NEWSLETTER OF THE ENGLISH HERITAGE RESEARCH DEPARTMENT

RESEARCH NEWS

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In *Research News* 6 we examine a range of different projects and initiatives currently under way in the English Heritage Research Department in the areas of developing methodologies, new discoveries and interpretations, and outreach and training.

The work of the Scientific Dating team in refining radiocarbon dating using Bayesian mathematics has enormous potential to revolutionise our view of prehistory. With the new analytical tools that have been developed we are able, for the first time, to appreciate the actions of particular generations of Neolithic people at specific times in the past. This work puts the 'history' into 'prehistory', and brings into focus the work of real people in the remote past. In a sense prehistory becomes human. The Heritage 3D project also advances technique, through testing laser scanning equipment the Metric Survey Team have established the techniques appropriate for Heritage work, and will be issuing guidelines on the subject. In the Mendip Hills the involvement of a reconstruction artist in survey work allows more immediate interpretation.

Recording using multidisciplinary techniques at St Mary's on the Isles of Scilly has been necessitated by advancing coastal erosion as the important coastal defences, built against human threats, are now potentially menaced by climate change. The St Mary's project exemplifies co-operation within Research Department, but working in partnership with other organisations enables English Heritage to influence research and conservation agendas to a greater extent than otherwise possible, as exemplified by the HEATH project. At RAF Coltishall a unique partnership between English Heritage and the RAF enabled us to understand the functioning of the station prior to decommissioning and the recording of the structures on the base.

Partnership working together with training and outreach helps the realisation of the 'virtuous circle' of understanding, valuing, caring for, and enjoying the historic environment of England. Our geophysical team have been passing on their expertise by training an amateur archaeological society to undertake geophysical survey on their own initiative. Two conferences are highlighted, one on the results of the recent survey of seaside resorts (*Research News* 2), the other on the Roman amphitheatre. The second of these was conceived as an integral part of the Chester Amphitheatre Project (*Research News* 5), and enabled international specialists from as far afield as Brazil, Canada and the USA, as well as many parts of Europe to discuss the phenomenon of the amphitheatre, but also to appreciate the work of English Heritage.

Elsewhere in this issue new work has enhanced our understanding of the importance of two very different kinds of buildings at risk; the 19th-century Woolwich Rotunda, a demountable timber-framed ballroom-turned-museum, and the tenement blocks at Egerton buildings. Work on artefacts enhances our understanding of the spread of Viking technology and life on a Roman villa.

Christopher Scull
Research Director
Research and Standards Group

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Heritage3D: laser scanning in archaeology and architecture

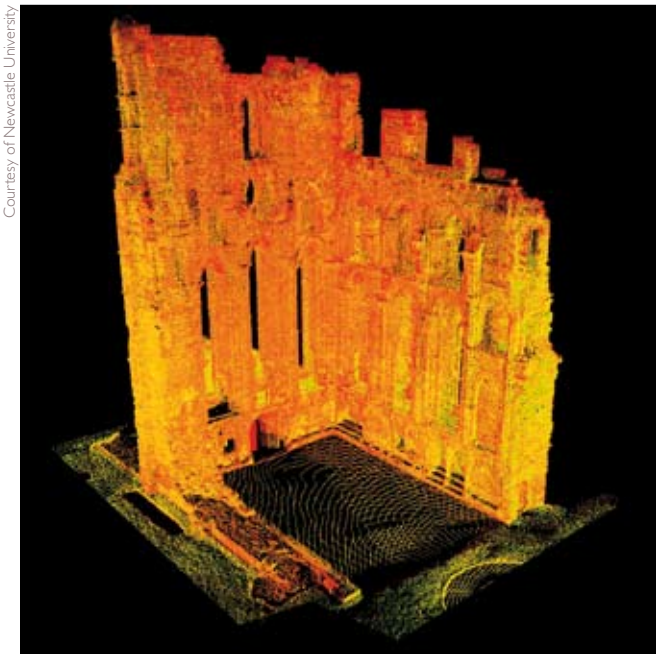
Developing Professional Guidance: laser scanning in archaeology and architecture.

Since the arrival in the UK of the first terrestrial laser scanner, back in 1999, laser scanning technology has seen continual development, growth and expansion into many areas of survey. The actual term 'laser scanner' may apply to a range of survey instruments that operate on a wide variety of measurement principles, accuracies and scales of operation. Whether they are operated from a moving platform, such as an aircraft, or a stationary position on the ground they are all characterised by laser observation in some form which allows the typical high-speed, high-density capture of three-dimensional point data. Used alongside other more established survey techniques, such as photogrammetry and GPS, this 'mass capture' approach to survey, be it on an artefact, building or even across an entire landscape, is proving beneficial in an increasing number of heritage based applications. These include recording, condition monitoring, landscape analysis and three dimensional modelling.

Rather than immediately invest in the technology, English Heritage Metric Survey Team has instead concentrated on researching the heritage application of laser scanning technologies in order to provide both advice to users and set standards in this developing field (see *Research News* 2, 38). The latest two year project, known as 'Heritage3D' and managed on behalf of the Metric Survey Team by the School of Civil Engineering and Geosciences at Newcastle University, supported by HEEP funding, completed back in October 2006. Through a combination of workshops, the running of an expert network of over 60 project associates and dissemination via a project website, this two year project has successfully developed a wide range of information that will enable users to apply laser scanning appropriately and successfully within heritage projects. This includes an addendum to the English Heritage Metric Survey Specifications, on 'The Collection and Archiving of Point Cloud Data obtained by Terrestrial Laser Scanning or Other Methods', and a 57-page document providing advice and guidance to potential heritage users of laser scanning. Both documents are available for download via the project website at www.heritage3d.org

The advice document is currently being published as a free English Heritage advice leaflet. Entitled *3D laser scanning for heritage, advice and guidance to users on laser scanning in archaeology and architecture* this will be available from September 2007 in both hard-copy and pdf formats. Although focusing primarily on laser scanning technologies, including close-range, terrestrial and aerial applications, the project has also considered other sources of three dimensional data, such as photogrammetry, and related issues in using them within a heritage context such as data management and archiving.

Paul Bryan



Courtesy of Newcastle University

Time of flight laser scanning carried out at Tynemouth Priory

DEVELOPING METHODOLOGIES

The times of their lives: building histories for prehistory

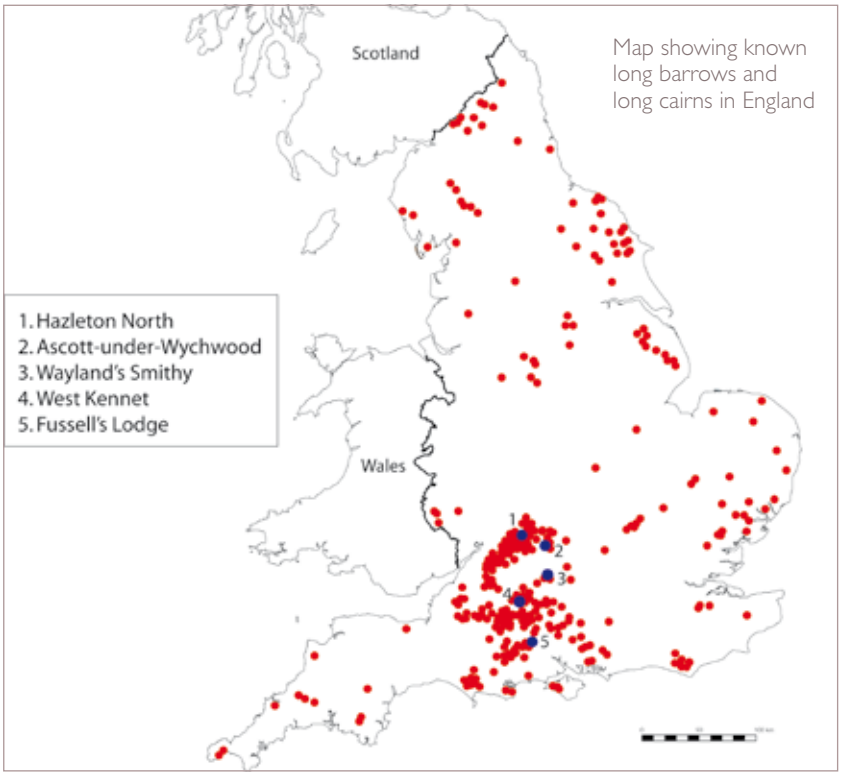
A new dating programme reveals potential for revolutionising our understanding of prehistory

For the first time we have provided precise dating for a series of prehistoric monuments – five long barrows and long cairns in southern England—by combining radiocarbon dates with archaeological information using Bayesian statistics. The results from this new research have dramatically changed our view of how these burial monuments were used.

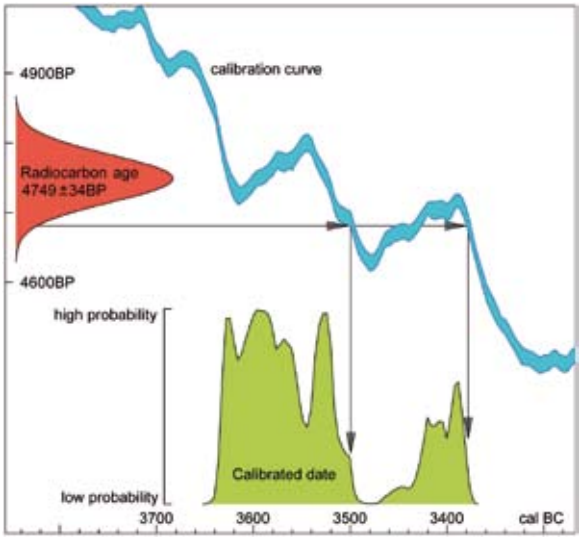
Long barrows are elongated mounds, built of earth (earthen long barrows) or stone (long cairns). They enclose chambers of timber or stone, which often contain human remains. Most bodies were complete when buried, but repeated use of the burial chambers over time can create masses of jumbled bones. Over 300 long barrows are known across Britain, with concentrations in the Cotswolds and on the Wessex downs. They were built during the Neolithic, although until now they have been dated only to somewhere between 4000 and 3000 BC.

People may have built long barrows to commemorate their past, to honour their dead ancestors, and to mark their claim to land. The process of construction and the use of these monuments may have helped to establish and maintain community identities. By dating these monuments more precisely, we can better understand how they were built and used. This can help us to explain how Neolithic communities understood themselves and the landscape in which they lived.

West Kennet long barrow



Map showing known long barrows and long cairns in England



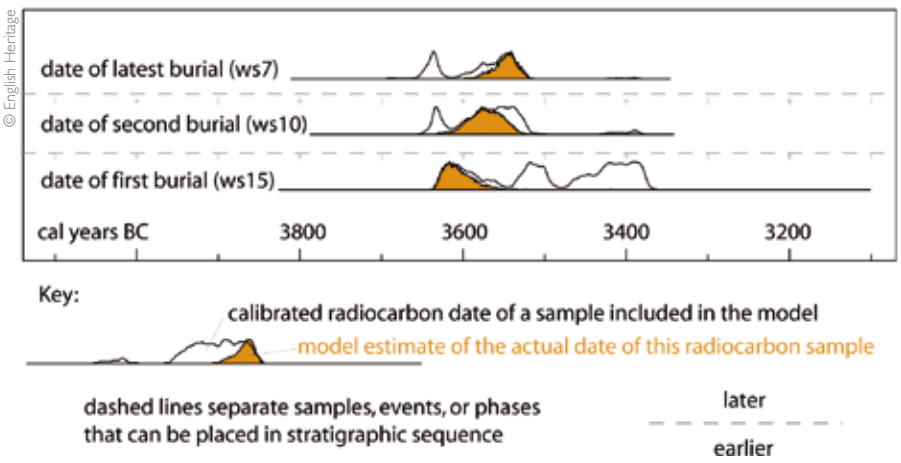
A calibrated radiocarbon date, showing a raw radiocarbon determination and the calibration curve

Radiocarbon dating has now been available to archaeologists for more than 50 years, with high-precision calibration, based on wood dated by dendrochronology, available for the Neolithic period in England for the last 20 years. On its own, this method provides complicated, and relatively broad, ranges for the dates of individual samples.

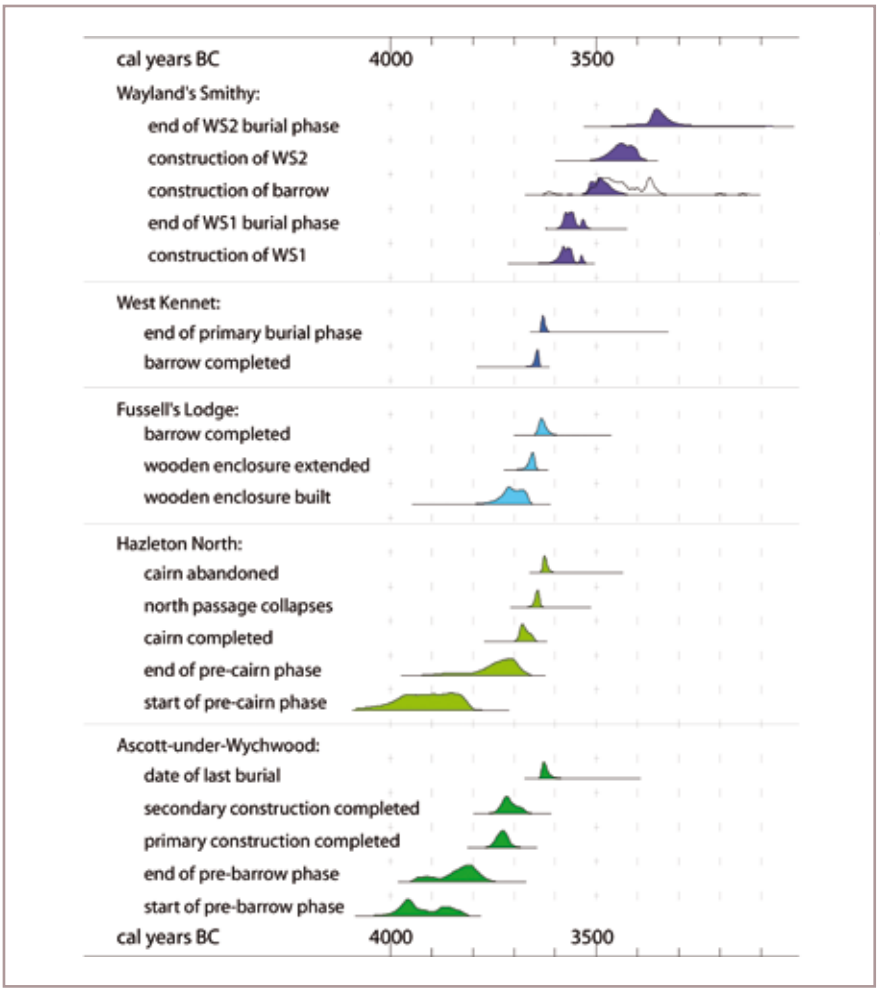
In most cases, however, we have more information about the date of archaeological finds than just the radiocarbon dating. Excavation reveals the order in which layers were deposited. This sequence can be combined with the calibrated radiocarbon dates, using a form of mathematics invented in the 1760s by Rev. Thomas Bayes. For example, excavations at Wayland's Smithy showed that skeleton ws15 was buried before skeleton ws10, which was buried before skeleton ws7. A Bayesian model of this sequence of burials combines the probability distributions of the calibrated radiocarbon dates (shown here in outline) with the information that ws15 was buried first, ws10 second, and ws7 last. The model produces a 'posterior density estimate' of the date of each burial (shown in orange), which can be much more precise than the skeleton's calibrated radiocarbon date.

