection to culinary traditions. Within an academic setting, contemporary studio courses often focus on process, based on a modern and post-modern conception of art-making. Although this format and line of thinking is commonly accepted, it can remove a deeper understanding of how artists today make aesthetic decisions. Historically, artists were the sole proprietors of their practice and their materials. They not only knew where each ingredient and tool came from, they may have had to construct or make their own materials. Material sources such as pigments were available through apothecaries and had dual purposes in medicine, cooking, and art making. Artists, alchemists, scientists, and physicians shared knowledge and sometimes occupations. Today, the ready availability of mass-production and standardization from large art supply companies has resulted in a loss of historical knowledge. This demonstration aims to share examples and insights of how and where artists procured their ingredients as well as how they put them into practice. We will share techniques such as egg tempera, encaustic, gilding, and how illuminated manuscripts were painted in relation to their relevance within history. Participants will be able to touch, mix, and apply materials to understand original artists' intent within the given techniques. Historical examples and contemporary references will be provided. We will also share recipe examples, which include studio and kitchen ingredients and how they are symbiotic.

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The Craftsman's Handbook Cennino Cennini

The Materials and Techniques of Medieval Painting

The Medieval Kitchen: Recipes from France and Italy by Odile Redon and Francoise Sabban

Apicius Cookbook (ancient Roman cookbook)

A Taste of Ancient Rome

### **Archaeo-Music**

**Benjamin Simao**

The recreation of ancient musical practices is not easy. This art not allow the discovery missing sounds, but also an understanding of the close relationship between society and music. Archeomusicologist and music instrument maker for early music, Benjamin Simao shows a set of wind & stringed instruments. Improvisations, musical fragments or instrumental pieces from different repertoires, it's more than 35000 years of sound shared with the audience.

## **A practical exercise in the construction and operation of a warp-weighted loom improves understanding of its structure and may indicate a practical use for previously unidentified archaeological finds**

**Shirley Walsh**

The building of a warp-weighted loom for operation by a group of medieval craftworkers /reenactors highlighted the paucity of available information regarding the construction and warping of this type of loom. Many diagrams of these looms are incomplete or inaccurate, even in academic papers, and some photographs of looms in museums demonstrate that they have been built without real understanding of the purpose of various parts – they have been built for display, rather than use. This loom, constructed using tools and methods available to medieval craftsmen, has been warped several times, indicating that the construction and procedure for use are appropriate. At each warping the process has improved; problems have emerged and some solutions found. Since the warp-weighted loom is not an ergonomically efficient method of weaving, and there is no incentive for modern weavers to use one to produce fabric, exploration of the loom is often limited to fairly basic constructions, and theorisation. Use of the loom is now generally limited to research and to reenactment displays, and researchers (and reenactors) often stop short of weaving sufficient quantity or quality of fabric to properly test the equipment. It is in the interests of broader research to demonstrate how it may originally have been designed and efficiently operated. Further, extensive operation of the loom clarifies the potential use of previously unidentified archaeological finds which may have a simple and practical function in this type of loom.

## **From raw material to final product: Manufacturing techniques of steatite ornament production**

**A Vassanelli, E Adami, C Petrinelli Pannocchia & N Visintin (Università di Pisa)**

In Italy, during the whole pre-protohistoric period, steatite was one of the raw materials used for ornament production such as: beads, pendants and so called "buttons". Our workshop is intended to show certain probable techniques used in the past to produce different types of ornament. Taking a cue from some of the archaeological artefacts found in Tuscany, all the necessary phases for transforming a block of raw materials into a finished product and the needed tools to achieve the result will be illustrated and demonstrated.

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## **Prehistoric Musical Instrument Manufacture and Performance**

**Holger Lönze and Billy Mag Fhloinn, *Umha Aois***

This talk and demonstration will examine aspects of Irish bronze horn manufacture, including the cast horns of the Late bronze age and the sheet bronze horns of the Iron Age. Conventional wisdom about their manufacture makes several assumptions about aspects of their construction, and the aim of this talk is to challenge some of these interpretations in light of experimental attempts to reproduce working copies of these instruments. The potential use of lost wax models, possibly in conjunction with bivalve clay moulds, in late Bronze Age horn manufacture will be discussed. Another element under discussion will be the steps in producing a curved conical trumpet bell for sheet metal Iron Age instruments such as the Loughnashade trumpet, or the Ardbrinn horn. The main point of discussion will be whether the instruments were made as a straight cone, and subsequently bent, or whether they were hammered directly over a pre-curved mandrel. In either case, the creation of curved formers appears to be a necessary step in the creation of such instruments. The demonstration will also feature a performance on reproduction instruments, to explore some of their potential musical abilities.



## Session 5: Forged in the Fire: Aspects of Hot Technologies

### Creation and Cremation: Understanding ritual use of Neolithic material culture of the Irish passage tomb tradition in relation to the cremation process

Tara Clarke (University College Dublin) & Niall Inwood (University College Dublin)

During the Irish Neolithic the primary form of burial practice is cremation. Associated with this practice from c.3300-2700 is the construction and primary use of passage tombs to serve as ritual centres. Many of the grave goods located within these monuments show evidence for fire; either in their construction or at some stage after. However, our experimental project has demonstrated a large variability in the extent to which different objects are affected within cremations, suggesting that this was a much more elaborate and controlled ritual process than was previously considered.

