NEWSLETTER OF THE ENGLISH HERITAGE RESEARCH DEPARTMENT

RESEARCH NEWS

Excavating a cremation at the Birdoswald Roman cemetery, Cumbria – see story page 16

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English Heritage's Research Department embodies skills and expertise that have long been central to the organisation and to its predecessors in the Department of the Environment (DoE) and before that the Ministry of Public Buildings and Works. In this general issue of *Research News* we take a retrospective look at two areas where this long-term public investment in heritage expertise has generated an international profile and influence. Justine Bayley, recently retired as Head of Technology in Archaeological Science & Archives, recounts the changes both organisational and methodological that she has witnessed over a long career beginning when she joined the former Ancient Monuments Laboratory in 1973. Complementing this, Trevor Pearson reports on a project to capture the development of practice in archaeological graphics by the Ancient Monuments Drawing Office and its successor the Archaeological Graphics Team.

Archaeological Projects is another part of the organisation with a heritage that goes back to the early 1970s. Two recent projects have shown the way forward in partnership working and training. At East Harptree, excavation tested the results of geophysical survey undertaken by local groups with English Heritage support. Excavation training for the local volunteers honed fieldwork skills, and has provided a network of contacts that will be used as the local groups develop and implement their own research projects. At Birdoswald, on Hadrian's Wall, excavations were mounted to recover the archaeology of a Roman cremation cemetery threatened in the short and medium term by erosion of the river cliff. The work was undertaken in partnership with the Archaeology Department of the University of Newcastle, which provided the resources to undertake student training in all aspects of excavation, and in finds and environmental processing.

Architectural Investigation and Archaeological Survey & Investigation are Research Department teams whose history lies in the former Royal Commission of Historic Monuments for England. Their diverse work is represented in this issue by buildings research as part of the Miner-Farmer Landscapes project in the North Pennines AONB (*Research News* 11), by the research undertaken on the stables of Audley End house to inform their future public display, and by the investigation of a notable Victorian drill hall in Great Yarmouth.

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Community-centred training excavation at East Harptree

Local volunteers and professional archaeologists work together to investigate the buried history of a Mendip village.

In April and May 2009, the Archaeological Projects and Archaeological Science & Archives teams undertook excavations at East Harptree (Bath and North-East Somerset), providing training for members of the Harptrees History Society (HHS) and other local history/archaeology groups. The training covered not just excavation and recording, but the whole range of tasks entailed in taking an excavation project from inception through fieldwork, archive completion, assessment, analysis and archive deposition. The aim was to create a skills base among the volunteers, enabling them to continue work in the future. English Heritage is also helping establish a network of contacts between HHS and other local groups on the one hand and relevant organisations and individuals on the other, to support the volunteers in carrying out further archaeological research to a high standard.

The project capitalised on and helped develop links already established between English Heritage staff and local volunteers in the context of the Mendip Hills AONB project (see *Research News* 5, 8 and 11). The overall research aim was to obtain information regarding the origins of the settlement of East Harptree and how the village and activities carried out there developed over time. The nature of the project enabled targeted excavation in a currently occupied rural settlement, an avenue of settlement studies which has, until recently, been neglected. The focus on investigating still-occupied – as opposed to deserted –settlement was modelled on work undertaken in East Anglia by Carenza Lewis with the Higher Education Field Academy (University of Cambridge).

The excavations comprised three trenches in Haydon's Field – an area of pasture in the village containing earthworks – along with four test-pits at various locations in the settlement. HHS volunteers helped identify and secure the agreement of householders in the village who were willing to have test-pits dug in their gardens.

Initially, two trenches were located to investigate the earthworks in Haydon's Field. HHS members carried out an interpretative hachure survey of the earthworks in 2007. In broad terms, the earthworks apparently consist of two raised platforms, sub-divided by a number of linear depressions. These were interpreted as representing abandoned tenements, consisting of dwellings and associated plots, with possible streets or trackways running between them. The same area was surveyed by English Heritage's Geophysics Team in July 2008, also as a training exercise for local volunteers. Results appeared to enhance the interpretation of the recorded earthworks, suggesting the location

Locations of excavation trenches and test-pits in East Harptree, with general location map (inset)

Jonathan Webster, © English Heritage

Eleanor Collier, © English Heritage

John Howarth, © English Heritage

of property boundaries, the layout of tracks and possible building remains. The pattern of anomalies seemed to indicate that there was earlier, possibly medieval, settlement in Haydon's Field, aligned to the same street plan as the modern village.