Two very similar monuments in the Cotswolds were dated, at Ascott-under-Wychwood and Hazleton. Each consisted of a wedge-shaped mound containing stone-walled chambers, accessible through short passages on each long side. At Ascott-under-Wychwood, the chambers and passages contained the remains of 21 people (one man had a flint arrowhead lodged in his spine). At Hazleton, the remains of about 40 individuals were found. At each site the remains of earlier settlements were found underneath the barrows.

The recent dating programme shows that the earlier Neolithic settlement at Ascott-under-Wychwood dates to the 3900s or 3800s cal BC. After a gap of at least 50 years, the first phase of the barrow was constructed in the 3730s or 3720s cal BC. It was used for three to five generations, the last bodies probably being buried in the 3640s or 3630s cal BC. At Hazleton, the earlier settlement dates to the 3800s cal BC. After an interval, the cairn was built, between 3700 and 3650 cal BC. It was used for burial for two or three



Sequence of burials from Wayland's Smithy I, showing the impact of the constraints provided by archaeological sequence on the simple calibrated radiocarbon dates from these skeletons



Key parameters for the interpretative chronologies of the five long barrows and long cairns

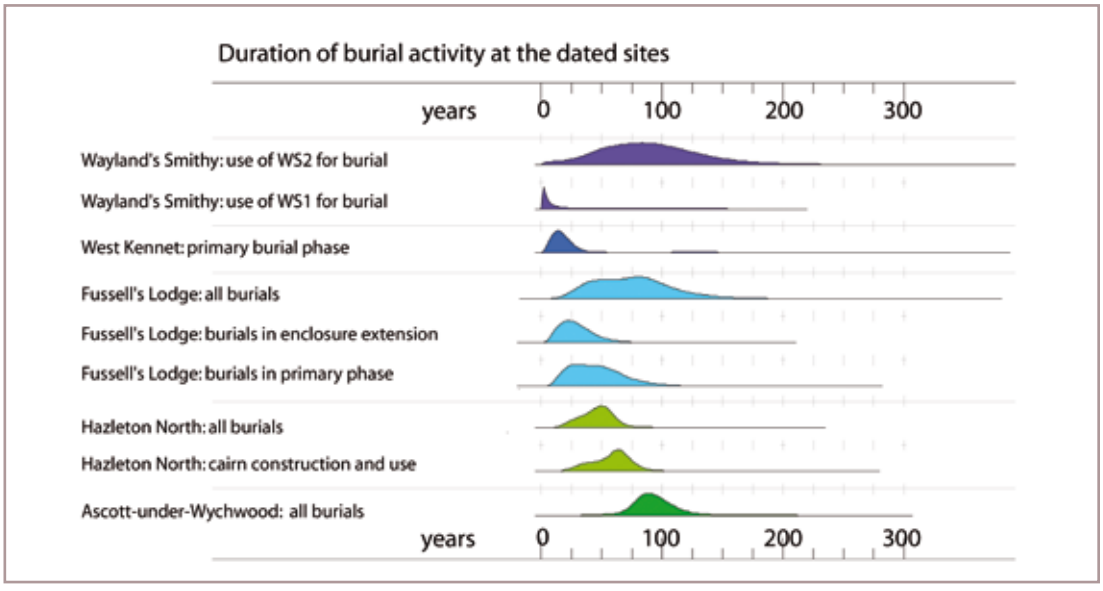
generations, even after one of the passages collapsed in the 3640s cal BC. The final burial took place within about a decade of 3630 cal BC.

Excavations at Wayland's Smithy, Oxfordshire, showed that the barrow consists of two monuments, the smaller and earlier concealed within the mound of the later one. The earlier monument was a simple wooden structure, containing the remains of 14 people (three of whom were probably killed by arrows). These burials took place over a short period, probably under a decade, between 3590 and 3560 cal BC. Then, after an interval of 40 to 100 years, an earthen mound was built over the timber structure. After another interval, the second phase of the monument was constructed, sometime between 3450 and 3400 cal BC. Its stone-built chambers contained the disturbed remains of several people, the last of whom was probably buried in around 3350 cal BC.

Excavations at West Kennet long barrow, near Avebury, showed that the remains of around 40 people had been placed in the stone-walled chambers. The first of these burials probably took place in the 3640s cal BC, and the last only 10–30 years later. Then, after a gap of more than a century, the chambers were gradually filled up with earth and chalk over a thousand years before the barrow was closed by enormous stones.

The difference in date between West Kennet and Wayland's Smithy II was unexpected. The chambers are stylistically similar, and the two monuments have long been assumed to be of a similar date. However, we now know that the Wayland's Smithy chambers were built about 200 years later than West Kennet. Perhaps the builders wanted to claim long ancestral connections to the land by emulating older monuments?

Finally, on the edge of Salisbury Plain, the long barrow at Fussell's Lodge consists of a mound of chalk which filled the space



Durations of the primary phase of burial in each of the five monuments

defined by a large timber enclosure. A smaller timber structure contained the remains of 40 people, most of whom were probably buried here shortly after death, although some apparently died some time before their remains were placed here. The first burial structure was built within a few decades of 3700 cal BC. It was extended probably between 3670 and 3650 cal BC and the last individuals placed in it at this time. The covering chalk mound was probably built between 3630 and 3620 cal BC. Each of the burial structures was probably in use for only a generation or two.

This dating programme demands a revolution in our thinking about prehistory – and not just that of early Neolithic burial monuments in southern Britain. It has shown that we now have the potential to place sites in a historical context than can be measured in generations, and to reveal the choices of individuals and communities in the remote past.

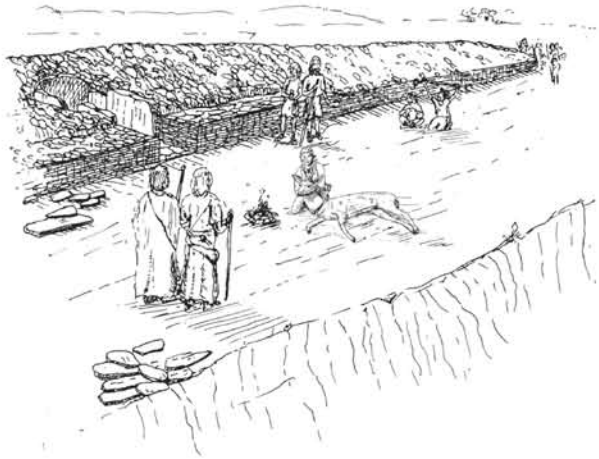
People began to build these barrows soon after 3800 cal BC, around 200 years after the start of the Neolithic period. Building long barrows may indicate that people had started to define the landscape in relation to ancestral histories, and to identify themselves by where they lived. Few barrows were used for more than 3-4 generations. Wayland's Smithy I was probably used for under a decade! Such short timescales support the impression of small communities keeping alive memories of their relatives. Burial activity ended in the decades around 3625 cal BC at four sites. Precise dating reveals the choices made by different communities within the same generation. At Fussell's Lodge the wooden chamber was consumed by fire; at Ascott-under-Wychwood the entrances were blocked; at Hazleton burial ended, but people returned to place offerings in the passages; at West Kennet, burial simply stopped.

To approach the Neolithic as prehistory conveys a sense of timelessness, in which nothing changes for long periods. Using Bayesian modelling to refine radiocarbon chronologies, however, we can now think about Neolithic history – ideas, events, and people at specific times over 5000 years ago.

Alex Bayliss, Michael Wysocki, Alasdair Whittle, John Meadows, Johannes van der Plicht, and Christopher Bronk Ramsey

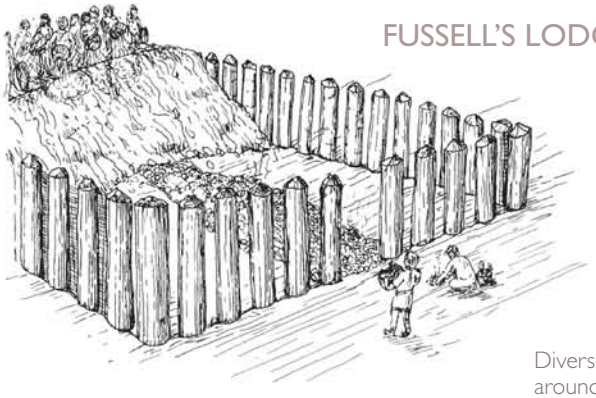
ASCOTT-UNDER-WYCHWOOD

HAZLETON



WEST KENNET

FUSSELL'S LODGE



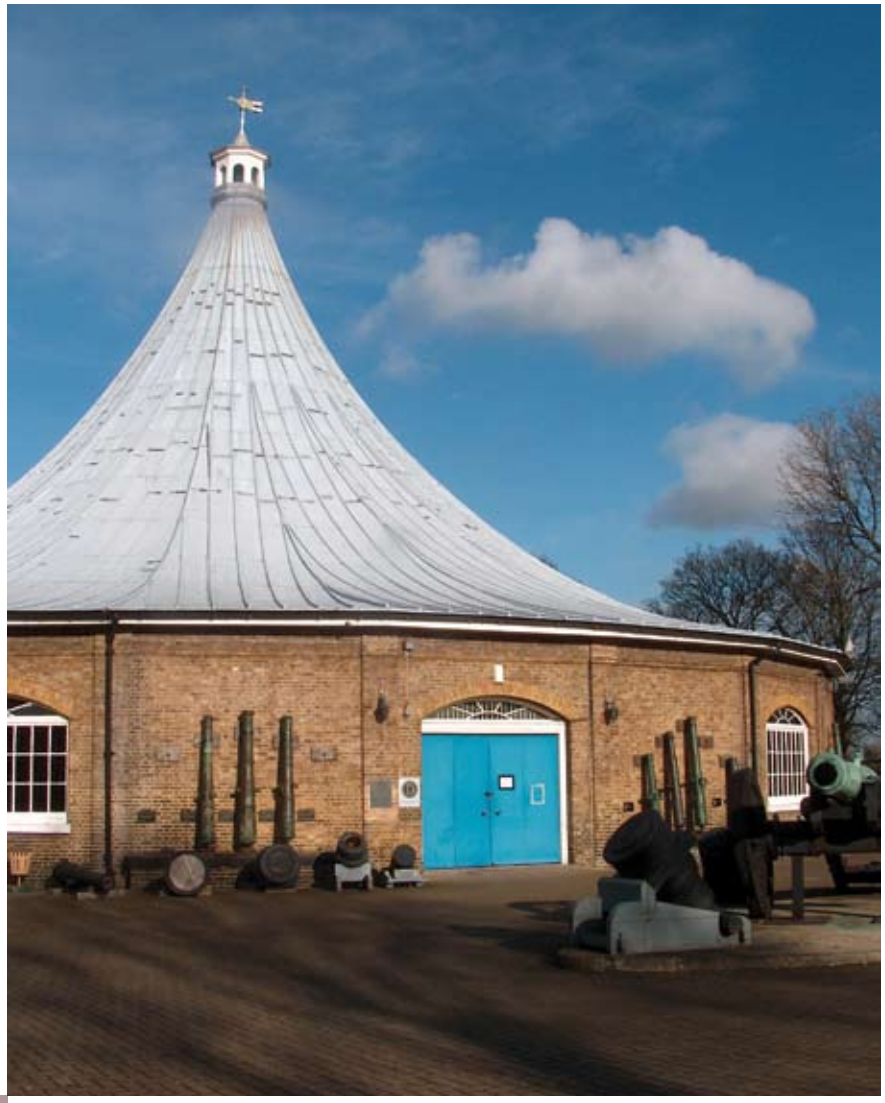
Diversity in the decades around 3625 cal BC

DEVELOPING METHODOLOGIES

The Woolwich Rotunda: 'no equal but the dome of St. Paul's Cathedral'

An iconic and influential Regency building by the renowned architect John Nash is accorded its place in architectural history.

The Woolwich Rotunda is an impressive building. One Georgian admirer even compared it to the dome of St. Paul's cathedral, because its116ft internal diameter actually exceeded that of Wren's masterpiece. But unlike St Paul's and other domical roof structures, the Rotunda was designedly not of that hemispherical tradition. Expressive of the revival of interest in eastern styles of architecture that occurred in the late 18th-century, and, more overtly, modelled on the shape of the British military bell tent, the Rotunda represents an innovative and highly unusual approach to engineering a geometrically complex freestanding enclosure. Designed in the summer of 1814 by the renowned architect John Nash (1752 -1835) with the help of a highly skilled carpenter named William Nixon (d. 1826), it originally functioned as a huge, self-supporting ballroom in the grounds of Carlton House, central London. The centrepiece of a whole suite of semi-permanent marquees erected under the patronage of the Prince Regent for a series of lavish festivities celebrating the defeat of Napoleon, it made for an eye-catching, sublime sight. Looking like a giant single-skin tent from the outside, its column-free interior must have surprised and awed the hundreds of revellers, who surely wondered how mere oilcloth could seemingly sustain itself overhead in a funnel-like contour.