This paper will primarily focus on the manufacture and destruction, in cremations, of fundamental elements of this Neolithic passage tomb culture; namely metapodial bone pins and “jasper” pendants. It will include a summary of our overall research and associated images from the joint experiment carried out by Tara Clarke and Niall Inwood as part of their Masters thesis. The purpose of this research was to understand possible manufacturing techniques evident on grave goods associated with the primary burial deposits of Neolithic passage tombs in Ireland. Post production processes were also tested, challenging assumed cremation treatment of such grave goods associated with the burial practice.

Following an introduction to the time period and associated archaeological record, the paper will lay out the primary aims and methodologies from the experimental process. The choice of materials selected and how they reflect the archaeological and environmental record will be put forward. The paper will discuss the methods and approaches taken for the manufacture of the reconstructions, supported by the archaeological record. We will argue for certain post-production treatments and how they may be reflected in archaeological material recovered from excavations. Finally through the data, the experiment shall show how this challenges preconceptions about Neolithic ritual practices in Ireland.

### Inverse segregation: It's not just for artists anymore

E. Giovanna Fregni, PhD (University of Sheffield)

Surface analysis of ancient bronze objects has always been problematic. Techniques such as portable XRFs are ideal for non-destructive analysis of metal objects, but they have acknowledged limitations. Readings frequently display elevated levels of tin and lead in Late Bronze Age bronze alloys. This has variously been attributed to metal depletion or enrichment due to the burial environment or corrosion processes. Other explanations include deliberate surface treatment to give an object a different appearance (Tylecote, 1979, 351, Scott, 1991, 43-44, Robbiola et al., 1998). However, a major contributing factor that is well known to modern bronze sculptors, but not well recognised by archaeologists is the process of inverse segregation.

As alloys cool in a mould, the heated surface of the interior of the mould will delay the hardening of the alloys with the lower melting temperature, thus enriching the surface with elements such as tin and lead, elements typically part of Late Bronze Age alloys.

After conducting experiments casting bronze tools in closed moulds and also casting ingots in open moulds, XRF analysis showed that the tools had a surface enriched with tin and lead, while ingots that were cast into open moulds did not.

The use of experimental archaeology, supported by chemical analysis enables new insights into Bronze Age metalworking practices. The recognition of inverse segregation introduces the possibility of further experiments to explore mould temperature as a means of altering the surface colour of bronze objects. While there are metal objects from the Bronze Age that could have been given surface treatments to change the colour, the possibility of controlling the temperature and cooling rates of moulded castings opens new potential for how we interpret metalsmithing practice in the Bronze Age.

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## **Production of glass beads in open hearth based on findings from Ribe (Early Medieval)** **Marta Krzyżanowska (Adam Mickiewicz University, Poland), Mateusz Frankiewicz (Experimental Archaeology Laboratory, Poland)**

There are several theories in archaeological literature of how the glass beads were made. In many publications and during archaeological festivals there are tendency to use clay furnaces where the glass beads are shaped. In our experiment, we assumed that there is easier way for glass beads production than building a clay furnace. We conduct our experiment on open fire hearth with flat surface. We used tools which were based on archeological findings, such as mandrels from Ribe. Some traces on glass rods may indicated that metal tongs might be used by early medieval glass makers that is why we used metal tongs for holding the glass rods. In our experiment we used Effetre Murano glass rods. We also tried to make simple beads eg. melon beads and beads with polychromatic ornamentations eg. eye beads and the racitella rods. The experiment showed that two people with high skill are required to make glass bead, one for production of beads itself and one who would be blowing the bellows according to stage of bead production.. During the experiments we were using our knowledge and experience from contemporary glass beads making.

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## **Session 5: Posters**

### **Steel carburising in a small shaft furnace: The so-called "Aristotle process"; its possibilities and limitations**

**Jiří Hošek, Ryszard Kaźmierczak, Paweł Kucypera, Maciej Tomaszczyk (Nicolaus Copernicus University)**

The so-called "Aristotle furnace" was modernly introduced by L. Sauder and S. Williams (2010), but it had already been described and successfully operated by O. Evenstad (1790) in the 18th century. It is a slick design that allows an indirect production of small quantities of a relatively homogeneous steel of varied carbon content from scrap bloom iron. The process itself is characterized by low material, fuel and time consumption, it is rather easily controlled, and gives very good results in terms of the attainment of the desired degree of carburisation, structural homogeneity and minimization of the presence of impurities in the material. It is highly probable that the description given by Aristotle in his *Meteorologica*, dealing with repeated melting and solidification of wrought iron, accompanied by slag removal, deals with this very process. Hence the terms "Aristotle furnace," "Aristotle steel," "Aristotle process," or "Aristotle method". During the course of our studies, a series of experiments with varying parameters were carried out to evaluate the effects, variables, and limitations of this method. Acquired samples were analyzed metallographically and compared with other available archaeometallurgical and experimental data. Drawn conclusions will be presented and discussed.