Somewhat surprisingly, the first two trenches in Haydon's Field (A and B) demonstrated that the original interpretations of the earthworks and geophysical survey were incorrect. Where evidence of boundary fences or ditches, building remains, pits and tracks had been expected, only ploughsoil merging into undisturbed natural subsoil was encountered. Very small amounts of highly abraded pottery were recovered from these two trenches, suggesting scattering of household rubbish as manure on an arable field. Without further excavation it is impossible to be certain, but it may be that some of the earthworks may derive from mineral extraction, e.g., small-scale mining for calamine, rather than settlement activity. While admittedly slightly puzzling, these results will help refine the interpretation of future geophysical surveys on similar types of soils.

A third trench (C) in Haydon's Field investigated geophysical anomalies matching a building and field boundary depicted on an early-nineteenth-century map. Features relating to the field boundary were excavated, and the lack of rubble or post-holes suggests that it was probably a hedge rather than a wall or a fence. The alignment was modified at least once. Traces of the building were associated with what appeared to be a cobbled surface, perhaps a yard or pathway. The excavated remains corresponded with cartographic evidence, indicating that the building was demolished by the turn of the twentieth century. The exact size and use of the structure remains unclear, as does its initial date of construction.

It was clear from the outset that the small number of test-pits excavated as part of the fieldwork in 2009 would not be sufficient to address fully the overarching research aims of the project. Many more test-pits will need to be excavated to build up a detailed and robust picture of how the village developed over time. Nevertheless, the results so far are both encouraging and tantalising. For example, medieval pottery ranging in date from the late twelfth to the fourteenth

centuries was recovered from Test-Pit 1, together with a substantial amount of hammerscale – residue from ironworking. Thirteenth-century pottery was also found in Test-Pit 2. The test-pitting demonstrated that the evidence to piece together the story of the village is out there, but a great deal more time and effort will be required to obtain it.

Assessment of the finds from the excavations is now mostly complete. The artefact assemblages are all fairly small, and so the information which can be gleaned from them to try to answer some of the project's research questions is somewhat limited. But again, some intriguing details have emerged. For example, a horse bone showing signs of butchering, recovered from a shallow pit in Trench C, may indicate the processing of horse (or possibly donkey or mule) for dog food. Pottery from the same pit dates from the seventeenth century, and human consumption of horse meat is not known to have occurred in England at this time. Clay tobacco pipe recovered during the excavations (together with pipe fragments found by the owners of one of the gardens in which a test-pit was dug) shows considerable potential for exploring issues of social status as well as patterns of local and regional trade in the seventeenth to nineteenth centuries.

The main driver for the project, of course, was providing training for volunteers from the local community. In total, twenty-six volunteers took part in the excavation, contributing roughly 240 person days over the six weeks of the fieldwork. Experts from within and without English Heritage provided formal training sessions covering a dozen different topics, ranging from project planning and management to archaeometallurgy to on-site preventive conservation techniques for archaeological finds. Depending on their availability and interests, the volunteers had the opportunity to gain experience in a variety of practical activities, including digging in the trenches and test-pits, washing and recording artefacts, and surveying the locations of the test-pits. Nineteen of the volunteers who participated returned forms evaluating the training and providing feedback on the project. The volunteers' overall impressions were highly positive, and their feedback indicates the training was effective. Two groups of pupils from the local primary school also visited during the fieldwork,

Stefanie Vincent, © English Heritage

getting the chance to see and learn about the excavation, the processing of environmental samples and work on the finds.

The fieldwork and training were both extremely successful, but the full potential and benefits of the project will only be realised over time, as the local volunteers apply the skills and knowledge they acquired. At the time of writing, HHS members have already excavated a further test-pit on their own. They have also undertaken the cleaning, sorting, weighing and tentative initial identification of some of the finds recovered. The hard work and enthusiasm of everyone involved in the project means that local volunteers are now able to contribute to a growing body of evidence and knowledge that will enrich understanding of their community, and, by extension, of similar settlements throughout England.