The Woolwich Rotunda (1814; 1819-20); originally it stood in Carlton House Gardens (dem.), near Pall Mall

In 1819-20, having outlived its original, ephemeral function, it was re-erected in more permanent guise on the edge of Woolwich Common to serve as a repository for military models. Owing to the 'exposed situation' of the new site, brick walls were substituted for the original boarded enclosure, and a giant central column was introduced to help support the roof structure. These introductions gave the Rotunda a more formal, dignified appearance, but even so, Nash's illusionistic set piece lost none of its power to beguile and baffle. Even the great German architect Karl Friedrich Schinkel, on his English tour of 1826, seems to have been misled into thinking the Rotunda's tented roof was single rather than double-

Interior view, showing the huge column that was introduced in 1819-20

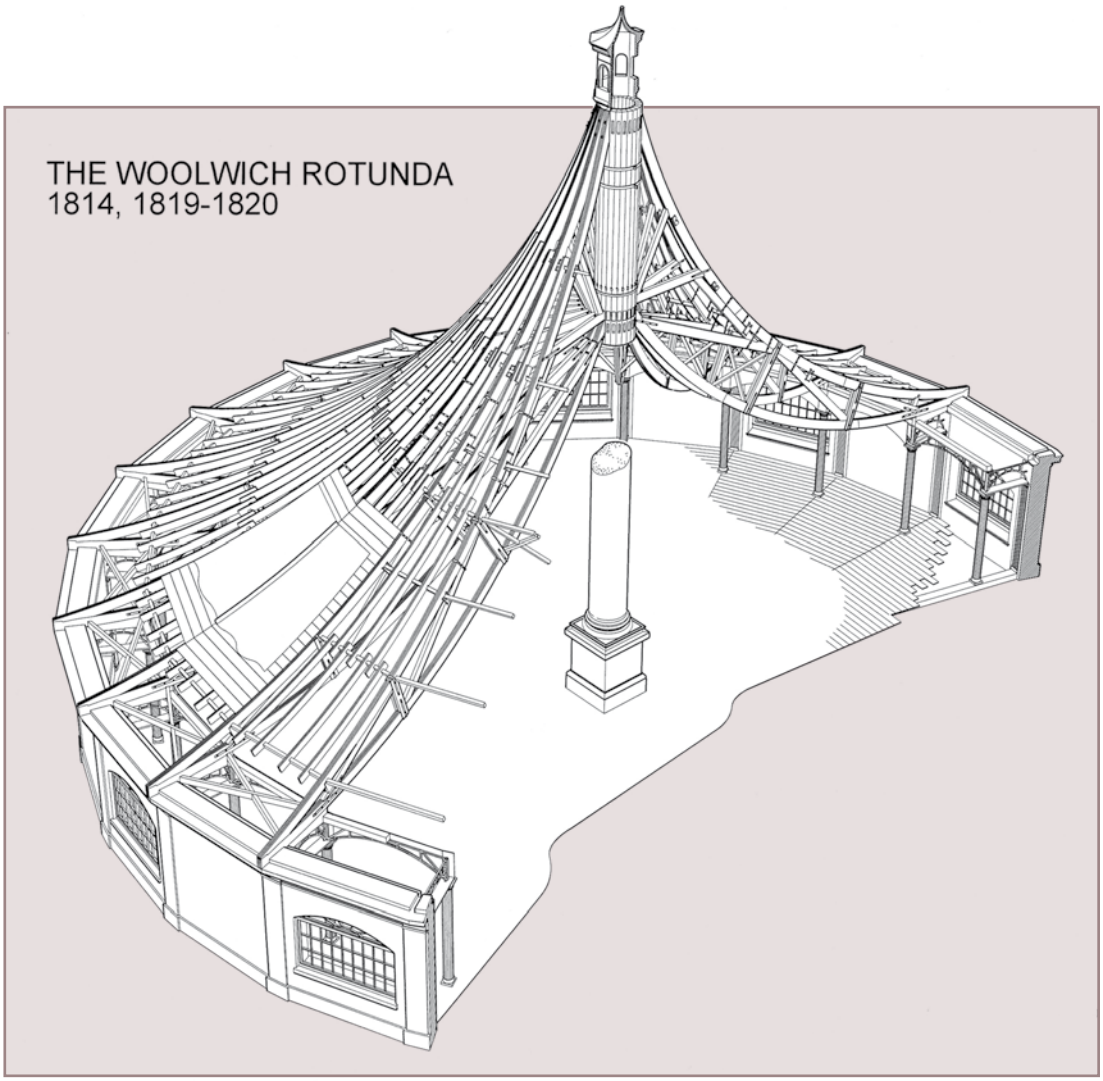
skinned, for his sketch omits the concealed trusses and is annotated 'Ropes tied fast to a central post, with metal sheets between'. Despite these modifications, and others, including the addition of the outer lead sheeting, this Grade II* building survives substantially as Nash intended it – cutting-edge timber engineering with a real 'wow' factor.

DESIGN

Nash was concerned with both the external aspect and internal space of his roof structure; he wanted both the outside and inside to imitate the elegant catenary curvature of a tent, specifically the British Army Bell Tent, a type introduced in *c.*1794 to replace the inferior ridge-pole infantry tents. But unlike the Bell Tent, he designed his catenoidal structure without any central support, thereby breaking new ground in timber engineering. Aided by Nixon, his solution was an array of 24 tapering ribs that fanned downwards and outwards from the roof apex, each a trussed assembly of laminated timber members with curvilinear upper and lower chords shaped as catenary curves. These timber ribs are strapped together at the crown, their bevelled upright members – analogous to king posts – combining to form a cylinder rather like the staves of a barrel. The feet of the ribs rest on two concentric wall plates, connected and braced by cast-iron and timber members, which may help prevent the outward spread of the roof structure. Containing the outward thrust of the timber roof structure (which weighs some 58 tons) was one of the most problematic issues Nash faced, but was resolved by the peculiar configuration of each opposing pair of half ribs, which formed what might be described as a 'divided tie-beam truss', a configuration first introduced by Asher Benjamin in 1811. The lower chords of the 24 ribs act as tie beams, effectively restraining the structure, and preventing it spreading outwards. The use of laminated timber members, made from abutting roughly hewn planks, enabled the necessary curvature to be achieved cost effectively, and ensured structural continuity along the length of the trusses.

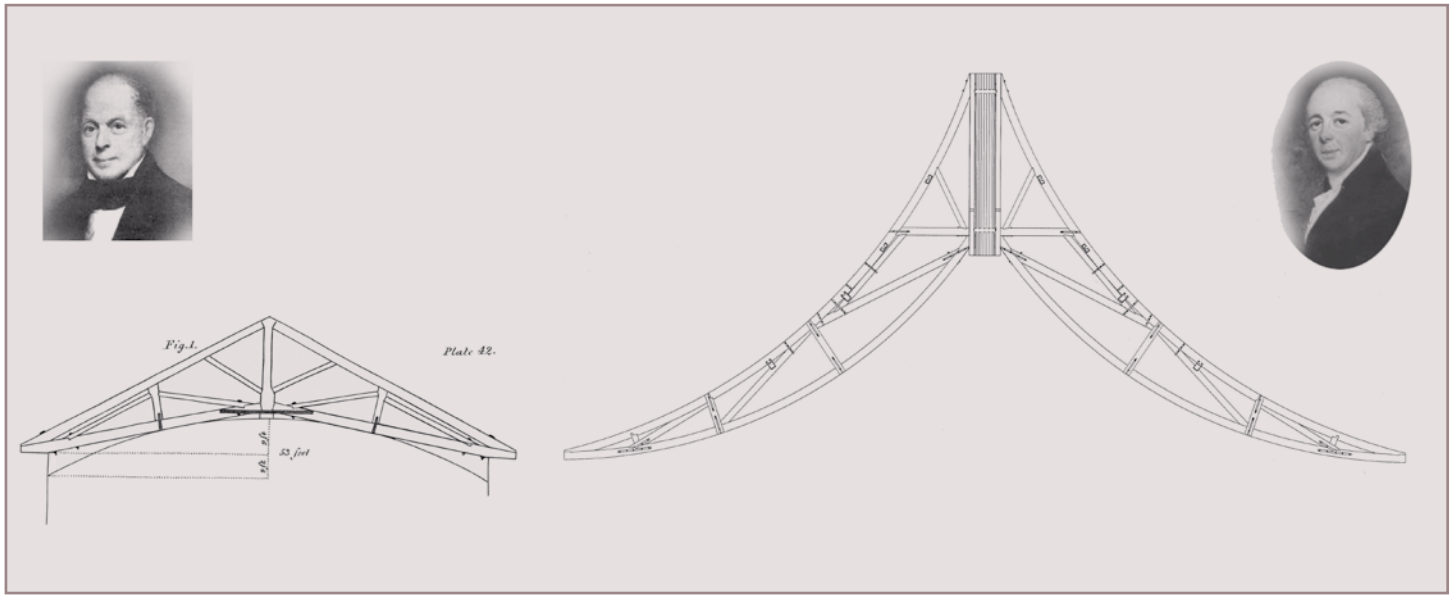
INFLUENCES

Whilst there is no known direct precedent for the Woolwich Rotunda (or rather the 'Tent Room' at Carlton House), Nash, and his chief carpenter, William Nixon, seemingly drew inspiration from the designs illustrated in 18th and 19th century carpenters

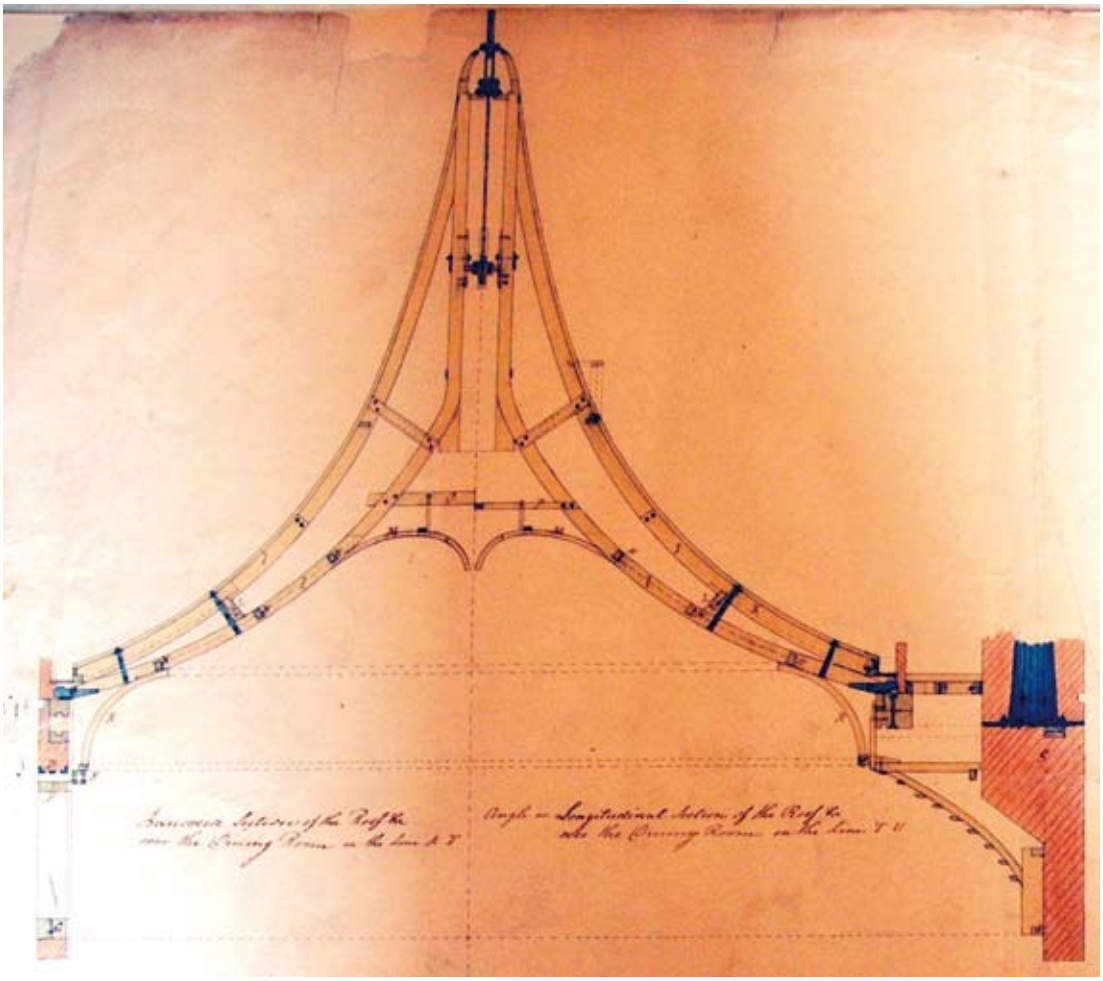


Perspective view of the Woolwich Rotunda as it survives today, showing the tented form of the roof structure

manuals, particularly those of carpenter-mathematician Peter Nicholson (1765-1844). His design for a 'circular building', first illustrated in his *Carpenter's & Joiner's Assistant* of 1797, simultaneously solved a number of pressing problems in the design of three dimensional trussed structures, including outward thrust, intersecting members and of preserving interior volume and shape. Nevertheless, Nash and Nixon were perhaps the first to apply his principles in the 'real world', and in doing so, added their own innovatory modifications.



Divided tie beam truss arrangements as illustrated in Asher Benjamin's *American Builder's Companion* (1811, left) and in the Rotunda (1814, right)



Section through the Banqueting Room roof, Brighton Pavilion, drawn up by William Nixon, 1827

PROGENY

Such was the success of the Tent Room at Carlton House that it proved to be a prototype for one of Nash's more famous works – the Brighton Pavilion. The tented roofs over the music and banqueting rooms, either side of the great onion dome in the centre, were the direct progeny of the Polygon Room, smaller, but in some ways more refined. Besides Brighton, Nash and Nixon's innovative Tent Room may have produced further, lesser-known offspring, such as the Tent Room of Hertford Villa (later St Dunstan's), in Regent's Park (1827). Designed by the young Decimus Burton (1800-81), a protégé of Nash, this freestanding convex enclosure was used by Lord Hertford, to stage 'extravagant and costly entertainments'. Although Burton's surviving drawings do not show the structure, it probably relied on divided tie-beam trusses, if not laminated timber. Other comparable structures were possibly built in this decade, but thereafter Victorian sobriety most likely saw the demise of the quirky, semi-permanent tent room, and with it a particular strand of timber engineering.

PROJECT BACKGROUND AND DISSEMINATION

Alan Johnson of Government Historic Estates Unit (GHEU) commissioned Architectural Investigation to report on the history and significance of this Grade II* building, which has recently been added to the Buildings at Risk Register. Some of the results of this ongoing enquiry, undertaken by Emily Cole, Susan Skedd and Jonathan Clarke, were presented before the Second International Congress on Construction History last year, and this year will see the production of a detailed English Heritage monograph report, which, in drawing attention to the Rotunda's historical, architectural and constructional importance, will help safeguard its future and enhance its place in architectural history.