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### **Keeping it simple: Low technology glass bead production in the African context** **Jonathan Thornton (Buffalo State University)**

The making of glass and glass beads has often been represented as requiring technological sophistication. Partly because of these assumptions, almost all glass beads excavated in Iron Age contexts in South Africa (those found at the Mapungubwe site, for example) have been ascribed to importation from the Middle East, India, or Southeast Asia. This literature has assumed such beads were made using either of two techniques, winding and drawing. Both indigenous methods in use elsewhere in twentieth- and twentieth-first century Africa, however, and the author's experimental replication of bead-making techniques and analysis of the beads produced, suggest that African craftspeople could have produced some of the bead types excavated in South Africa. Scholars have observed/documentated West African bead-making methods involving powdered glass, either acquired by trade or made locally. These "powder glass" beads can be made from dry powder fired in ceramic molds, or they can be wet-formed using a temporary binder and fired without a mold. The author's experimental replication shows that these powder methods produce beads that are easily mistaken for ones made by winding and drawing, (though microscopy

can show differences). Further experiments suggest those methods too may have been used by African bead-makers. They demonstrate that simple and small charcoal-fired furnace pots, modeled after “top flame” furnaces documented in West Africa, generate ample heat for melting glass, such that even unskilled workers are able to wind or draw beads using such equipment. The thrust of the experimental work has been to make functional equipment as small and ephemeral as possible using methods and materials available to Iron Age African workers. The work has focused on Africa, but has implications for other societies, since it challenges the assumed necessity of large, well-equipped glass-making shops, at least for such small objects as beads.

## **Casting into Open One Piece Moulds: Problems and Possible Solutions**

**Padraig McGoran (Umha Aois)**

Umha Aois has been running for twenty years, and amid a myriad of other casting experiments, we have poured into open moulds on numerous Symposia. At Umha Aois 2011, Killarney, County Kerry, we dedicated the Symposium to smelting copper ore, and also to pouring one piece open moulds. As a project, the smelting was a resounding success, but the successful pouring of an axe into an open mould remained elusive.

Prior to the event, we had visited the vaults of the N.M.I. in Dublin. I noted straight away the stone presented had several carvings that were twice as deep as the axes presented in museums. I mused upon this. At Killarney 2011 I carved several moulds fifteen millimetres deep, and then poured the moulds to half their capacity.

To my delight, I had a result. The top side had no sign of reticulation due to oxidation that previous attempts had manufactured, unfortunately, when the casting was turned over, it presented the same dreaded bubble in where had now been considered to be the usual place.

However, I still thought there was one final trick up my sleeve. We had tried covering the mould with straw immediately after pouring. I personally tried putting a straw near the bubble area thinking that would do the trick.

So then, it turns out that our ancient forebears had similar problems. I made contact with several Archaeologists who had previously participated on the Umha Aois Project. They have furnished me with examples of the bubble in antiquity, how fascinating to know that a simple trick solves these problems.

## **From Galena to Silver: a first attempt at experimental archaeology**

**Y. Godino (University of Florence) - L. Teppati Losè (University of Siena)**

Archaeological research in the area of Piedmont resulted in the identification of 13 sites with characteristic features of metallurgic activity, which date between the 5th and 10th century A.D.: in 6 of them, archaeologists investigated different artisanal facilities whose purpose was the reduction of minerals.

The presence of specific archaeological markers (ingots, hemispherical and semi-finished lead bars, tools associated with goldsmiths) and the proximity of the settlements to the argentiferous lead deposits led to hypothesis of the existence of activities related to extraction of silver: these activities seem to be associated with the production of iron, a topic that has often been under the attention of researchers.

The experimentation carried out by the authors has the aim to demonstrate how the kind of structures documented in Early Medieval Piedmont could be useful both for reducing

iron and for extracting silver from galena minerals. The work was focused on

reconstructing the structure found in Misobolo (TO) and dated back to the 8th century A.D.(CIMA 1986): iconographical sources led us to the reconstruction of two bellows in leather and wood; ceramic tuyeres were replicated recreating one of the two furnaces found during the excavation of Brescia - Santa Giulia of Brescia.

The experimentation was useful to document all the steps of the production cycle and to obtain a small quantity of metal; during the research we were able to achieve a better understanding of some particular aspects of the structure's working principles.