Andrew Lowerre

Above: Volunteers hard at work cleaning artefacts in the Finds cabin

Facing page, from top: Excavation in Trench B, searching for elusive features

Pupils and teachers from the village primary school visiting Trench C, lead by the Archaeological Interpreation Supervisor. In the foreground, excavation continues on the demolished building and cobbled surface

Volunteers recording the stratigraphy in Test Pit 4

Below: Kelly Abbott (Wiltshire County Council Conservation Centre) delivers a training session to volunteers on the conservation of archaeological finds

Maria Vinnels, © English Heritage

NEW DISCOVERIES AND INTERPRETATIONS

Audley End Stables

New research into a little-researched building type reveals an important early-seventeenth century stable block.

The Architectural Investigation Team in Cambridge was commissioned by Andrew Hann, Senior Properties Historian in the Properties Presentation team, to produce a detailed report on the stable building at Audley End House in Essex. This outlined the building's architectural history and provided an assessment of the surviving fabric in order to inform the future usage and possible display of the building to the public.

Audley End House has been in public ownership since 1948 and the house and garden have been the subject of much research in the past 60 years. The stable building, by contrast, has received little attention. It is only recently, with the publication of the late Giles Worsley's book *The British Stable* in 2004, that serious study of this common building type has been undertaken. Some previous historians have been misled into thinking that because the style and materials of the stable building are so different from those of the main house that it must predate it. But as Worsley's study points out, 'there is generally little sign of the advanced ideas of Elizabethan and Jacobean architecture in stable design' and he goes on to state that 'this is also the case at the grandest surviving stables of this date, those at Audley End'. His explanation for its old-fashioned appearance – the low status of the stable in the architectural hierarchy of the day – is confirmed by other examples which he quotes. It is a salutary lesson for those of us who on occasion have to rely totally on surviving fabric to make judgements about the probable date of a building, and it highlights the importance of knowledge about a building's function and its place in the architectural hierarchy prevalent at a particular time.

Careful study of the fabric of the stable building proves conclusively that it was built in a single campaign. Comparison of the brickwork with surviving garden walls, known to be part of the major rebuilding of the house undertaken by Thomas Howard, 1st Earl of Suffolk, between *c* 1605 and 1616, show that these structures are contemporary. This is confirmed by documentary evidence in the form of a survey of the estate made before 1605, which shows that there was nothing on the site of the present building at this date.

The single most important person involved in unravelling this story is Henry Winstanley, famous as the designer and builder of the first Eddystone Lighthouse. His father had been bailiff at the house, and Winstanley's first employment after he left school was in the estate office. He was clerk of the works at Audley End from 1679 to 1701, when it was in royal ownership. He produced 23 high quality engraved views and a ground plan of Audley End which he published in 1686. Amongst these views there are two of the stable building, one of the north front and one the south. These visual records are of inestimable value and very unusual. Winstanley's detailed record of Audley End is itself unique. His engravings are also extraordinarily accurate, which is not so surprising when one considers how well he must have known the house.

Patricia Payne. © English Heritage

The south front of the stable building at Audley End

Patricia Payne, © English Heritage

The north front of the stable building at Audley End

These two views of the stable building, when combined with the plan, confirm that the surviving structure has been relatively little altered since the late 17th century, but they also show that the bays and the central round-headed opening on the north front, which are clearly additions, must have been added before this date. This suggests that the most significant alterations made to this building in the past 400 years were made during the first 50 years of its existence, and this dating can very likely be pushed back even further. As the 2nd and 3rd Earls of Suffolk inherited an estate burdened with enormous debts, they are unlikely to have carried out any alterations, leading to the conclusion that these alterations were made by the 1st Earl soon after the building was completed around 1616. Perhaps the Earl's fall from favour and loss of income resulted in a retrenchment which meant that the stable building had to be adapted to serve as a coach house as well.