Jonathan Clarke

RESEARCH THEMES AND PROGRAMMES

A 1 B 3

The HEATH Project

The HEATH project – unravelling the heathland history of West Cornwall.

HEATH (Heathland, Environment, Agriculture, Tourism and Heritage) is a broad-based partnership looking at all the major aspects of the heathlands, or rough ground, of West Cornwall, past, present and future. HEATH aims to improve the management, understanding and interpretation of these important areas and to increase public use and enjoyment of them as part of the UK-wide *Tomorrow's Heathland Heritage* programme**.** The HEATH study area covers the western end of the Cornwall peninsula, extending as far east as Droskyn Point, Perranporth.

English Heritage's role in HEATH, in close collaboration with Cornwall County Council's Historic Environment Service (CCC HES), has been to study in greater detail the historic environment of Cornish heathland in terms of its origins, uses and development. The main focus is on areas defined in Historic Landscape Characterisation (HLC) terms as "Upland Rough Ground", "Coastal Rough Ground" and "Recently Enclosed Land". These are characterised by a vegetation cover of heather, ling, gorse, bilberry, bracken and a range of grass species. Some of the west Cornish heathlands are also home to three rare plants: spring and autumnal squill and Cornish heath.

English Heritage's in-house contribution to HEATH involves palaeoecological and dating studies aimed at tracing the origins, long-term history and development of West Cornwall's heathland vegetation.

The Lizard Common sampling site

Heathlands are the product of hundreds and, in some cases, thousands of years of human management, so understanding their vegetation history adds to knowledge of human history. Surprisingly, vegetation history is rarely considered when heathland management strategies are drawn up.

EH has also funded the preparation by CCC HES of two substantial reports. The first – *Goon, Hal, Cliff and Croft, west Cornwall's rough ground* – presents current understanding of the development of west Cornwall's rough ground and the wide range of archaeological features found within them. It draws on archaeological, cartographic, place-name, documentary and folklore evidence, as well as a review of previous palaeoecological work. The second report – *Managing the historic environment on the rough ground of west Cornwall* – sets out current best practice in recording, interpreting, evaluating and managing the historic environment of rough ground in west Cornwall and has been designed to be of relevance to those with an interest in rough ground throughout north-west Europe. It also includes a summary of best practice for palaeoecological work.

In addition, HES has undertaken archaeological and historical surveys of six National Nature Reserves on the rough ground of the Lizard peninsula and prepared summaries of the historic environment resource of nearly 50 other areas that are to be subject to improved rough ground management, such as increased grazing (including fencing).

PALAEOECOLOGICAL STUDIES

The history of the vegetation of almost any landscape is best investigated through palaeoecological studies - analyses of pollen, seeds, leaves, insects, testate amoebae, diatoms etc. preserved in lake sediments, peat bogs and old land surfaces sealed within natural deposits or under archaeological monuments. When coupled with various dating techniques, notably radiocarbon dating, the results of these analyses reveal the origins and development of the surrounding vegetation and landscape. Some palaeoecological studies have already been carried out in the study area. The Lizard coast and West Penwith are the areas best covered, followed by the North Cornish coast, but there are none from the

Where possible, samples were collected for pollen analysis and radiocarbon dating using metal monolith tins driven into a cleaned section

Carmenellis area. Considerable potential has been identified in coastal valleys, submerged/inter-tidal wood and peat deposits and old land surfaces. The sediments in coastal valleys often extend far back into Mesolithic or even earlier times. Some accumulated entirely under freshwater conditions; others include marine episodes revealing direct evidence of sea-level change. Buried old land surfaces have been found under ancient monuments dated from the Late Neolithic/Bronze Age onwards.

Bulk samples were also collected for insect and plant macrofossil analysis.

WEST CORNWALL'S VEGETATION – THE STORY SO FAR

Previous studies on Penwith and the Lizard have provided us with a very sketchy picture of the vegetation history of west Cornwall. The earliest vegetation data available are from the Late Mesolithic. At that time there seems to have been damp alder woodland with a rich understorey in the valleys; drier slopes, hill tops and plateaux hosted oak-hazel woodland. Then came episodes of human woodland clearance leading to a more open landscape. Woodland, or rather hazel scrub, persisted longest in West Penwith, surviving perhaps into the last millennium BC. Heathland apparently developed on the cleared landscape of the Lizard before the Bronze Age. In West Penwith, clearance made way for crops and animals with little heathland development before the historic period. The landscape here became progressively more open over the last 2000 years. However, with few exceptions, previous studies are rare, poorly dated and do not all relate to areas where knowledge of the vegetation history is so badly needed for management purposes.

At Tregantallan Farm, the deposits were too deep (more than 2 metres) and conditions too wet to allow a pit to be dug for monolith samples to be taken. So, the sediments were sampled using a so-called "Russian" corer

© English Heritage

As for the rare and characteristic Cornish heath plants, some pollen of ling, heather and squill was found in the Mesolithic deposits in the valleys of the west Lizard, but their origins are still unclear and they could originate from relict Late Glacial floras.

© English Heritage

NEW HEATH STUDIES

With the above hazy and incomplete picture in mind, work was initiated to seek out, sample and assess the potential of further deposits to provide more-detailed and useful information. Several campaigns of fieldwork – prospecting and sampling – have been undertaken. It proved difficult to locate suitable and intact lake or bog sediments, largely due to the combined effects of widespread and very long-term peat-cutting for fuel and mineral extraction (tin streaming). Many "obvious" localities were revealed, on closer examination, to be useless as any organic deposits once present had been dug away or otherwise severely disturbed.

Promising deposits were located in West Penwith – a small basin mire (Treen Common) and shallow blanket peat (Carn Galver); in Carnmenellis – two inland valley mires (Lower Lancarrow and Tregantallan Farm) and on the Lizard Peninsula – a small basin mire (Lizard Common).

PRELIMINARY RESULTS

Well-preserved pollen and testate amoebae, together with well preserved insects remains and plant macrofossils suitable for radiocarbon dating, were encountered in samples from four sites:

Treen Common (West Penwith): The basal deposits comprise fine herbaceous material (some of it charred) including sedge/ rush leaves, seeds and roots and ling leaves and produced a radiocarbon date of c. 11100 – 10920 cal BC (i.e. in the Late Glacial period). The pollen here is dominated by sedges, grasses and other herbs, with some grains of the heather family. Unfortunately levels of testate amoebae (sensitive indicators of climate change) are too low to be considered significant.

Lower Lancarrow (Carnmenellis): The basal deposits contain similar pollen and plant macrofossil remains to Treen Common and also gave a very early radiocarbon date

of about 12000 – 11500 cal. BC. Testate amoebae concentrations decline sharply with depth. They are dominated by species indicative of wet local conditions.

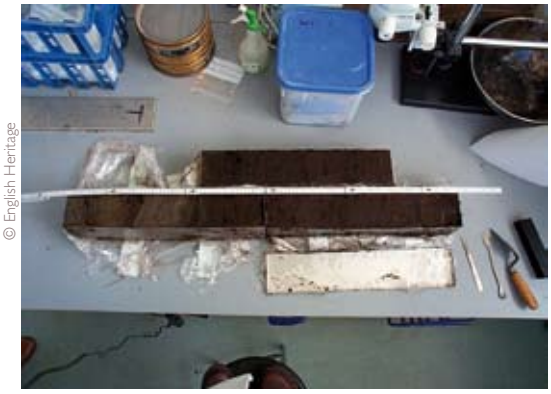
Tregantallan, (Carnmenellis): The basal deposits here appear to be rather later (about 6500 – 7000 cal. BC), but the pollen is again dominated by sedges, grasses, other herbs and ferns, with a scattering of tree pollen. There are unfortunately very few identifiable plant macrofossils. Testate amoebae concentrations were variable, but upper levels contained specimens favouring nutrient enriched conditions.

Unfortunately, not all the sampled sites proved to contain suitable deposits. The Lizard Common samples contained only very sparse and poorly preserved pollen and there were no plant remains suitable for radiocarbon dating. The sediments had also been very disturbed by living roots and rhizomes. At Carn Galver, the radiocarbon dates suggest we had sampled an old stack of cut peat turves rather than an *in situ* blanket peat deposit. No further work was attempted at either site.

WHAT HAPPENS NOW?

The work so far has assessed the potential of various deposits to provide information on the development of west Cornwall's heathlands and on human interaction. Deposits in coastal valleys, submerged/inter-tidal peat and larger inland valley and basin mires are best suited to providing information on developments in the regional vegetation. For a more local picture, use should be made of smaller valley and basin mires, spring-line mires and buried soil horizons. The human use of heathland resources (plant and animal), as revealed in the archaeological record, is also very worthy of consideration. Charcoal and other charred plant remains recovered from archaeological sites can be extremely useful sources of data, as can animal bone, where preserved.

What is required now is more detailed study of the most promising deposits. This will involve further palaeoenvironmental analyses and many more radiocarbon dates – coupled with appropriate use of archaeological, dendrochronological and OSL (Optically Stimulated Luminescence) dates. Together, these will generate a body of nuanced vegetation history data and provide a solid foundation for the development of heathland management strategies.



Left: In the lab the samples were cleaned and described in detail before sub-samples were taken for pollen analysis and radiocarbon dating

below: Testate amoebae provide information on wetness/dryness and nutrient conditions. This species, *Hyalosphenia subflava*, is a reliable indicator of dry site conditions

David Earle Robinson, Vanessa Straker, Derek Hamilton & Zoë Hazell

The partnership is led by Natural England and includes The National Trust, The Cornwall Wildlife Trust, the Eden Project, The Countryside Council for Wales, Penwith and Kerrier District Councils, Cornwall County Council's Historic Environment Service (Projects) and Natural Environment Service and European partners in Brittany and the Netherlands. For more information see: HEATH: http://www.cornwall.gov.uk/history/ab-hi30.htm: Tomorrow's Heathland Heritage: http://www.englishnature.gov.uk/thh/default.asp?P%7C0000. Thanks are due to Peter Herring and Peter Dudley (CCC HES).

The coastal valleys of the Lizard have great potential for future palaeoecological studies

NEW DISCOVERIES AND INTERPRETATIONS

RAF Coltishall: documenting drawdown and closure of an historic airfield

An unrivalled opportunity to investigate a soon-to-be redundant military facility during its last days of use points to new ways to record the recent past.

It seems fitting that the vast scale of many 20th century defence sites and the pace of technological and strategic changes require new and evolving investigation methods. That is the case with RAF Coltishall (Norfolk) where English Heritage is creating a characterisation of the base that involves conventional photography, historic landscape characterisation and, unusually the involvement of three visual artists. This collegiate approach seems appropriate for documenting a place over time, and capturing both process and place in a way that both engages the base's wider public and the service personnel who worked there.

Damian Grady NMR 24369-007 © English Heritage

RAF Coltishall, the careful symmetry and tree lined roads of the original 1930s airfield are clearly revealed by air photography.

In the lead up to the Second World War new airfields were spread across a countryside where horses remained the chief source of motive power. Contemporary concerns about the impact of the modern world on rural England led to advice on their architecture from the Royal Fine Arts Commission. Many of the buildings, especially in the domestic areas, were brick finished in neo-Georgian style. Air photography allows us to see that airfields were carefully ordered landscapes, evident in their symmetrical layout, the careful zoning of activities, and roads with wide grass verges and ornamental trees. Covering many hundreds of acres aerodromes severed historic routes, as lanes were truncated or conversely, as at RAF Coltishall, roads were created to serve these new places. Post-war the airfield was adapted to accept jet aircraft and missiles, but it escaped the massive NATO sponsored reconstruction programmes of the 1970s and 1980s allowing it to remain true to the intentions of its 1930s architects. As a relatively small airfield it had a reputation as a particularly friendly and efficient station, with strong links with the local community.

Since the early 1990s, English Heritage has documented many defence sites following the withdrawal of the Services. We have often experienced these as derelict, lifeless places, with stripped buildings devoid of meaning after their personnel have left. Uniquely, in the months leading to the closure of RAF Coltishall, the RAF granted English Heritage unprecedented access to record the base's drawdown and closure.

The project set out to characterise the airfield's last operational months prior to

Steve Cole, © English Heritage

Hangar 1, 41 (F) Squadron, the painting on the doors dates from the first Gulf War 1990-91

closure in November 2006. To achieve a high level understanding of the aerodrome, a map-based characterisation study has been commissioned, to analyse the development of the base and its changing spatial organisation, with the deployment of different types of aircraft and their evolving roles. Rather than slavishly recording the different building types, the stills photography sought to record the visual character of the base and its activities.

Overwhelmingly, most historic photography of airfields is heavily weighted to views of aircraft, either on hard-standings or more rarely in hangars. Airfields the size of Coltishall, are, however, communities of several thousand people, whose task is to keep a relatively small number of aircraft ready for immediate deployment. Our intention was also to record these rarely seen, sometimes mundane, behind the scenes activities.

Working in the month before the last squadron flew out, we were able to document aircraft in their hangars and how these internal working spaces were organised. We were also able to photograph the air traffic controllers at work; when we returned a few months later the control tower had been stripped bare, leaving the empty spaces we usually encounter. Much of the airfield's work involved light engineering, including the assembly of the Jaguar's Rolls-Royce Turbomeca Adour engines, engine testing, the servicing and repair of electronic components, paint shops and stores. More specialised tasks included the fitting and maintenance of flying clothing, much of which was specifically fitted to individual pilots. In other buildings aircraft brake-chutes and the pilots' emergency parachutes were inspected and packed. Other sections

Air Traffic Control. Visual Control Room, with operators at work

Steve Cole, © English Heritage

Steve Cole, © English Heritage

Hangar 1, 41 (F) Squadron AEA Maintenance Section.
Pilots transition area for the storage, maintenance, and fitting of flight gear

were devoted to missile storage and maintenance. To maintain the Jaguar force at maximum readiness, the pilots constantly trained for their combat roles. In a specially constructed building a large and elaborate model was constructed to simulate diverse missions and emergency procedures. More recently, a complex computer simulator has replaced the physical model.