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## Session 6: Thinking Through Methods and Approaches

### Capturing fugitive dyes through re-creation and algorithms: a case study from the north coast of Peru

Flannery Surette (The University of Western Ontario)

Despite nearly a hundred years of textile research in Peru, experimental approaches and novel applications of technology are rarely applied to material excavated from the region. For this project, I tested the effectiveness of Dstretch, a decorrelation stretch algorithm plug-in for ImageJ developed by researcher Jon Harman to study rock art. I used this program to enhance the faded dyes of a series of textiles recovered from Huaca Santa Clara, an Early Intermediate Period (200 B.C.-A.D. 800) site located in the Virú Valley on the north coast of Peru. Seven examples of plangi or tie-dyed textiles, light blue cloth with faint red or light brown rings or diamonds, were selected, revealing ring motifs largely hidden in photographic form and barely visible to the naked eye. In other cases, the algorithm revealed dyed patterns invisible in photographs and enhanced the colour-leached outlines of tapestry motifs. With the relative ubiquity of high quality photographs, this technique adds a new dimension to research where circumstances prevent in-person analysis.

The second and ongoing aspect of this experiment involves the re-creation of the ring motif, using material and dye available to artisans during the period in question, in order to test the effectiveness of the algorithm on other common colours. These samples will also be subjected to a bleaching process to mimic the changes undergone by archaeological textiles and will also be photographed under less-than ideal conditions to test the utility of the algorithm where low quality photographs are the only option available. The overall goal is to determine the applicability of this particular technique (algorithm) for textiles where its usefulness has been met in the study of rock art.

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### Relevance of the Sequential Experimentation for Quartz Stone Tools

Sabine Martin (University of Exeter)

Quartz is one of the most common raw materials used for the myriad stone tools found throughout the Paleolithic and is present in a variety of geological contexts. Its relative abundance and its poor aptitude for controlled knapping procedures especially when compared to flint have often relegated it to a secondary position as a research interest (e.g. V. Murre, Master thesis 1994, A. de Lombera 2011).

Indeed, quartz presents a network of micro or macro crystalline fractures which are difficult to observe under an optical microscope. That is one reason why this stone industry has not been the object of in-depth use wear analysis studies despite their significant representation in a number of Paleolithic sites. However, two different technologies exist to significantly improve the observational qualities of quartz tool surfaces (Knutsson 1988; Sussman 1988; A. Borel et al 2013). First, the optical metallographic microscope associated with a Nomarsky prism allows for a better analysis of the crystal surface based on the differential interference contrast. Secondly, the scanning electron microscope associates high spatial resolution and a large field depth of the surface under examination allowing better observation of surface details.

The main goal of this work is to establish diagnostic features on quartz tools by establishing a reference collection for the interpretation of quartz tools. The aim of this reference collection is to assist in the analysis of the quartz artifacts from the middle and early Paleolithic site of Payre in France and the Gran Dolina in Spain, in relation to the tools use. Thanks to the Scanning electron microscope, we can present here the preliminary results of an attempt to monitor the process of use-wear formation on quartz stone tools.

Sequential experimentation as a methodology was used to provide a better understanding of the formation of use wear on quartz faces produced during specific actions. This type of experimentation makes it possible to observe the sequential formation of each micro wear generation on the cutting-edge (A.Ollé, J-M. Vergès 2008). Preliminary results

from the first set of data are encouraging, and the identification of use wear indicative of individual actions on various material types such as bone, skin and wood looks promising.

## **A Study of Prehistoric Irish Shale and Porcellanite Axes/Adzes through Experimentation, Quantification and Comparative Analysis**

**Bernard Gilhooly (University College Dublin School of Archaeology)**

This paper will discuss the methodological approaches currently being applied to the analysis of particular lithologies of prehistoric Irish axes/adzes and the range of skill sets developed to accomplish this. As part of an ongoing PHD research project, the method of manufacture and range of uses of Irish shale and porcellanite axes/adzes from the Mesolithic through to the Early Bronze Age, along with the influence of taphonomy on their final appearance in an archaeological context, is under investigation.

A number of experimental replicas have been manufactured, using both hard and soft hammer techniques. These reproductions are being utilised for a broad variety of tasks including, tree felling, coppicing, splitting and wedging, fine carpentry, butchery and as digging implements. Taphonomic processes, such as trampling by humans and animals, the effects of vehicles and ploughing and water rolling are also being replicated. In co-operation with the UCD School of Mechanical and Materials Engineering, a quantitative analysis of the mechanical properties of these lithologies is also underway. Here, the flexural and tensile strength, along with fracture toughness and hardness is being tested. The damage and/or characteristic features which develop on these replicas will then be compared with archaeological examples from the National Museum of Ireland (NMI) to assist in determining which activity or activities the prehistoric examples may have been used for.

From this wide array of methodological approaches, new interpretations of the multi-dimensional aspects of these objects can be formulated; the interplay of ideas and actions, the importance of material selection and the properties of the material itself along with the multiple roles, both ritual and/or utilitarian, these objects took in Ireland from the Mesolithic to the Early Bronze Age.