The remaining 400 years of this building's history have been uneventful. The surviving records of the Crown's ownership tell us that the building was in poor condition and that the little repair work done involved the removal of some of the dormer windows and the gables from the bay windows. The poor condition of the roof in particular helps to explain the problems found in the roof today. Unfortunately it has not been possible to use dendrochronology to date the timbers, and the carpenters' marks on the surviving

Patricia Payne, © English Heritage

Henry Winstanley's engraved view of the north front of the stable building published in 1686

The attic space and roof structure over the stable building

Patricia Payne, © English Heritage

trusses are only partial and out of any logical order. The only sensible conclusion is that the roof had been taken off, extensively repaired, and the trusses put back in a different order.

Since we know that the roof was not repaired before the property was handed back by the Crown to the 5th Earl of Suffolk in 1701, it seems likely that it was allowed to deteriorate

The corn bins installed in the attic over the west cross-wing in 1777

Patricia Payne, © English Heritage

even further before it had to be rebuilt sometime in the early 18th century.

The three internal cross-walls which now divide the original open stable and are not keyed into the main structure were probably added sometime in the 18th century. John Hobcroft, who designed a number of garden buildings at Audley End, added battlemented gables to the stable building, though judging by two surviving watercolours painted around 1840 these Gothic embellishments did not survive for long.

Detailed building accounts survive for the period 1771 to 1817 amongst the Braybrooke papers in Essex Record Office. Only the surviving corn bins in the attic of the west cross-wing can be definitely identified as being installed in 1777. The remaining payments record general repair work and modernisation of the accommodation. There is a single payment in these accounts to the architect Thomas Cundy in 1814, suggesting that he was responsible for much of this work. The architect Richard Hussey was employed at Audley End by the 5th Lord Braybrooke in the 1860s. Plans and a proposal for alterations by Russell to the stable building survive in Essex Record Office. He repaired the brick gables and metal finials and flags and he added the elaborate Gothic style lantern over the central roof crossing, the single most significant addition made to the building since the 17th century.

The earliest known photograph of the stable building is dated 1891, though perhaps the most evocative image is one of *c* 1907 which proudly displays an expensive new motorcar parked in front of this stables. The early 20th century saw the complete refitting of the stalls and the creation of a new tack room within the stables, and the replacement of all the doors. This work appears to have been carried out for Lord Howard de Walden who leased Audley End in the Edwardian period.

Since 1948, when the house came into public ownership, the stable has been used for storage. For a brief period in the 1980s the coach house was open to the public when it was fitted out with an exhibition about the history of the house and its gardens. The stable fittings in the east crosswing have been dismantled to allow for the storage of architectural fragments found on site. This

The central cupola or lantern added *c.*1885, to the designs of the architect, Richard Hussey

architecturally and historically significant building has been overlooked and underused in the past and it is to be hoped that this report has contributed substantially to its recent opening to the public for the first time this summer.

Pete Smith

The north front of the stable building with a new motorcar c.1907

NEW DISCOVERIES AND INTERPRETATIONS

The vernacular buildings in the North Pennines Area of Outstanding Natural Beauty (AONB)

Architectural Investigation's research into the buildings of Alston Moor, Cumbria, as part of the Miner-Farmer Landscapes of the North Pennines AONB project.

Over the last 18 months, members of the Architectural Investigation (North) team have been working alongside colleagues from Archaeological Survey and Investigation, Aerial Survey and Imaging, Graphics and Survey in the North Pennines AONB as part of the Miner-Farmer Landscapes of the North Pennines AONB project. As with many of the other components of the project, Architectural Investigation's work is centred

View across the Nent valley, showing a typical series of linear farmsteads (some derived from the house-over-byre form), in various states of repair

Lucy Jessop, © English Heritage

Matthew Whitfield, © English Heritage

Nettle Hall, Galligill: the 17th-century house-over-byre with its chamfered first-floor fire window surround has been extended to the left in the 18th century and to the rear in the 19th century, at which point it was totally refenestrated and much of the front wall was rebuilt