An airfield is more than a working place; it is home for the personnel, but a community clearly ordered by rank. The oldest houses on the base date from the late 1930s and many still retain traces of wartime camouflage. The end of conscription and the reduction in the proportion of single personnel led to enlargement of the housing estates, but without the symmetry of the original design. The allocation of housing was strictly zoned and allocated according to rank. Differentiation according to rank was most visible in the messes. The officers' mess had the appearance of a country club or country house, with elegant reception rooms used before mess functions or as sitting rooms. The sergeants' mess was arranged on a similar layout, but with less space devoted to reception rooms. Both also contained accommodation for single personnel or temporary visitors. In contrast, the airmen's institute comprised two floors of large open rooms, in its latest phase laid out as a contemporary cafeteria and with a nightclub attached. With a requirement for many hundreds of meals per day in all three messes, catering was on a semi-industrial scale. For single non-commissioned personnel barrack accommodation was typical, but as social expectations have changed, their interiors have been modified to create single rooms.

Other aspects of the social life of the base included - the supermarket, a chapel with

Steve Cole, © English Heritage

Propulsion and Components Flight (PACF), engine maintenance.
Last Rolls-Royce Turbomeca jet engine at RAF Coltishall

Steve Cole, © English Heritage

Pre-war RAF other ranks housing showing traces of wartime camouflage

stained glass and embroideries with air force themes, the families centre, and a children's playground. During our investigations we also discovered many murals, including some on hangar doors painted after the First Gulf War (1990-91). Around 1970, in the cellar - and former air raid shelter - of the officers' mess, the Lightning squadron created a private drinking club, the Spitfire bar, decorated with playing card murals.

Our close collaboration with three sound and video artists, Angus Boulton, Gair Dunlop and Louise K Wilson, sets this project apart from other work in this area. The involvement of the artists will bring a new and very particular dimension to this project, capturing in new and innovative ways some of the essential characteristics of the base (such as its auditory landscape), as well as the rituals and ceremonies associated with closure, and the administration and management required. Together with our characterisation map and the stills photography, these complimentary pieces of documentation will provide a lasting record of what RAF Coltishall was like, and what it meant to those that lived there and in the surrounding area.

More images from the project may be found on our website www.english-heritage.org.uk/viewfinder/

Wayne Cocroft, Steve Cole, John Schofield

Steve Cole, © English Heritage

The Airmans Institute, the junior ranks mess

NEW DISCOVERIES AND INTERPRETATIONS

The St Mary's Garrison Project

Multidisciplinary work provides the knowledge to confront a new threat.

A multi-disciplinary study of the outstanding coastal fortification of St Mary's Garrison located on the Isles of Scilly; this project has delivered an holistic audit within an integrated knowledge base, which provides 'one-stop' digital access to the full range of the available historical, conservation and management information for this guardianship property. This project has been undertaken by Research Department staff in collaboration with staff from the South-West region.

Situated 28 miles off the south-west tip of Cornwall, the Isles of Scilly formed the first link in the chain of national coastal defence that extended from the Western Approaches to Dover. St Mary's Garrison had the pivotal role in this defensive line because it protected a sheltered anchorage which served as the base for a small British fleet and also was the first safe refuge for shipping approaching Britain from the west. Its presence also deterred foreign invasion of the islands thus preventing a bridgehead for an attack on the mainland. Threats to the Scillies came from Barbary Pirates, Privateers, the Dutch, the Spanish, the French, and the Germans who were each at one time or another in the ascendancy as the maritime threat – usually when the English fleet was otherwise engaged. The only recorded attacks on the islands were brief forays by the Spanish and the Dutch and landings by the English themselves. During the English Civil War the Parliamentarians took the islands from the Royalists – not once, but twice.

Over the past four centuries St Mary's Garrison in its various guises had faced a number of short-lived threats from seaborne invasion. These threats have now long gone but today the Garrison faces a new enemy – the results of climate change. This new threat is evident as rising sea levels and

Damian Grady © English Heritage

An aerial view of
St Mary's Garrison, Isles of Scilly

Mike Hesketh Roberts, © English Heritage

Woolpack Battery, built in 1742

increasingly frequent, violent storms that are causing accelerated erosion. The nature of these storms has resulted in a number of recent and dramatic collapses in the cliff face that now threaten the integrity of a length of the Garrison wall.

The first recorded fortification to be located on the extensive promontory was Star Castle constructed in 1594. It still has a commanding presence in its position on a highpoint within the two concentric curtain defences of the Garrison. The earliest fabric of the Garrison wall dates from around 1600, it was faced with large, irregular blocks with no pattern of coursing. An outer ditch and a glacis provided enhanced protection. Six large gun batteries were located at intervals along its length; two extra gun batteries were added later when the wall was extended down to the cliff edge from its southern end. The threat of an English attack against St Mary's in the mid 17th century resulted in the construction of an earthen breastwork around the coastal fringe of the promontory and in other vulnerable points around the main island. This breastwork which was linked to the existing stone curtain wall incorporated nineteen earthen gun batteries. It was made up of a bank constructed with spoil dumped on the downhill side of a ditch that was then utilised as a covered way. In 1714 a government inspector identified that the islands '*would be the strategic location for the enemy to disrupt our shipping and also there is a good anchorage to shelter ships'*. As a result of the inspectors recommendations a substantial curtain wall was constructed on higher ground within the breastwork circuit. Impressive gun batteries and intermittent smaller gun batteries or redans were incorporated in this circuit, first along the north side by the mid 17th century then southwards and finally westwards in a number of phases that belong to the later 1740s. Building work had reached the south-west corner of the promontory, probably in the late 1740s, by which time the wall facing consisted of large, regular blocks set in neat courses with fine joints.

At Steval Point the programme of superseding the modest earthworks with robust stone fortifications ended abruptly. Why? Had the immediate threat evaporated? Had the builders realised that such grandiose and expensive structures were excessive for the threat level? Had they recognised that to man these substantial walls effectively would require hundreds of soldiers at a time when the Islands' population was probably less than 1,000? Or was it a combination of all of these?

There is scant evidence of 19th-century fortification; for example there are no casemates to protect the guns. Was this

View of the stone-capped bank and inner ditch of the breastwork against the cliff edge

Dave Fellows, © English Heritage

Peter Topping, © English Heritage

The outer face of a gun platform of mid-17th century teetering on the edge of an eroded cliff

because the Garrison was omitted from the extensive refashioning that occurred at coastal fortresses during this period? In 1902 two large earthwork batteries housing four six-inch guns with a third earthwork for a defended barracks were constructed on the highest point within the Garrison. These emplacements were served by two defence electrics lights located on the cliff edge each with a director station set into the hillslope behind them. Although the Garrison was manned during the two World Wars there is little evidence of new fortification apart from five pillboxes that were inserted into the existing fabric complete with the ubiquitous coils of barbed wire around the coastline.

A unique feature of this fortification is the many fine early military structures that largely escaped subsequent rebuilding and remodelling. They reflect developments in fortification techniques and technology that occurred during its long history. The Garrison may have had grand pretensions but during extensive periods in its lifetime, in common with many other British coastal fortresses, it was virtually unmanned and lay in a state of disrepair with many of its cannon unserviceable.

In 2004 part of a mid 18th-century gun battery that collapsed after a winter storm

© English Heritage

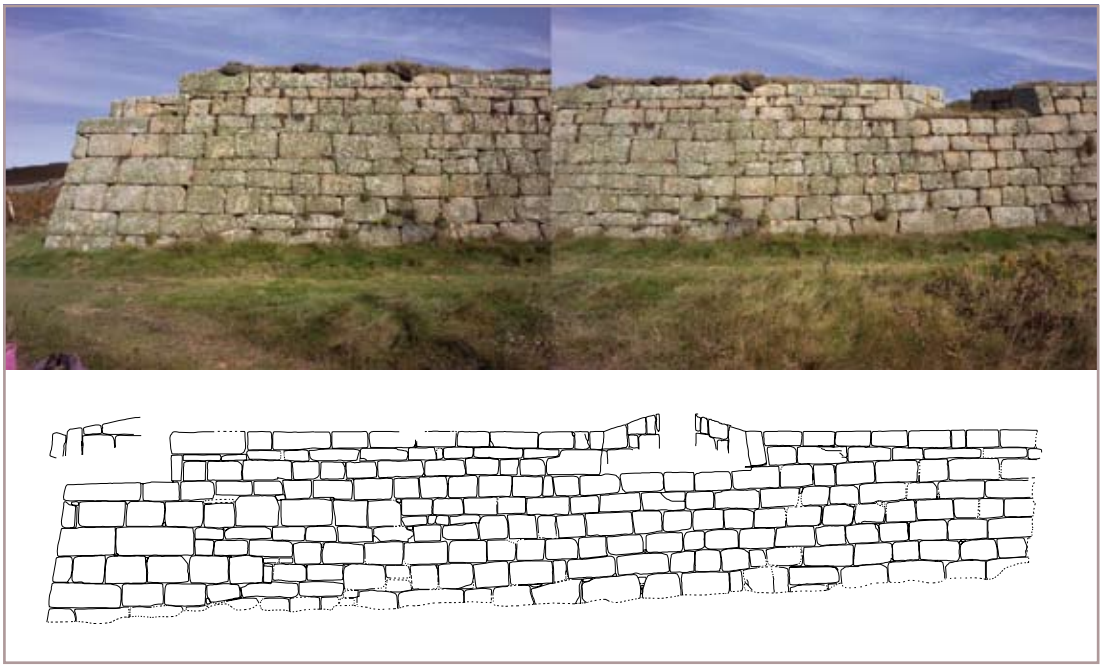
In 2006 a series of trial trenches were cut across the line of the 17th-century earthen breastworks and one of its three surviving earthen gun batteries. The aims were to establish the method of construction and design of the earthworks; to define the relative chronology of the features and to provide data on which future management decisions can be based. The latter is particularly important because coastal erosion is steadily effacing these unique earthworks. The excavations established that the works were of one phase of construction and that they were abandoned not long after their construction. Few finds were made that could date the earthworks depicted on a map dated 1655.

Textual and photographic records that describe the construction of, and repairs to, wall fabric are important and necessary. Photogrammetric survey however, can not only reveal much about the present state of fabric but where a feature is threatened it can provide a valuable and unique record of the feature.

Two gun batteries and part of the Garrison wall have been identified during this project as particularly under threat from coastal erosion. These features were photographed stereoscopically along with appropriate control targets and the data archived. Should any part of these walls collapse due to coastal erosion this archived photogrammetric field work package can be used to produce precise drawings of the fabric that have been effaced, thus they will be preserved by record. The photographs are set-up in a digital photogrammetric workstation and the detail is traced in 3-D into a CAD system by a skilled operator.

The detailed history of the works undertaken on a property – the repairs, the rebuilds and the excavations - is as important as the history of the property itself. Although of course both are inextricably linked there is a tendency for the records and the archives of the respective researchers, the interventions and the events to be compiled and used independently of one another. To address this problem a 'one-stop' integrated knowledge base has been developed for St Mary's Garrison as part of this project. This management tool brings together the totality of accrued knowledge such as the various archives, reports and also links to external databases so that the present state of, the threat to, and the future action about, can be fully quantified.

This integrated knowledge base was developed using a Geographical Information System (GIS) platform with a 1:1000 scale



An outer face of a Redan, a part of the Garrison Wall. Above is, one pair of, a number of overlapping photographs taken by Mick Clowes and used by Steve Tovey, both of the Metric Survey Team, to produce the precise drawing of this face shown below

of capture. This system not only defines and highlights the threat to the nationally important fortification but it also delivers the full range of information to facilitate informed management and conservation decisions. One advantage of the GIS platform is that this extensive and complex property can, for recording purposes, be broken down into manageable parts. For example each feature - a gun battery, a length of curtain wall - is linked to a data-sheet that presents a digest of information as well as providing links to external databases such as the Portable Collection Archive.

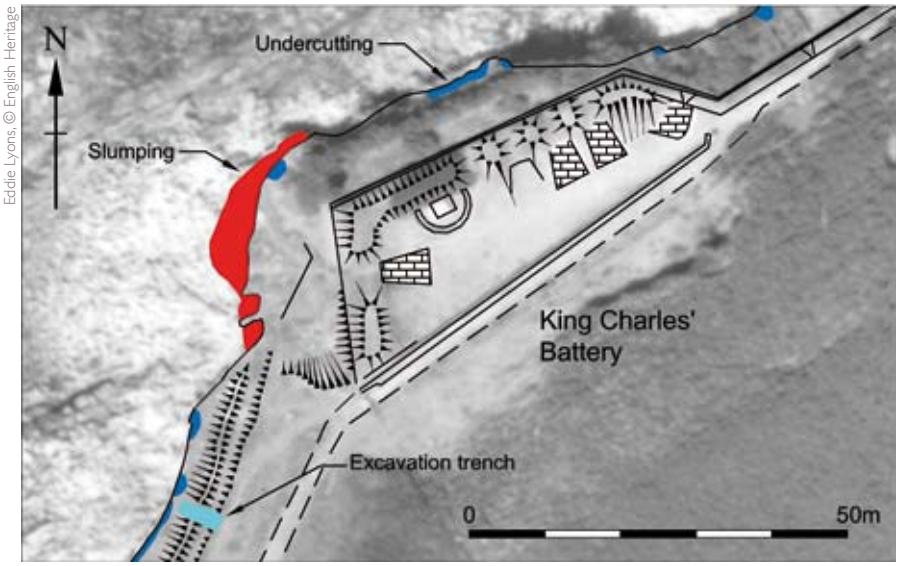
Other features in this integrated record include a history of the property; a record of interventions; a compendium of all photography in public and private hands; historical mapping and a map regression survey as well as condition and management statements and strategies. Additionally it signposts future actions for works on the site incorporating the recommendations of the new Conservation Plan; it also defines the regular monitoring programme that especially targets the threats from coastal erosion.

This integrated knowledge base is designed to provide the totality of known actions and events about this property. It will also guide and indicate all future identification and interpretation. It can easily be up-dated by staff from all disciplines and it will serve to inspire future users through the free exchange and easy accessibility of knowledge and information.

English Heritage and its partners are facing very difficult decisions about the threat of climate change to many coastal properties in England This is nowhere more evident than at St Mary's Garrison where joint decisions need to be made about whether very extensive and expensive coastal defences to 'hold the present line' should be implemented. An alternative strategy could be implemented 'for managed realignment' of the cliff edge that might result in severe threats to parts of the fabric.

This integrated knowledge base can now provide ready access to the full range of information and data required to inform this decision.