## **Session 6: Posters**

### **Drilling through antler with wooden and bone drill bits: first observations and conclusions**

**Justyna Orłowska (Nicolaus Copernicus University in Toruń)**

From the Stone Age comes a whole range of various kinds of artifacts made of antler (e.g. axes, hammer-adzes), distinguished by a presence of a large hole (diameter over 2 cm) in their structure. With time, people started to wonder about possible ways of producing holes of this type, because besides the size itself, enchain also their regularity (in the majority of cases their inner walls are smooth) and the fact that their inlet parts are of the same diameter on both sides (Bagniewski 1992; David 1999; Pratsch 2006). This encouraged researchers to suggest that the holes had to be produced with help of special drill bits (most probably made of bone or wood), designed for kind of drilling devices (Henriksen 1973; Bagniewski 1992). Unfortunately, so far we do not possess findings unambiguously resolving the problems surrounding the production of this type of holes in antler artifacts.

The above issue became a starting point for conducting an experiment, designed to test the properties and capabilities of bone and wooden drill bits.

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### **When the dance ceases & the fire is put out. (Catlin, 1844). Smoking the Shield – Is There An Alternative to Leather**

**Sally Herriett (University of Bristol)**

There are numerous processing methods, which when applied to green skin result in the production of a viable material. The variety of materials and thus the products created are obviously determined by particular nuances within each method and the environment that the material then resides in. Many of these methods can be easily



reproduced using primitive prehistoric technology and with the additional of only the simplest of ingredients. Although many of these processing methods result in viable and versatile materials they may not render the material impervious to the process of decay and as an organic material if left uncared for it will rot. The value of this material as a prehistoric commodity is not disputed (Hurcombe, 2007, Gronman-Van Waaterling et al., 1999), however, archaeologically its organic nature has resulted in relatively few discoveries.

Literature research into alternative processing skin methods revealed references from Catlin (1844), regarding the processing of buffalo skin carried out by Sioux men when they needed a new war shield, “the shield is made of the skin of the buffalo’s neck, hardened with the glue extracted from the hoofs and joints of the same animal”. Grinnell (1896) also noted that the shield “was heavy enough to turn the ball from an old-fashioned smooth-bored gun” and Dellenbaugh (1906) also stated ‘they heat shrink and harden it’.

This paper seeks to introduce experimental research that demonstrates the potential for this method of skin processing, a method that uses obtainable prehistoric technology and offers a plausible alternative to that of Cuir-Bouilli, (the addition of wax and heat to hardened leather) as the process commonly considered the production method for the prehistoric shield known as the Clonbrin Shield. Results of initial experimentation using green cow skin and the application of heat and steam, generated by hot-stone technology will be examined as this alternative processing method explained further.

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## **Identification of handedness through knapping gesture in experimental studies**

**Sebastian Teska (Adam Mickiewicz University)**

Since XIX century lateralisation in past societies is an important issue discussed in the scientific literature. According to the latest research asymmetry in development of cerebral hemispheres should be matched with humans language skills. The character of flint knapping technology gives an opportunity to learn plenty of information about a producer, including handedness. In this paper there is presented an actual state of research concerning markers of dominant hand preference, especially involving knapping gesture. They were verified during experiment with a method proposed by author of this paper. The aim of the experiment was checking an influence of external factors like raw material morphology, complexity of the project or flintknapper experience on markers of handedness. Conclusions drawn from experiment may be useful in understanding correlates between those factors and flint knapping technology. Also they give an opportunity to extract characteristic forms and traces that can be observed in specified conditions, which would give further studies an advantage.

## **Who made the handaxes? An experimental approach to bifacial expertise during the Acheulian/mousterian production in Central Iberia**

**Concepción Torres Navas (Universidad Autónoma de Madrid) & Javier Baena Preysler (Campus Cantoblanco – 28049 Madrid)**

In contrast with Upper Paleolithic studies, the analysis of skill in the lithic production in the study of Lower and Middle Paleolithic assemblages are scarce. In the majority of the contributions, the deficiencies and errors during these periods are explained as low quality raw material constrains. However, the use of experimental comparison between experimental re-production and the archaeological materials indicate that is quite reasonable to consider the existence of low technological levels (apprentices) in ancient archaeological productions.

In this contribution, we will present some of the experimental results in relation with the existence of different technical skill levels. For thus we analyze the raw material selection ability, the precision of impact percussion, the adaptation of adequate force in the impact, the employment of precise trajectories, etc. At the same time, we analyze the organization of the different technical behaviors into the global objective. The perception of limitations in the management of the configuration process, also indicate the existence of different technological skills at this level.

In this regard, we have conducted several controlled experiments to determine whether the ability of multiple knappers with various degrees of experience could be related with the Mousterian and Acheulean assemblages

analyzed in the center of the Iberian Peninsula.

From the experience documented in the paleolithic Cañaveral and Ahijones (Madrid) workshop sites, and expert knapper could be distinguished from a novice not only for the presence of errors in the lithic material but for the ability to solve those problems. The recognition of failures and errors, the correlation with technical behavior, the experiments in technical and technological processes, and finally the comparison with the well preserved archaeological samples provided the tools for a preliminary identification of several technological levels within the lithic production in those periods.