upon the parish of Alston Moor, Cumbria, a remote area of moorland and rich mineral deposits. The parish consists of Alston, which shares with Buxton, Derbyshire, the claim to be the highest market town in England, the villages of Garrigill and Nenthead, and a multitude of small scattered settlements whose inhabitants drew their livelihoods from a combination of farming and lead mining. The parish is dominated by two rivers, the Nent and the South Tyne: Nenthead marks the highest point of the Nent valley; the South Tyne flows from Tynehead in the extreme south of the parish, through Garrigill, to the confluence of the rivers at Alston. Mineral extraction and agriculture have been the area's two most significant industries, at least from the medieval period onwards; silver was initially the mineral of choice, but lead mining became increasingly important. The small-scale operations of local individuals up to the early 18th century, the larger-scale industrialisation of the lead mining process by companies such as the London Lead Company in the 18th and early 19th centuries, and the further exploitation of zinc and fluorspar into the early 20th century have all left tangible traces on the buildings and landscape of the parish. Subsequent depopulation, combined with changes in agricultural practice and a range of social factors have placed the built environment of this parish under severe pressure, with abandoned farmhouses and farm buildings still exceeding the demand for tourist-related development.

Architectural Investigation's role in the wider English Heritage project has been to develop a fuller understanding of the built environment in order to underpin future management and decision-making. An important element of the work has been the undertaking of a Historic Area Assessment of the parish of Alston Moor and to gather further information on the history and development of its buildings both by archival research and detailed survey of specific sites. The Historic Area Assessment was carried out in late 2008 and early 2009; its results will be published this year in the Research Department Report Series and sites visited will appear in the project GIS. Events such as 'How Old is your House?', held in the town of Alston in October 2009, encouraged local people to engage with the developing research and enabled the team to visit and examine many more houses than were previously accessible; the information gathered in this way has contributed to the more detailed aspects of the Area Assessment. Primary research has continued throughout the lifetime of the project with some targeted survey to follow in the next few months; reports on individual sites will follow.

Alston Moor is notable for its local stone, which is used for traditional rubble walling in the majority of the parish's vernacular buildings, across all building types and nearly all periods of construction. Graduated stone slate roofs are also much in evidence; materials such as brick and non-local stone tended only to be used after the arrival of the railway in 1852 and even then remained relatively rare. The more traditional buildings cling to and follow the steep contours of the landscape, often developing in a linear fashion. Although the area has been continuously inhabited from at least

Right: The mine shop, Nettle Hall, Galligill: the 19th century mine shop continues the tradition of living upstairs. A first-floor doorway on the rear of the building provided access to the heated living accommodation above the unheated ground floor; the fenestration has since been renewed. It is now in agricultural use

Bob Skingle, © English Heritage

Below: Kate's Lane, Alston: a house with an external stair to the first-floor chamfered doorway. Many of Alston's houses had such a stair well into the 19th century; a handful of them still survive

Naomi Archer, © English Heritage

the Roman period, almost nothing can be certainly identified from before the later 16th or early 17th century. St Augustine's, the parish church of Alston, and the chapel of St John at Garrigill were both medieval churches replaced in the later 18th century with complete rebuilding of the former in the 19th century. The bulk of the vernacular buildings date from the 17th and 18th centuries, including numerous examples of the bastle house and building types derived from the bastle tradition.

The bastle, a small, thick-walled, rubble-built rectangular structure with a byre on the ground floor and a heated living space above, is widely recognised to be a response to the insecurities of life on both sides of the Anglo-Scottish border in the later 16th and early 17th centuries. Bastles were mostly constructed throughout the 17th century, and Alston Moor is generally considered to be the southernmost, and last, outpost of bastle building. An example in the parish at Annat Walls has a date stone of 1707, making it a very late bastle indeed. Designed to counter the local practice of reiving, where the thieving of cattle from across the border or closer to home was rife, the owner of a small quantity of stock could barricade them in his byre and then retreat to the upper floor which was generally accessible only by an external first-floor door via a ladder which was drawn up after him. Most of the best-known examples of the type survive in Northumberland, but the concept of living in a house over a byre persisted well into the 18th century (even into the 19th) in Alston Moor.

Farmsteads in the area contain many structures with bastle-like characteristics: ground-floor spaces have limited fenestration and no original heating, denoting an original use as a byre; first-floor spaces consist of one or more rooms with a first-floor external doorway, smokehooded fireplace and, usually, an external stair replacing the less convenient ladder. They are often arranged in a kind of terrace, successive dwellings being built onto the gable end of an earlier structure, with later outshots built at the rear. Some continue to be occupied, although many are now used as farm buildings, whilst others are heading towards ruination, especially those highest up on the poorest agricultural land.