Martin Fletcher. Allan Brodie; Dave Fellows; David Andrews; Trevor Pearson; Eddie Lyons; Andrew Lowerre



Extract from the English Heritage 1:1000 scale survey of the Garrison walls showing the threat from coastal erosion. The blue shows the undermining of the cliff – not visible from the cliff edge. The red shows the active cliff edge erosion (slumping)

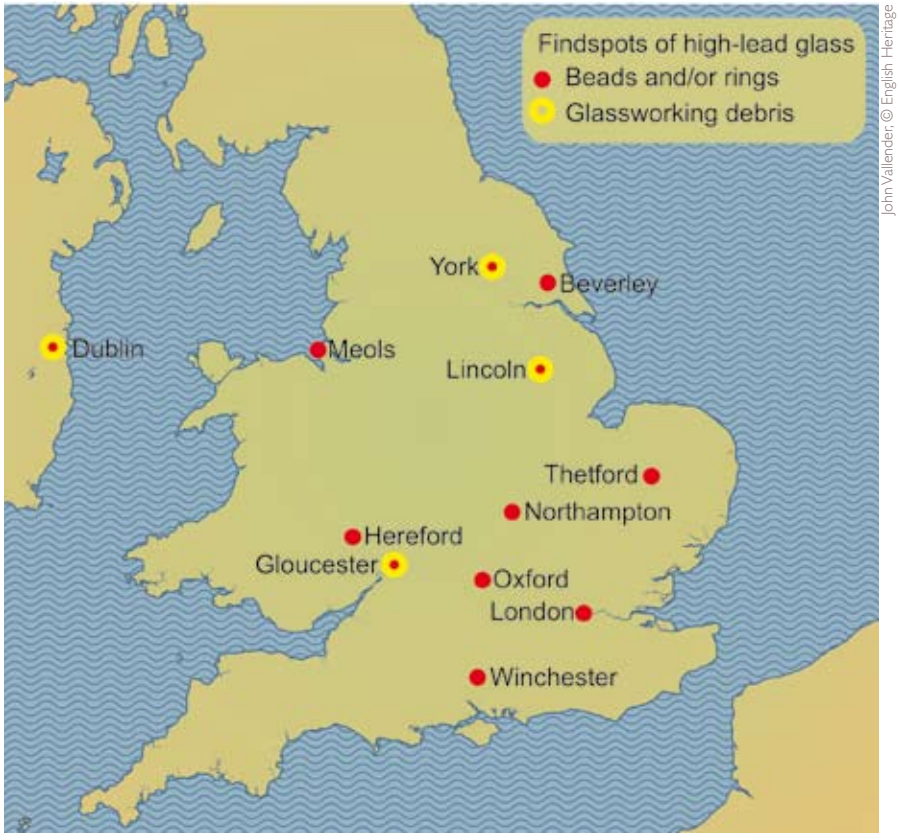
NEW DISCOVERIES AND INTERPRETATIONS

Early medieval lead-rich glass trinkets

New discoveries don't always come from carefully designed research projects, but can emerge from data accumulated in the course of work undertaken in support of EH-funded projects. The identification of early medieval high-lead glass and glass-working is a good example.

In the 10th and 11th centuries AD lead-rich glass suddenly appears in the British Isles, used for making trinkets such as beads and finger- or hair-rings. There are small numbers of them from England and they are also known in contemporary Viking settlements in Ireland. Similar objects are well known in northern and eastern Europe from the 9th century onwards. The earliest seem to come from the north Caucasus and lower Volga region. Hundreds have been found in Russia, Ukraine, Poland and Germany, though few are known in Scandinavia. Small numbers have recently been identified from Carolingian contexts in western Europe.

Findspots of high-lead glass objects in Britain



John Vallender © English Heritage

The manufacture of high-lead glass is described in a 12th-century text by Heraclius, *De coloribus et artibus Romanorum*. His recipe is to add one part of sand to two parts of lead oxide and to heat them together in a pot until they react and form glass, and he also says '… if you wish to make it appear green, take brass filings and put in as much you think proper…'. The recipe could be as much as 85-90% by weight lead oxide but during the prolonged heating necessary to make the glass some lead would probably have been volatilised and lost to the atmosphere so the composition of the glass would become comparable with that of the archaeological finds.

Lead-silica glass is naturally a golden yellow colour. The 'black' glass, which is actually dark translucent olive green, is coloured by several percent of iron oxide while the green glass is coloured by smaller amounts of copper oxide. Wherever these glasses are found, in the British Isles or in continental Europe, the nature and amounts of the colorants are the same.

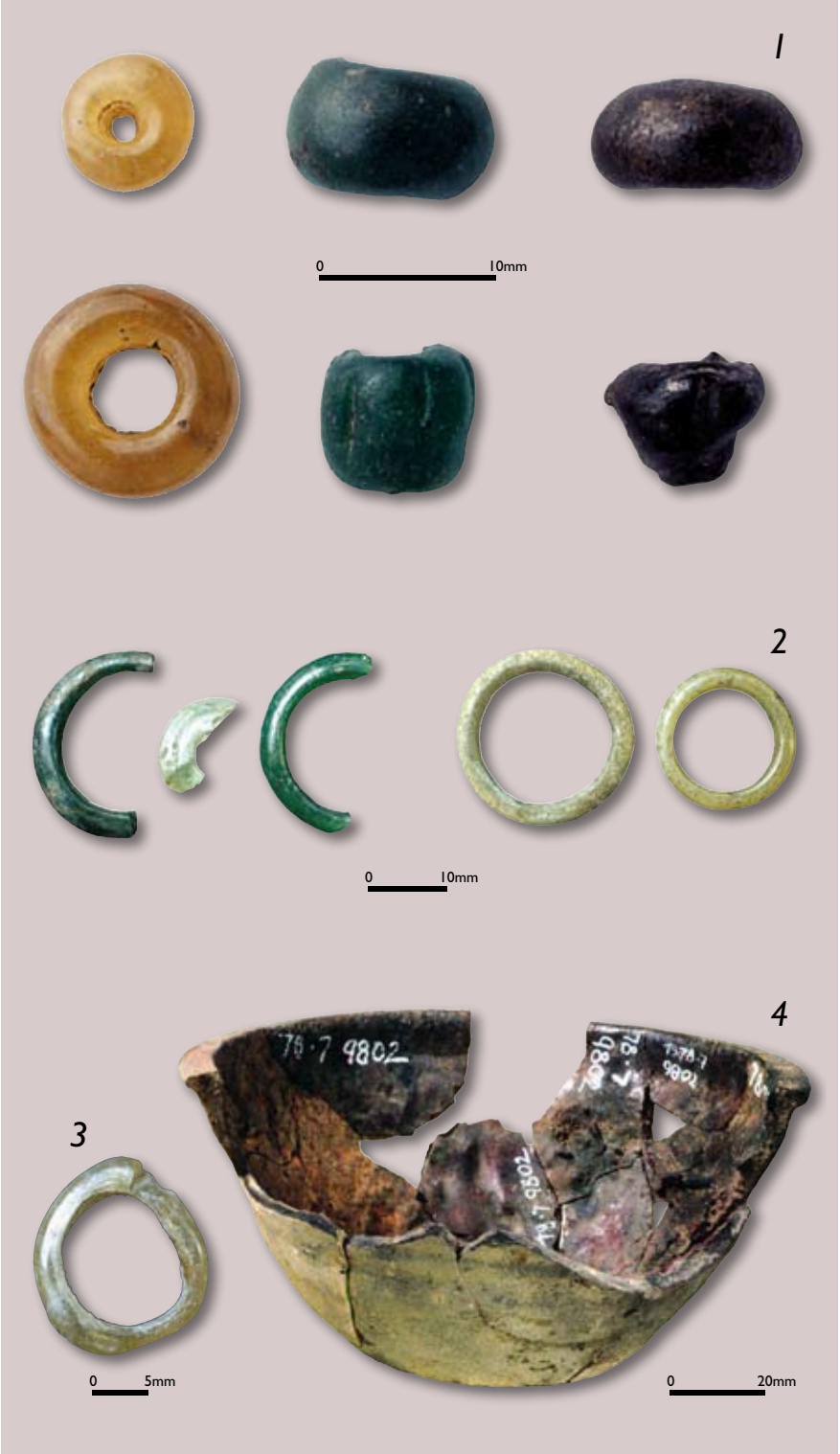
Four cities in the British Isles – Gloucester, Lincoln, York and Dublin – have produced evidence for the working of high-lead glass. Lincoln has a mis-formed ring; lumps of raw glass are known from Lincoln and Gloucester and all four cities have crucibles containing glass and glass dribbles or glass with adhering ceramic. This last class of material is quite varied and is likely to be the result of spilling molten glass, glass flowing from a cracked crucible, or glass that had solidified in a crucible breaking away from the vessel once it had cooled. The Gloucester and Lincoln crucibles are hand-made, of local oxidised-fired fabrics, and have similar shapes – flat-bottomed, shallow bowls with

the maximum diameters at or near the rim. The glass in the crucibles from Gloucester is yellow, while that in the Lincoln crucibles is either yellow or pale green. The glass in the crucibles from York and Dublin varies in colour from golden through olive green to dark brown and black with more than one colour visible on many sherds; the colorant is iron.

The majority of the c.1600 crucible sherds from York are from wheel-thrown grey-fired Stamford-ware bowls. The glassy deposits are mainly dark green to black, though about 3% of them appear genuinely opaque ginger-brown, orange or red – often with a range of colours on a single fragment. The composition of these glasses seems unrelated to colour. All analysed samples lack the high iron levels found in 'black' glass samples but contain varying amounts of copper oxide. In three samples the copper oxide content is under 1 wt%, which is similar to the quantities in many green glass beads, while six contain larger amounts of copper oxides (4-10 wt%). These high copper contents have, so far, not been generally found in high-lead glass objects, either in Britain or in continental Europe.

It is not unexpected to find relatively small numbers of high-lead glass trinkets which have close parallels in eastern Europe in the British Isles in the 10th and 11th centuries as this was the period of the Viking settlements, and Vikings were renowned for their long-distance trading connections which reached from the Atlantic to the Black Sea. What is more surprising is that high-lead glass appears to be rare in Scandinavia at this time, except at Haithabu in southern Denmark, and that high-lead glass objects have also been found at a number of southern English sites, outside the areas of Viking influence.

It is even more of a surprise to find this essentially north-eastern European technology flourishing in the British Isles, so far from its origins. High-lead glass finds concentrate in Russia, Ukraine and middle Poland, and it has been suggested that migrant workers transported the raw glass westwards. The manufacture of high-lead glass objects in the west can thus be seen as not only imported technology, but as the work of immigrant craftsmen. While this new type of glass definitely appears to be an import into the British Isles, there is nothing to show whether it was the raw glass, the idea of making high-lead glass, or the craftsmen themselves who came here in the 10th century. However it arrived here, it is clear is that in Britain the working of high-lead glass becomes rare after the 11th century.



1. High-lead glass beads from Coppergate, York;
2. High-lead glass rings from Flaxengate, Lincoln;
3. Mis-formed ring from Flaxengate, Lincoln;
4. Stamford-ware bowl used as a crucible for high-lead glass, from Coppergate, York

Justine Bayley

NEW DISCOVERIES AND INTERPRETATIONS

Groundwell Ridge, Swindon

Water-pipes, jewellery and a little goddess contribute to understanding of daily life in a typical Roman villa.

The assessment of the material collected during English Heritage/Wessex Archaeology excavations of the villa at Groundwell has recently been completed. 303 boxes of artefacts were collected during the three seasons' work (2003-5), among them 27 boxes containing 1841 small finds.

The assemblage of structural ironwork – much of it possibly mid-first century, giving an approximate construction date – can add to the information already gleaned from the structural assemblages of ceramic building material, mortar, painted plaster, *opus signinum, tesserae*, stone and glass. External to the buildings, pipework, probably supplying the bath-house, is evidenced in lead and wood - iron junction collars, used to join together wooden water-pipes, were collected; their placing can reveal the location of the pipes, now long-decayed, giving some form to the infrastructure of the site.

It is, of course, domestic life that really tells the 'story' of any site, and this is reflected here in small assemblages of bone needles and awls, lead weights, iron tools and implements, horseshoes and hipposandals, stone whetstones, a ceramic spindlewhorl fragment, and possible fragments of an iron and a silver vessel, as well as a larger assemblage of pottery. Two small bars, one in lead and one in copper alloy, were possibly used within the metal-working process (although the limited nature of this assemblage does not necessarily indicate industry on site), and there are two lead plugs for the repair of ceramic vessels.

Stylus writing tablets from waterlogged deposits

Clockwise, from top left: Lead plaque depicting the Egyptian goddess, Isis; Copper alloy pennanular brooch; Gaulish Samian ware bowl; and Medieval ring from the site (see *CfA News*, 7)

Coins and gaming counters give flashes of the people inhabiting the site; literacy is hinted at by the presence of an iron stylus and some possible wooden writing tablets.

One unusual artefact is a small lead plaque of the goddess Isis, probably used on the house altar. The mystery cult of Isis was well-practised in Rome from the 2nd century BC, and was widespread through the north-west provinces of the Roman Empire, but is not thought to have been prolific in Roman Britain; further brief research into local and regional occurrence of the cult of Isis will be carried out during analysis. The presence of a possible plaster eye, as well the placing of the beads, may also contribute to an understanding of the religious or votive aspects of the site. These ideas will be explored further within the analysis phase.

As well as leaving clues about their domestic life, their literacy and their religion, the inhabitants of this site also left behind a few items of their personal adornment, including brooches, bracelets, finger-rings, hairpins and delicate glass and other beads. The study of these objects can offer useful insight into the 'human' aspects of a site - people's perception of themselves, and their presentation of themselves to others, often discussed in terms of 'status'. It can also offer ideas into trade routes across the Empire, a theme which will be explored further during analysis.

The assemblage of artefacts from the villa at Groundwell is fairly limited in nature, and much of it is unstratified or residual, having largely been derived from the demolition deposits of the villa's bath suite. Despite this, a picture emerges that much of the ironwork is earlier in date, belonging to the construction of the site, while many of the 'personal' objects are later in date, probably representing casual loss during their use. A medieval ring represents casual loss on the site long after the villa was forgotten.

Nicola Hembrey

TRAINING AND OUTREACH

DIY Geophysics

The Geophysics team help the volunteers of the Chichester and District Archaeological Society to undertake their own surveys.

Local archaeological societies, made up of volunteers, have always played a key role in British archaeology and are instrumental in generating public enthusiasm and support for our archaeological heritage. However, they often lack the resources to take advantage of the specialised techniques, such as geophysical survey, routinely employed by professional archaeologists. During 2006 an opportunity arose for the English Heritage Geophysics Team to enable one such community group to carry out their own geophysical surveys of sites in their area by providing training and loaning the necessary equipment.