## **The production of steatite ornaments during the pre-protolithic period in Tuscany**

**A Vassanelli, E Adami, C Petrinelli Pannocchia & N Visintin (University of Pisa)**

Data from the analysis of the artefacts found in many pre-protolithic sites in Tuscany are used as the foundation for an experimental project aimed at improving our knowledge on techniques that are used for steatite ornament production. We explicitly focused on handmade possessions such as, beads, "buttons" and pendants. Basing our methods on experimental research and literature data, various operative chains were developed which combined different techniques, such as: raw material fragmentation and reduction, rough-hew, piercing and product finishing. Such experimental protocols being carried out, allow us to evaluate the effectiveness of certain techniques over others and define the operative chains probably used to obtain a specific ornament. It is also possible to use the result data to investigate whether or not, during the large chronological period from early Neolithic to the late Bronze there are significant changes in raw material provision and/or craftsmanship techniques.

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## **Flights of Fancy: The Behavior of Atlatl Darts and the Relevance of Experiments**

**John C. Whittaker**

In spite of thousands of years of successful use, ethnographic survival, a century of experimentation, and modern sporting use, the atlatl or spearthrower is widely misunderstood. Various kinds of evidence are claimed to show that atlatl darts travel over 100 mph, can penetrate plate armour, act by spring propulsion, and are spun and stabilized in flight by beveling the edges of stone points. Careful experimentation and modern instrumentation shows that none of this is true. In experimental evaluation of prehistoric technology, various kinds of experiments, including practical experience, work best together, but some experiments fail to tell us what we need to know.

## Session 8: Innovation and Technological Approaches

### **An archaeological experiment: a method of museum education or joke with science?**

**Dr Roksana Chowaniec & Prof. Aleksander Bursche (Institute of Archaeology, University of Warsaw, Poland)**

The archaeological discoveries in the late nineteenth century have influenced to the progress of various research methods, including the formation of the scientific basis of the archaeological experiments. Over the decades, original statements of experimental archeology underwent transformations. Also, the idea of presenting the results of experiments to the wide audience has born. Since that time, issues related to experimental archeology, but first of all the aspects related to the non-experts education, are very popular in literature and usually referred in the context of the open air archaeological museums. In time, the archaeological experiments also began to engage the observers (audience) and the presentations became to be an interactive. Until now it enjoyed a huge popularity.

And so we are confronted with a dilemma. On the one hand, the experimental archeology is one of the most interesting methods of education for wide public. But on the other hand, scientific archaeological experiment, which employs a number of methods, techniques, analyses, and approaches, based upon archaeological, iconographical, numismatic and epigraphical source material, needs the time to be done, an attention to details and scientific process to be implemented, to which is no time during the shows to the public. Willy-nilly, such presentations are simplified and everything is served in brief, to save time and energy. Because visitors need to understand the complex technological process and very often they have no time and patience to observe long demonstration.

Therefore perhaps, this type of shows, involving the archaeological experiments, is the simplification of scientific archaeological methods and research? Possibly it should not be named archaeological experiments but only the entertainment method for the people? Should be called as the archaeological experiment the presentation how to make a pot or brooch? It seems that it does not, because the experiment in their assumptions is not designed for making the artefact copy, but designed for recognizing the whole process of creation, using and also depositing the archaeological find.

### **Perishables, Pragmatics and Perception: the role of experiments in the interpretation, understanding, and presentation of archaeological objects**

**Linda Hurcombe (University of Exeter)**

Experiments come in many forms: some form reference collections others use replication to conduct research through practice. Modern technologies can be used alongside traditional crafts and research can use social science methodologies as well as those of hard science. The touching the past project includes multiple layers of data derived from experiments using all of these approaches to both research and present archaeological objects. Ideas were drawn from a range of sources and disciplines and installations were developed to deliver a range of touch experiences within a variety of museum and outreach settings. Crafted replicas were based on a raft of experiments. These were used alongside very new technologies such as 3D prints in a series of museum trials which themselves formed a series of experiments. The unique Bronze Age perishable material from Whitehorse Hill (Dartmoor, SW Britain) has formed the most recent iteration of these ideas in a 3 month exhibition at Plymouth City Museum and Art Gallery. The replicated objects include a tin-studded woven band and a nettle and hide textile as well as 3D prints of a lime bast basket. Using examples drawn from the project it is possible to show the complex role of experimental archaeology as the intersection between theory and practice, research and presentation, science and art.

### **Look with your eyes, not with your hands? Combining 3D visualisation and kinaesthetic methods for understanding use-wear on prehistoric metalwork**

**Barry Molloy and Mariusz Wisniewski**

Since the beginnings of Experimental Archaeology, there has been an uneasy tension surrounding the role of the investigator. The scientific ethos of the New Archaeology tradition sought to adhere to laboratory standards, including the strict repeatability of experiments and use of deductive methods in which the archaeologist was (in theory) an external observer of phenomena. In contrast, the interpretive movement of the 1990's emphasised the individual as a fundamental foundation for understanding past societies, along with inductive and context-driven approaches to understanding the material conditions of life. The implications for experimental archaeology were profound. The influential position established by Coles at the height of the New Archaeology had sought to extricate the investigator as marginal or irrelevant to experiments, but we came to face a dilemma about how to think of individuals or biographies of things if we are restricted to observing people-less phenomena (Doonan 2013).