The rising prosperity of Alston Moor in the later 18th century, due to the more effective

organisation of the lead mining industry by the London Lead Company in particular, contributed to a massive rise in the parish's population. At a farmstead such as Nettle Hall in Galligill, to the west of Nenthead, this turned a house-over-byre close to a productive lead seam into the nucleus of a small mining settlement. The house was extended several times into the 19th century, with a separate building (identified as a 'mine shop') constructed next to it providing first- and second- floor living accommodation above a ground-floor store or byre. Both house and mine shop provided accommodation for a large but fluctuating number of households throughout the 19th century, only reverting to single occupation well into the 20th century.

Perhaps surprisingly, many of the key features of the house-over-byre persist even in the town of Alston itself. A map of the town drawn in 1775 shows a large number of external stairs indicating the presence of first-floor doorways all over Alston. Although there is no documentary proof that the ground floors were used as byres, they raise the question as to their original usage: were they byres, spaces for storage, workshops or shops? Even today, many shops are situated in the basement of buildings with domestic accommodation above, and some basements probably originated in commercial use. Living above one's shop was a standard way of life even in the 17th century in Alston. The tall, single-pile buildings constructed against the churchyard wall fronting onto the Market Place, with their traces of chamfered window surrounds on their rear elevations, seem to be purpose-built shops of the 1690s, as local historian Alastair Robertson suggests and documents in the National Archives appear to confirm. A good quantity of later 18th-century housing stock persists in Alston; research has demonstrated that, as in the rural part of the parish, the 19th-century population influx resulted in the horizontal subdivision of some houses, with the poorest families living in the once-unheated basements that had been hastily converted for habitation.

The patterns and complexities of vernacular building in Alston Moor continue to fascinate and perplex, revealing a building tradition that is highly localised but of national significance.

Lucy Jessop

Matthew Whitfield, © English Heritage

Lucy Jessop, © English Heritage

Above: Cross View, Market Place, Alston. This pair of houses hide an interesting history behind their later 19th-century elevations. That to the left retains its late 17th-century walling facing the churchyard, with traces of chamfered window surrounds. As rebuilt, they retain the local distinction between principal living accommodation on the upper floor, reached by an external stair, and a separately-entered ground floor, which appears to have been in domestic occupation and is currently used as a shop

Left: Detail of a surviving chamfered window surround in the churchyard elevation of the former library, Front Street, Alston

NEW DISCOVERIES AND INTERPRETATIONS

The former Drill Hall, York Road, Great Yarmouh

A fine example of a once widespread building type, recently listed following a Defined Area Survey in Great Yarmouth.

The former drill hall on York Road, Great Yarmouth, was researched at the request of Heritage Protection as part of a Defined Area Survey examining the King Street area of the town. It was subsequently designated as a Grade II listed building and is an attractive example of a building type which may be found across the country.

The formation of large numbers of rifle and artillery volunteer groups in 1859/60 prompted a need for large, open spaces within which to practice as well as secure storage for weapons. Given the often inclement nature of British weather a covered area was preferable to the use of outdoor spaces and, although many of the earlier volunteer groups made use of existing buildings, such as village halls, a purpose-built drill hall was considered the most desirable option. Drill halls therefore, emerged as a distinct building type which, although no two are identical, may be considered to have three essential elements in common: firstly, administrative rooms such as offices, stores and an armoury; secondly, the large, open training area of the hall and associated target range; thirdly, accommodation for the caretaker or drill instructor. Beyond these three basic elements there may be additional social spaces, since drill halls, during the first decades of their existence, were seen as exclusive clubs and often served as social centres as well as a military establishments.