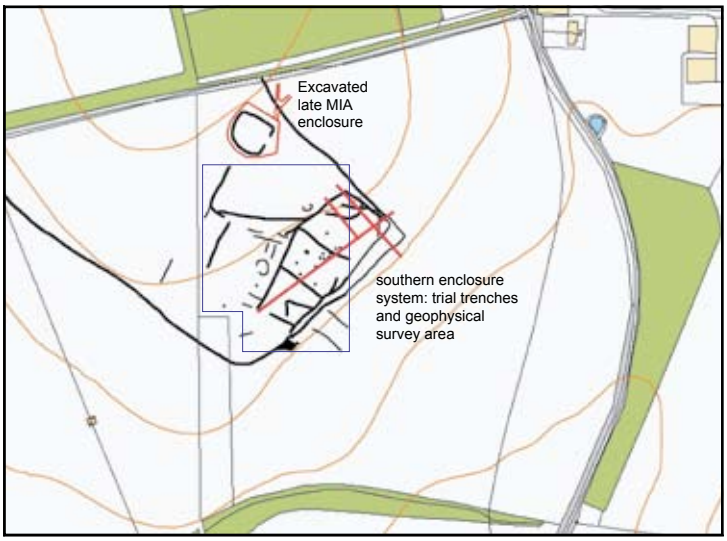
For the last few years Chichester District Council (CDC) has been running a series of archaeological projects in partnership with the Chichester and District Archaeological Society (CDAS) aimed at engaging local people with their heritage. One aspiration of this initiative was to incorporate geophysical survey into the suite of investigative techniques being used. Hence the English Heritage Geophysics Team collaborated with CDC and CDAS to provide a programme of geophysical survey training during their summer excavation of a Late Middle Iron Age enclosure at Selhurst Park Farm near Eartham where local volunteers undertake the excavation supervised by professional archaeologists.

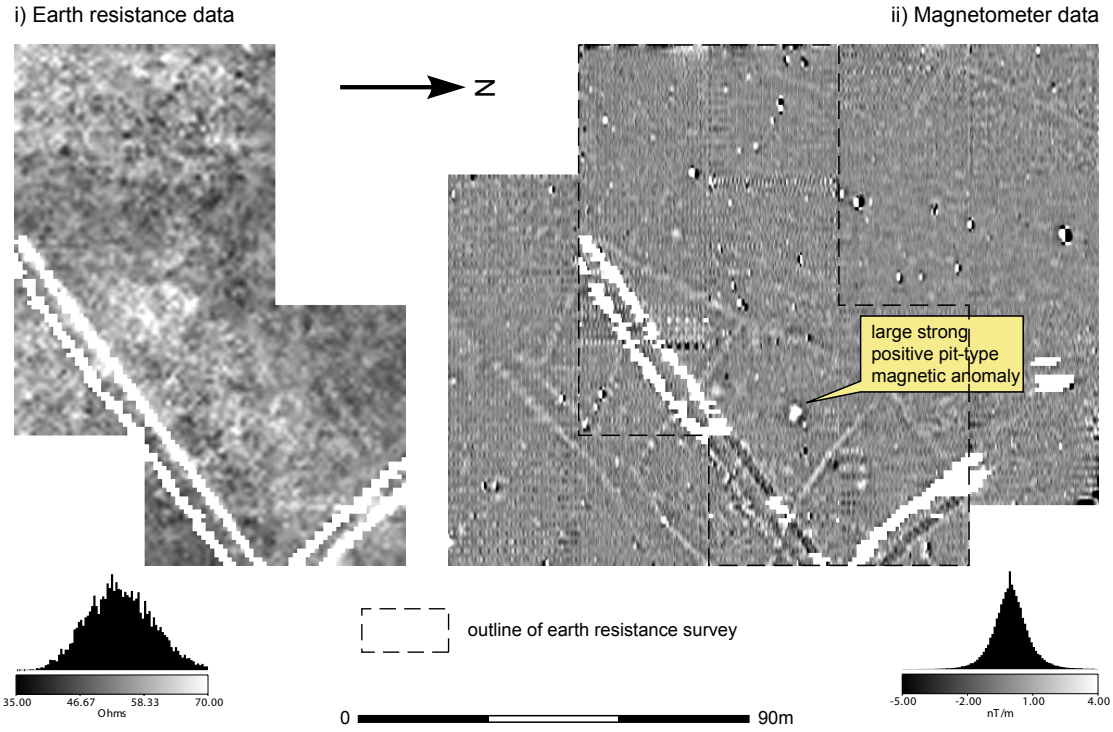
Over four days in August 2006, fourteen CDAS volunteers were given hands-on training with magnetometer, earth resistance and differential GPS (Global Positioning System) survey, the latter to locate the surveys. The goal wasn't just to see how geophysics was done but for the volunteers to produce their own geophysical survey of the site. Each participant had the opportunity to survey at least one 30m area themselves and their combined efforts built up a 1.4 hectare magnetometer survey as well as an earth resistance survey covering half that area. Frequent downloads of the data to a portable computer in the field allowed the surveyors to see archaeological anomalies they had detected as the survey progressed.

The geophysics proved very successful and the magnetometer has mapped out the in-filled ditches defining the southern part of the Iron Age enclosure system and revealed that the settlement continues into the field to the west of the current excavation. This information about the overall layout of the site will inform planning for further

Below left: The Iron Age enclosure at Selhurst Park Farm during excavation in 2006. The ditches produced numerous animal bones and pottery sherds, together with quern fragments and some daub. Small pits and/or post-holes inside the enclosure appear to indicate the remains of a small round house and associated four-poster granary

Right: Plan showing the location of the fully excavated enclosure, the geophysical survey area (blue outline) and the trial trenches over the enclosure complex to the south





Greyscale images of the earth resistance (left) and fluxgate magnetometer (right) data acquired by CDAS during the training week at Selhurst Park Farm. The magnetometer survey was particularly informative, mapping out the complex of enclosure ditches to the south. Blank areas in the plots correspond with the series of linear trial trenches cut across the enclosure system

excavations this year. However, some of the geophysical anomalies have already been tested: trial trenches over the enclosure ditches uncovered a large quantity of pottery suggesting nearby settlement, and an intriguing strong, positive magnetic signal proved to be a large pit containing heavily burnt deposits which it is thought might be associated with charcoal production.

Some of the CDAS participants have since taken things further, getting an additional day of data processing tuition so that they could carry out their own survey of a possible *vicus* outside the scheduled Roman *mansio* settlement on the Chichester-Silchester Roman road at Milland in West Sussex using equipment loaned by English Heritage. The CDAS team are planning two further surveys during spring this year before returning to Selhurst Farm to extend the survey there in the summer. CDAS have now invested in their own geophysical processing software and, with a regular team of geophysical survey volunteers prospects are good for geophysics to enhance the society's ability to investigate the archaeology of the Chichester area in the future.

Andrew Payne

Below left: The strong localised positive magnetic anomaly mapped by the magnetometry after partial excavation, showing the burnt deposits filling the feature in half section

Right: The author briefing a team of CDAS volunteers on the use of a Geoscan FM36 fluxgate gradiometer prior to a magnetometer survey at Milland in January 2007

RESEARCH THEMES AND PROGRAMMES

A 3 C 2

The Chester Amphitheatre Conference

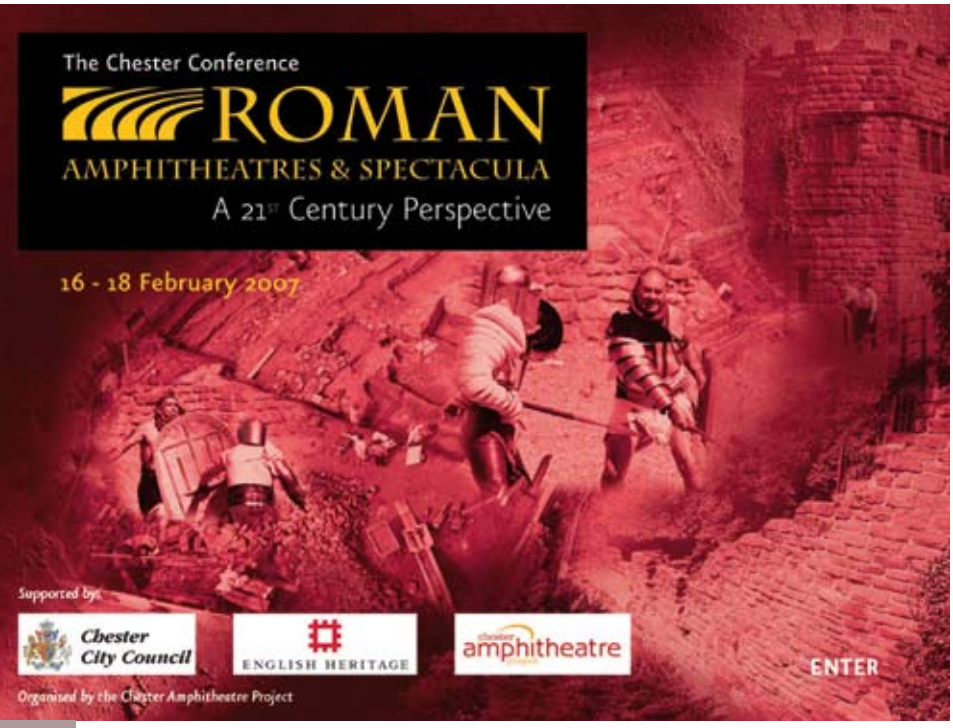
The first International Confernence on the Roman amphitheatre to be held in the English Language placed the Chester amphitheatre into its international context, and produced work of lasting value.

In mid-February, scholars of the Roman amphitheatre from all over the world congregated in Chester for the English Heritage funded conference entitiled *Roman Amphitheatres and Spectacula: a 21st Century perspective*. It is an extraordinary fact that despite the popularity of the subject of amphitheatres, fostered, of course by the Ridley Scott movie *Gladiator*, no major international conference on the subject in the English language had ever taken place. The last conference on the amphitheatre was held in France 20 years previously, in 1987, and was published in French.

The conference was an integral part of the original idea of the Chester amphitheatre Project (*Research News* 4), and was designed to place the Chester amphitheatre into its broader imperial context by examining all aspects of the amphitheatre and the spectacles which took place there across the entire Roman Empire. It was jointly hosted by English Heritage and Chester City Council, with the City Council contributing the conference venues at Chester Guildhall for the introductory public lecture and the Grosvenor Museum auditorium for the conference proper. The organisation of the event was placed in the hands of a professional firm, EMMM Ltd. This proved a huge advantage. Lisa Rutter and her team dealt with all enquiries, bookings, the organisation of meals, and the design of the conference pack and publicity material. It is safe to say that without this partnership the conference could not have taken place.

The conference was preceded by a reception and public lecture in the Chester Guildhall. The lecture, entitled *Arena of Conflict: Facts, Myths and Speculation About Gladiatorial Combat in Ancient Rome*, was given, in a very lively and entertaining presentation, by Kathleen Coleman, Harvard College Professor and Professor of Latin, Harvard University. It examined modern perceptions of the Roman amphitheatre, and how this related to what we actually know about what took place in the arena, and the meaning and place of the amphitheatres and their spectacles in ancient Rome.

The papers fell into three broad categories – planning and function, site and provincial case studies, and gladiators and spectacles. Mark Wilson Jones (University of Bath) covered the planning and layout of the buildings with particular regard to whether we should interpret the plans of the buildings when laid out as ovals or ellipses, two shapes which are mathematically generated in different ways. Tamara Jones (MacMaster University, Canada) examined the rigid social stratification whereby seating was allocated to different social and political groups, and Nick Bateman (MoLAS) studied the arena as a ritualised space, and the cult of Diana-Nemesis.



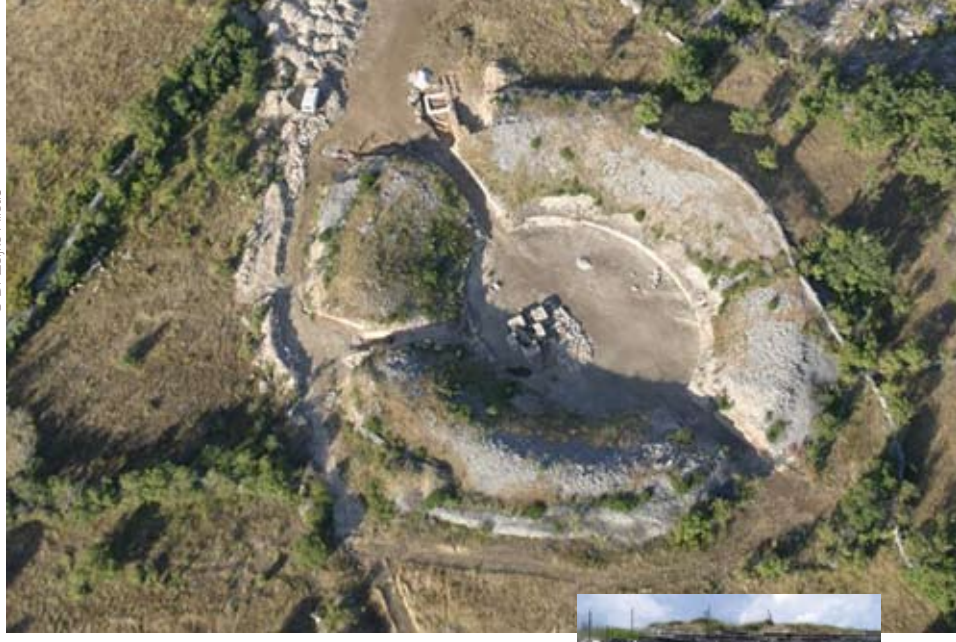
Front cover of the conference web-site

Case studies began, naturally enough, with a discussion of the amphitheatres at Chester by Dan Garner (Chester Archaeology). The comparison of Chester with other features of the military northern provinces of Rome was a deliberate intention within the programme, so a study of the amphitheatres of auxiliary forts on the frontiers of the empire by Sebastian Sommer (*Bayerisches Lansdesamt für Denkmalpflege*) was followed by Sonja Jilek (*Österreichisches Akademie der Wissenschaften*) on the unique sites of Carnuntum, Austria, and Aquincum, Hungary, in each of which two amphitheatres, one serving the legionary fortresses, the other the civil towns, were built. It is an index of the timeliness of the conference that colleagues from all over Europe wished to contribute case studies. Although it was not possible to allocate a slot to everyone, the published proceedings of the conference will include additional papers on the amphitheatres of Trier, Germany, Burnum, Croatia, and the paper on Sofia, Bulgaria, which the excavator Dr Zharin Velichkov was unable to present. On the day the fascinating sequence at Augst, Switzerland, whereby a theatre was developed into an amphitheatre, and then back to a theatre again was presented by Tomas Hufschmid (*Bauhütte Römisches Theater von Augst*). Two broader regional studies were the paper on recent work on Spanish amphitheatres by Prof Angel Morillo Cerdan (*Universidad de León*), which was given his colleague Esperanza Martin Hernandez, and Hazel Dodge (Trinity College Dublin) on the Roman East, a survey which stressed the adaptation of buildings such as theatres and stadia to allow wild beast shows and gladiatorial combat to take place.