Using the case of prehistoric metalwork, we will argue that experimental research can benefit by incorporating the

experiences of investigators using kinaesthetic methods. Specifically, this addresses the changing state of knowledge of experimenters through repeated engagement with material culture – both ancient objects and modern replicas. Drawing on use-wear analysis of Irish Bronze Age axes and swords as a case study, our purpose is to examine how use-wear can illustrate patterns of practice involving metal objects and in turn how these reveal aspects of the dialogue in design choices between craftspeople and artefact users. We do this by combining analyses of ancient use-wear, 3D visualisations of these, and experiences obtained inductively through experimental work with modern replicas. Particular emphasis is placed on the way we can use new visualisations of artefacts to enhance experiential learning, and the role of reflexive approaches that draw upon metric, digital and experimental methods for research and dissemination alike.

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### **Letting the Cat Out of the Bag: Using 3D Laser Scanning and Experimental Archaeology to Understand Cretan Bronze Age Figurines**

**Christine Morris (Trinity College Dublin), Alan Peatfield (University College Dublin) & Brendan O'Neill (University College Dublin, IRC Funded)**

This story began when a small ceramic cat's head was excavated, together with hundreds of other figurines, on the Minoan peak sanctuary of Prinias over forty years ago. This material has remained largely unexamined, but for the past three years the authors have been studying it for publication. Initially, this powdery, feline image seemed unique, particularly when viewed in relation to the more typical elements of the peak sanctuary assemblage, which comprises handmade figurines, primarily anthropomorphic, animal and 'votive limbs' or body parts. As the research progressed, our perceptions and understanding of our cat's head were transformed.

This Irish Research Council funded project uses a combination of traditional artefact study (cataloguing and photography) together with 3D laser scanning to study thousands of figurines from ten peak sanctuary sites in eastern Crete. This approach has enabled the project team to engage more fully with the technology of manufacture of the figurines. The creation of virtual 3D objects has also allowed the team to use innovative identification methods, to further analyse objects outside of the museum space, to create 3D prints and more.

This paper explores how experimental archaeology has played a central role in the verification of hypotheses relating to the production technology of the cat's head. Using the cat as our example, we also address the opportunities that replication provides both for further study and for outreach projects. It will also discuss the implications of this multifaceted approach for exploring issues of production, skills and society during the Cretan Bronze Age.

## **Session 8: Posters**

### **The experimental recreation of an ancient Egyptian garland and its interpretation derived from two types of knowledge; practical knowledge (*savoir faire*) and factual knowledge (*connaissance*)** **Sally McAleely (University College London)**

This paper will discuss how experimental archaeology and two different types of knowledge, namely *savoir faire* and *connaissance*, can be used together to inform and aid archaeological interpretation of plant based technologies and artefacts.

Organic remains in the form of deliberately placed plant material, prearranged to make bouquets, garlands, pillows and floral collars, are material cultural objects often used as offerings or honoraria. Examples have been excavated from a number of archaeological sites and provide evidence for a long-standing cross-cultural human behavioural trait which has continued to the present day. The author analysed the technology involved in constructing a garland using the theoretical concept of the *chaîne opératoire*, and then used the species identified in an extant fragment of Ramesses II's garland excavated from tomb TT320 to recreate a short length of garland. By discussing extant artefacts from ancient Egypt where organic preservation is often remarkable, the author also highlights the wealth of data about plant based technologies held in the ancient Egyptian corpus which is available to other branches of archaeology.

Knowledge can be categorised in various ways, and this paper aims to show how data from two distinct 'ways of knowing' can provide complementary lines of evidence. The author will show how practical knowledge gained by

experience (*savoir faire*) during the experimental recreation of Ramesses II's funerary garland was used in conjunction with factual knowledge (*connaissance*) from artefact analysis and 14C dating to aid interpretation of both the garland and the radiocarbon results, and led to a re-evaluation of the burial data and the accredited contexts.

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## **Experimental Archaeology in the Young Archaeologists' Club**

**Katy Whitaker**

This paper presents the results of a survey of UK Young Archaeologists' Club Leaders. The purpose of the survey was to find out how many Leaders use experimental archaeology in their Branches of the Club; what their understanding of experimental archaeology is; and what barriers they experience, if any, to using experimental archaeology with the 8 to 16 year-olds participating in their Club activities.

The UK benefits from a large number of venues where experiential archaeology is used for educational purposes for visiting school children and families. Sometimes this is embedded in a site's educational "offer"; at others it is an occasional experience, tied for example to school holidays.

An arguably smaller number of venues make explicit use of experimental archaeology with younger audiences, despite its attraction as an engaging method which, as well as teaching about the past, can help to develop other skills such as numeracy and language, and concepts such as a fair test. That such venues are scattered nationwide means that fewer young people are likely to come into contact with experimental archaeology, than experiential.

Experimental archaeology, however, might be expected to feature in the activities of the UK-wide Young Archaeologists' Club (YAC). Experimental archaeology's strong teaching value and fun, engaging potential should recommend it to YAC Leader Teams planning their activities.