The York Road drill hall was designed by JT Bottle in 1867 as the base for the 2nd Volunteer Battalion Norfolk Regiment. The foundation stone was laid by the mayor (and Captain of A Company), Captain Youell, on 24 May; and construction completed at a cost of £1,400. The building comprises three parts: the residential front block, which provided accommodation for the drill sergeant; the drill hall itself, and a rear block

Old postcard showing the Drill Hall

Katie Graham, © English Heritage

The Drill Hall today

containing offices and store rooms. Whilst the front block and the hall were both built in 1867, the rear block had been added by 1885, apparently replacing an earlier structure. The symmetrical front block is highly decorated in a polychromatic Gothic revival style, with a facing of uncoursed knapped flint enlivened by dressings of red brick, yellow brick and ashlar. The interior of the main hall is spanned by curved laminated trusses within a simple frame with projecting arrow-shaped finials. This striking design was originally further enhanced by the use of gilding.

The building has many of the characteristic features of a drill hall. It has the drill hall itself with the associated accommodation and office space, and a pair of entrance doors wide enough for four men abreast or for vehicles to enter. It had an armoury (although this cannot be located today with any certainty); it has a solidly built floor to minimise the noise from marching; it has skylights, heating, and galleries. Many original features such as doors, windows and hinges remain and, whilst adjustments have been made over time, the original design is very much in evidence. However, a number of questions remain. Given that this drill hall was constructed for a rifle division, the apparent lack of firing range is most unusual. It is possible that the men used an external range of some kind, although the only clear space close by of a suitable size appears to have been the formerly open St Peter's Plain to the south. The exact arrangement of the offices to the rear is a little confusing as the presence of bars and reeded glass in the one room may suggest that this served as the armoury, although the proximity to the boiler would seem to make this an unwise choice if ammunition as well as guns were ever stored there.

Whilst earlier purpose-built drill halls (eg that belonging to the 25th Kent Rifles, erected in 1862 at Blackheath and since demolished) were constructed, the York Road example is one of the finest early drill halls still standing. Although, as already stated, drill halls first came into being during the 1860s, many date from the 1880s, or later, following the Cardwell reforms of the Territorials. Out of a total of 1,863 known drill halls in England, 476 were built prior to 1900, and of these only 309 are still standing. The average size for a drill hall was around 80ft x 40ft (24.5 m x 12.3m) (e.g. Stourport, constructed in 1911), of which only the drill instructor's accommodation remains). Chester's Albion Street drill hall (of which only the façade remains) was constructed in 1868 and described as lofty and spacious at 100ft x 60ft (30.5m x 18.3m). Given its size at 147ft x 65ft (44.8m x 19.8m), the York Road drill hall compares favourably with some of the very largest drill halls in the country. Whilst detailed descriptions of comparable buildings are scarce, the use of timber for the roof structure, along with the width of the span, is particularly notable.

Katie Graham

Katie Graham, © English Heritage

The interior of the Drill Hall, showing laminated trusses

RESEARCH THEMES AND PROGRAMMES

D 4 C 2

NEW DISCOVERIES AND INTERPRETATIONS

Birdoswald Roman cemetery

Erosion of a river cliff at the Hadrian's Wall fort threatened the site of the known cremation cemetery. Excavation of the area under long-term threat produced new evidence for burial rituals in the Roman military north.

In 1959 a field on the edge of the river cliff near Birdoswald Roman fort on Hadrian's Wall was ploughed. The farmer, John Baxter, saw many small black patches in the freshly ploughed ground. From two of these he recovered complete Roman pots dating to the third century. He had located the cremation cemetery of the fort and Roman settlement. The following year, ploughing produced part of the tombstone of a Roman legionary soldier, Gaius Cossurtius Saturninus of Legion VI *Victrix*, originally from Hippo Regia in North Africa. The site was not ploughed again. In 1999 Channel 4's *Time Team* did an evaluation of the cemetery and civilian settlement of the fort. In the cemetery, a complete cremation was excavated, containing two pottery vessels, one of which contained burnt human bone and decorative bone plaques from a funerary bier. During this work it was noticed that erosion of the cliff face was posing a serious threat to the archaeology. In 2008 a major erosion episode took place prompting the North West Region of English Heritage to survey the site to investigate means of arresting the erosion. This proved impossible. The only way to ensure that the archaeology was not lost was to mount an excavation of the area under immediate, and long term threat. Because so little is known about the cemeteries of Hadrian's Wall, and because their examination has high priority in the recent Research Framework for the World Heritage Site, the opportunity was taken to maximise the research potential of the work.