The last theme concerned evidence for the events which took place in the amphitheatre. A particular day in the life of a North African amphitheatre was described by David Bomgardner (Elstree School), who examined the story behind the mosaic of Magerius, a wealthy provincial who paid a large sum to the Telegenii, a guild of performers, for a particularly memorable wild beast hunt. Evidence for gladiators and their activities in a variety of media was interpreted; Renate Lafer (University of Klagenfurt, Austria) on epigraphy, Jon Coulston (University of St Andrews) on the evidence for victory and defeat in the arena from the sculptural and other iconography, and, the furthest travelled of all of the contributors, Renata Senna Garrafoni (Paraná Federal University, Brazil) on the gladiatorial graffiti on the walls of Pompeii. A cautionary note was sounded in a rousing address by Prof Mary Beard (University of Cambridge) on 'cutting gladiators down to size'. Appropriately finally, the remains of the gladiators themselves, from the gladiator cemetery recently discovered at Ephesus were described in a remarkable paper by Dr Fabian Kanz (*Österreichisches Archäologisches Institut*). Some of the graphic detail of injuries received by gladiators, such as the skull pierced by the trident of a *retiarius*, were genuinely shocking.

The conference provoked wide-ranging discussion and debate both in formal and informal session. It is intended to publish the papers in the Autumn, in a volume which will be an internationally important addition to the literature of the Roman amphitheatre.

Tony Wilmott



© Dr Željko Miletić

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Main: Aerial photograph of the amphitheatre of Burnum, Croatia

Inset: Theatre at Stobi, F.Y.R. Macedonia. The extra wall on top of the podium was built to increase height from the *orchestra*, forming an arena wall to allow amphitheatre spectacles to be put on

© Esperanza Martin Hernandez

Death at dinner: the conference dinner was enlivened with gladiatorial entertainment put on by Chester Roman tours

NOTES & NEWS

A round-up of activities and developments showing some of the scope and variety of projects that are ongoing in the Research Department.

EGERTON BUILDINGS, BARROW-IN-FURNESS

At Egerton Buildings, Architectural Investigation casework was undertaken in support of North West Region Planning and Development Team. The buildings are a pair of substantial 19th-century tenement blocks within the Barrow Island Conservation Area to the west of the main dock complex in Barrow-in-Furness. The conservation area is dominated by a series of large and distinctive four-storey tenement blocks built in the 1870s and 1880s to house workers at the Barrow Iron Shipbuilding Company – itself a creation of the earlier Furness Railway Company. Such tenement blocks are relatively rare in England but have many similarities, as well as some significant differences, to contemporary blocks in Glasgow and Edinburgh, and historically the dwellings within the Barrow blocks were described as 'Scotch flats'. The earliest and finest are called Devonshire Buildings after the Duke of Devonshire, one of the chief local landowners. Built of red sandstone, with corner turrets and an integral public house, Devonshire Buildings are Listed Grade II* as are two further blocks, of brick with polychrome embellishments, built behind and at right angles to them. Between these blocks, and behind Devonshire Buildings, are four more, also of brick, which, although simpler, are not without attractive embellishment; these are Listed Grade II. All are confirmed as the work of Paley and Austin, architects of Lancaster and Barrow. Egerton Buildings stand slightly apart from this listed group and occupy an island plot on the opposite side of Ramsden Dock Road, the main road connecting Ramsden Dock (opened in 1879) with the rest of Barrow Island and the town, and a little to the south of the original offices of Barrow Iron Shipbuilding Company (also Listed Grade II).

Egerton Buildings consist of two large U-shaped tenement blocks symmetrically

Part of one of the Egerton Buildings tenement blocks from within the central court. Tenement flats were stacked on either side of the open stairwells and each originally contained a living room and one or two bedrooms, within the main body of the block, and a scullery and flying backyard (containing a coalhouse, WC and a chute for ashes) in the outshots. The flying back yards have now been enclosed and converted into bathrooms

Egerton buildings from Ramsden Dock Road. Most of the tenement flats within had only one bedroom but those in the corner pavilions had two

opposed on either side of a large square court. They are four storeys high and, although they are stylistically identical to the four listed blocks, they are not themselves listed and hitherto had not been confirmed as the work of Paley and Austin. They are also largely empty and somewhat rundown, although apparently structurally sound, and in separate ownership from the other tenement blocks which are almost fully occupied and well maintained.

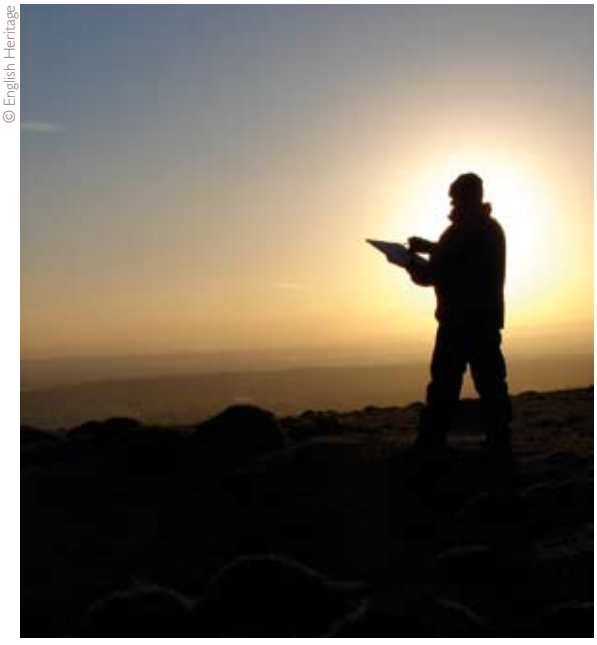
The need for a greater understanding of Egerton Buildings emerged at a meeting of English Heritage, the North West Development Agency, Barrow Borough Council, English Partnerships and West lakes Renaissance. The regeneration partners wish to remove the buildings to make way for an access road into a proposed business park (a project seen as fundamental to the West Lakes Renaissance programme) and also because of a supposed weak market for tenement-style housing. The Architectural Investigation Team based at York was asked to quickly provide a fuller understanding of the role of Egerton Buildings in the historic development of the Barrow tenements and in the wider Barrow Island townscape, to research the buildings' origins and design provenance and explore the possibility of spot listing with Heritage Protection (it is thought that Egerton Buildings were originally excluded from Listing due to unproven design provenance). In response, a rapid investigation programme, led by Matthew Withey and Simon Taylor, was executed in February. Internal and external investigation of the fabric was supplemented by documentary research and an important discovery was a file of building control plans which appear to show one of the blocks of Egerton Buildings. They are signed and dated Paley & Austin, August 1879, and also bear the stamp of the Furness Railway Company, confirming that they are by the same architects as those buildings listed Grade II and II*. Other documentary sources confirm that one of the buildings had been finished by 1881 and that the second block was in place by 1886. The North West Region Planning and Development Team have been briefed on our findings and, at the time of writing, a text for the Research Department Report Series, authored by Matthew Withey, is in preparation.

Simon Taylor

Peter Dunn at work on the ramparts at Westbury Camp

RECONSTRUCTION ARTIST WORKS WITH FIELD SURVEY TEAM

Drawings and paintings that reconstruct how an archaeological site or historic building appeared in the past are among the most demanding illustrations produced by the English Heritage graphics team. Usually such illustrations are prepared after all the research on a site has been completed, but in a new approach, English Heritage reconstruction artist Peter Dunn has been working as part of the field team surveying the Mendip hillfort of Westbury Camp overlooking the Somerset Levels. The idea behind this collaboration was for Peter to prepare quick sketches reconstructing how the hillfort looked while the earthwork evidence was being pieced together by the Archaeological Survey and Investigation team led by Elaine Jamieson. The site consists of a grassed-over earthen rampart reduced by centuries of erosion to a low earthwork nowhere more than a metre high. The remains are so slight that they hold few obvious clues to the original construction of the defences but Peter and Elaine developed their thoughts as the fieldwork progressed.



Peter working at sunset

Peter Dunn, © English Heritage

Peter's reconstruction painting of the gateway at Westbury Camp

A particular focus of their attention was the appearance of the hillfort entrance. Surviving as a gap in the earthworks of the rampart and the outer ditch, the reconstruction sketch shows an impressive gateway overshadowing the adjacent defences. This stems from the observation that the entrance was sited for maximum visual impact facing east along the Mendip escarpment. As well as helping to develop ideas about the original appearance of the site, it is proving useful to have reconstruction drawings available for lectures and outreach events so soon after the end of the survey.

Trevor Pearson

© English Heritage

Clevedon Pier, a Grade I structure, provides an impression of how most piers looked before kiosks and pavilions were added later in the 19th century

SEASIDE HERITAGE COLOURFUL PAST, BRIGHT FUTURE

The seaside resort is one of Britain's greatest exports to the world. Since the early 18th century the lure of the sea has been a fundamental part of British life and a desire to bathe in the sea began to transform settlements around the coast. Small working towns grew into large resorts with exotic buildings and their distinctive urban character is set against the monumental backdrop of the beach and sea. In the late 20th century many people fell in love with new resorts on warmer foreign shores, leaving some traditional British resorts to struggle with falling income and decaying infrastructure and by the early 21st century many resorts faced significant social problems. Nevertheless, many people now have higher disposable incomes that allow them to enjoy extra short breaks by the sea.

On 16-17 October 2007 a major conference about the heritage of the seaside will be held at St Mary-in-the-Castle in Hastings. Its aim is to reveal the wealth of the historic environment of seaside towns and to discuss how this can contribute to the future of resorts. This conference will feature a wide range of speakers including leading researchers in seaside history and heritage, and a range of local, regional and national bodies concerned with the future of seaside resorts.

This conference will be of particular interest to anyone involved in the management, regeneration, promotion and conservation of seaside towns or with an interest in their history and future. For further information please visit the English Heritage website: www.english-heritage.org.uk/seasideheritage or contact Helen Charlton at helen.charlton@sam-culture.com (01273 882112)

Allan Brodie

Inset: Blackpool's seafront is undergoing a major renovation programme, including the creation of a number of major new pieces of sculpture. In the background is the 'Big Un', the white-knuckle ride that towers over the Pleasure Beach

Top: Pelham Crescent, with St Mary in the Castle in the centre, was built in Hastings in the 1820s for visitors and new residents in the rapidly-growing resort

RESEARCH DEPARTMENT REPORT SERIES: January – May 2007

1. Bridge, M, 'The Barn, Court Farm, Aylton, Herefordshire: Tree-Ring Analysis of Timbers'
2. Arnold, A J and Howard, R E, 'St Nicholas' Church, Potter Heigham, near Norwich, Norfolk: Tree-Ring Analysis of Timbers'
3. Fell, V, 'West Stow, Suffolk: Analysis of Metalwork from a Burnt Reconstructed Grubenhäus (WSW060)'
4. Tyers, C and Tyers, I, 'Peterborough Cathedral, City of Peterborough, Cambridgeshire: Tree-Ring Analysis of the Nave Ceiling'
5. Linford, N and Payne, A, 'Ogbourne St. Andrew, 8, Barbury Castle Estate, Wiltshire: Report on Geophysical Surveys, June 2005, August 2005 and April 2006'
6. Arnold, A J and Howard, R E, 'Polesworth Abbey Gatehouse, Polesworth, Warwickshire: Tree-Ring Analysis of Timbers'
7. Fradley, M, 'Water Street, Lavenham, Suffolk: A Desk-Based Assessment of a Brick Culvert'
8. Arnold, A J, Howard, R E and Litton, C D, 'Leicester's Gatehouse, Kenilworth Castle, Kenilworth, Warwickshire: Tree-Ring Analysis of Timbers'
9. Arnold, A J and Howard, R E, 'The Gildhouse, Poundstock, near Bude, Cornwall: Tree-Ring Analysis of Timbers'
10. Arnold, A J and Howard, R E, 'The West Tower Roof, St Catherine's Church, Ludham, Norfolk: Tree-Ring Analysis of Timbers'
11. Blakelock, E, 'Bedminster Glue Factory, Bristol: Examination and Analysis of Glass and Glassworking Debris'
12. Martin, L, 'Carisbrooke Castle Privy Garden, Isle of Wight: Report on Geophysical Survey, August 2006'
13. Fell, V and Williams, J, 'Fiskerton, Lincolnshire: Analysis of the Modern Iron Analogue Samples Buried for 30 Months'
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15. Hunt, A and Ainsworth, S, 'Scordale lead mines, Cumbria: A Preliminary Assessment of the Threat from River Erosion'
16. Hall, N, 'Bowes Roman fort, County Durham: Examination of Ironworking Debris'
17. Graham, K, Crow, P, Fell, V, Simpson, P, Wyeth, P, Baker, R, Vallender, J and Griffin, V, 'Alice Holt Forest, Farnham, Surrey: A Woodland Burial Study: Report on Six Month Modern Analogue Samples'
19. Bryan, P, 'Chiswick House, London: Laser Scanning Tests on a Gilded 18th-Century Table'
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23. Franklin, G, '5 Old Compton Street, London Borough of Westminster'
24. Bridge, M, 'All Saints' Church, Culmington, Shropshire: Tree-Ring Analysis of Timbers'
25. Bridge, M and Miles, D, 'The Church of St Mary the Virgin, Cleobury Mortimer, Shropshire: Tree-Ring Analysis of Timbers from the South Porch Roof'
26. Dungworth, D and Wilkes, R, 'An Investigation of Hammerscale'
27. Dungworth, D, 'St Thomas Street, Bristol: Examination and Analysis of Glass and Glassworking Debris'
28. Bridge, M 'All Saints' Church, Gazeley, Suffolk: Tree-Ring Analysis of Timbers from the Roof of the South Aisle'
29. Bridge, M 'St Mary's Church, Kington, Herefordshire: Tree-Ring Analysis of Timbers from the Tower and Spire'

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