There are 68 YAC Branches (with more currently in development). Meeting usually monthly, the Branches offer a range of hands-on learning experiences for children across the UK. Although there are geographic gaps in its provision, city-centre and rural areas, prosperous and deprived areas alike are served by the network. Far more children might learn from and contribute to experimental archaeology through this outlet. Do they?

## **Excavating experimental archaeology: The reconstruction of education through reconstruction of the past**

**Nuala Sheils McNamee, UCL**

"Archaeologists and anthropologists have been advancing their knowledge about the day to day lifestyle of past peoples through experimental archaeology for over 100 years, however it has never been recognised or utilized fully as a legitimate teaching tool within the educational system.

This poster will examine the results of various experimental archaeology experiences and evaluate if they satisfy the curriculum criteria. This study will hopefully contribute to determining how experimental archaeology can be used as an educational technique and whether it should be used.

The study investigated what the educational results were when partaking in experimental archaeology activities. It focuses on the how the reproduction of an activity can produce, simultaneously, a similar learning outcome of historical and archaeological information to each participant, whilst stimulating a more progressive curiosity of the topic.

To achieve these research goals interviews and observations were conducted with different groups within the educational system. These groups partook in varying experimental archaeology activities and their feedback gave mixed types of data to the project. These groups include:

- First year undergraduates studying archaeology
- Instructors of and experimental archaeologists
- Students partaking in experimental archaeology modules
- Participants of the Young Archaeologist Club (YAC)

The results of this research will be paired and compared to the educational theory behind various curriculums and whether or not it meets it's criteria. Hopefully answering the question, how effective is experimental archaeology as a teaching technique and could it ever be moved forward in the teaching of archaeology and history?"

## **Grange Stone Circle Acoustics: “If only those stones could speak!”**

**Tom Cassidy (B.A. (Hons.), M.I.A.I., M.A.C.O.A., Conservation Officer, Limerick City & County Council) & Mikael Fernstrom (M.Sc., Ph.D, Director, Interaction Design Centre, University of Limerick)**

Grange Stone Circle, in the western part of the archaeological landscape that surrounds Lough Gur, Co. Limerick, consists of a circle of upright stones which, for the most part, are fitted close to one another. A further feature, and unusual in itself, is the fact that the stones comprising the circle are enclosed by an earthen bank to their rear.

Two stones (identified as Nos. 1 and 113 in Sean P. Ó Riordáin's report on his 1939 excavation) are considerably larger than most others. Located in the N.E. area of the 45m. diameter circle, they lie astride an alignment that stretches from the centre of the circle over the landscape to the hills that line the northern shore of the lake and a cleft over which the sun rises on the Summer Solstice. They lean into the circle's enclosed area.

These stones are the focal point for a distinct phenomena that the first writer has been aware of for some two decades- sounds created at a particular location within the circle resonate backwards, by way of an echo, to deliver a distinct reflection and resonance to anyone standing within the south-west quadrant of the circle or atop the penannular earthwork that embanks the stones.

This paper, through the acoustical research work of the second writer, will explore whether or not this phenomenon is accidental or a deliberate creation of the Bronze Age inhabitants of Lough Gur in the context of recent studies. Is the Grange Embanked Stone Enclosure a genuine archaeo-acoustic relic speaking to us through the ages?

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## **Making pots that fail: The thermal resistance of large crushed angular quartz tempered pottery, with reference to the early British south west Neolithic**

**Angela Wickenden (University of Exeter)**

This paper presents an early, recently designated, regional Neolithic pottery fabric from southwest Britain, restricted to Devon and Cornwall. It represents the Mesolithic-Neolithic transition. This fabric, which has been called large angular crushed vein quartz tempered pottery, has early C14 dates associated it. One of the issues of incorporating large pieces of temper in pottery is whether it is acting as a thermally resistant material or whether it may have had a symbolic significance, over and above a purely technological function. If it would be possible to establish whether or not these inclusions are an effective temper or not, i.e. prevent the pots from cracking whilst being fired then, it may be possible to draw some conclusions or at least offer a tentative interpretations.

Using an experimental methodology, designed by myself, based on producing and quantifying cracks in pottery, correlating data from 19 differing clay paste recipes, containing Upper Greensand sand and large crushed angular vein quartz, the aim is to confirm or suggest that the LACVQT is not an adequate thermally resistant material. The pottery was fired in three bonfires. Quantification and analysis of inclusions in the early

Neolithic pottery types of southwest Britain has recently been completed.

Due to large possibility of huge variations in firing condition each clay paste recipe was fired twice in different bonfires. A crack analysis tool was designed to quantify the cracks and crack types. The whole experiment now requires repetition to verify data collected.

Large angular vein quartz tempered pottery has multiple surfaces cracking around the large inclusions and this pattern was reproduced in the experimental collection.

The paper considers the wider archaeological questions of distribution, the possibility of exploring the production and whole chaîne opératoire of British southwest Neolithic pottery experimentally and the likely clay sources of the region.



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