Aerial view of the excavation on the cliff edge. Note the evaluation trench in the wood to the left of shot

Excavation from September-November 2009 was carried out by Archaeology Projects Department in partnership with Professor Ian Haynes and the Department of Archaeology of the University of Newcastle-upon-Tyne. For the University the project provided an invaluable opportunity for the training of students working alongside the professional English Heritage team.

A strip of land 12m wide was excavated along the edge of the cliff, and a further trench was opened in woodland north of the main area as an evaluation exercise, proving that archaeology does not extend this far. The archaeological findings are of great importance to the study of Birdoswald and of broader issues of cremation and burial in the Roman military north.

The first discovery was that a metalled road led from the western extra-mural settlement to the cemetery. This ran north-south through the site, and was the part of the archaeology of the site under most threat from the current erosion. The *Time Team* work had taken place to the west of this road, our work was on its eastern side. Parallel with the road was a ditched enclosure within which all of the funerary deposits excavated were found.

The date range of the deposits was interesting. Most of the datable examples were Hadrianic to later second century. Horizontal strata including metalled surfaces sealed some of these, and a couple of third century funerary deposits in turn cut these surfaces. There were none of the well-preserved third and fourth century cremations found on the other side of the road. Despite this, the back-fill of the boundary ditch included a very large part of a vessel in Crambeck parchment ware, dating to the very late fourth century (AD 375+).

The range of deposits was surprising, and opened up questions about the nature of commemoration in Roman cremation deposits. The simplest were unlined pits containing charcoal and burned bone. Some contained nails of differing types and sizes; presumably re-used scavenged wood and nails were used on the pyre. These nails may have been included deliberately for ritual reasons. Some are hobnails, and shoes are known to have been worn on, or placed to the side of, the body. Several deposits also contained fragments of solidified molten glass vessels, used for aromatics for anointing bodies or pouring on the pyre. Two bead fragments were found, but only four tiny

Top left: Funerary deposit, showing black charcoal and white cremated bone in a pit lined roughly with flat stones.

Top right: Rectangular, stone lined cist with flagstone base, containing a small pottery vessel laid on its side. Note the cremated human bone to the right of the photo

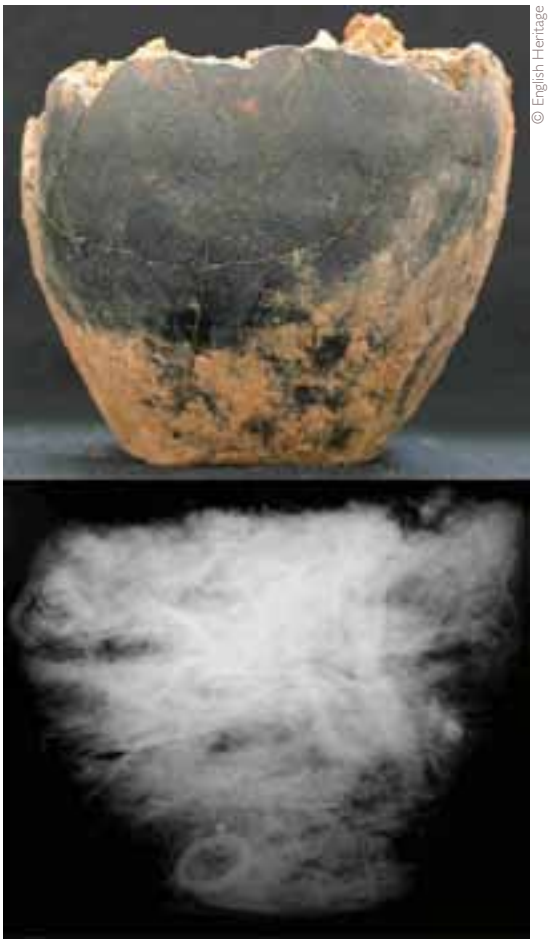
Bottom left: Rough stone cist incorporating complete pottery vessel. Note the vertically and horizontally positioned iron nails showing the shape of an original nailed wooden box

Bottom right: Pair of cremation deposits in Hadrianic pottery vessels. The vessel on the left is the earlier

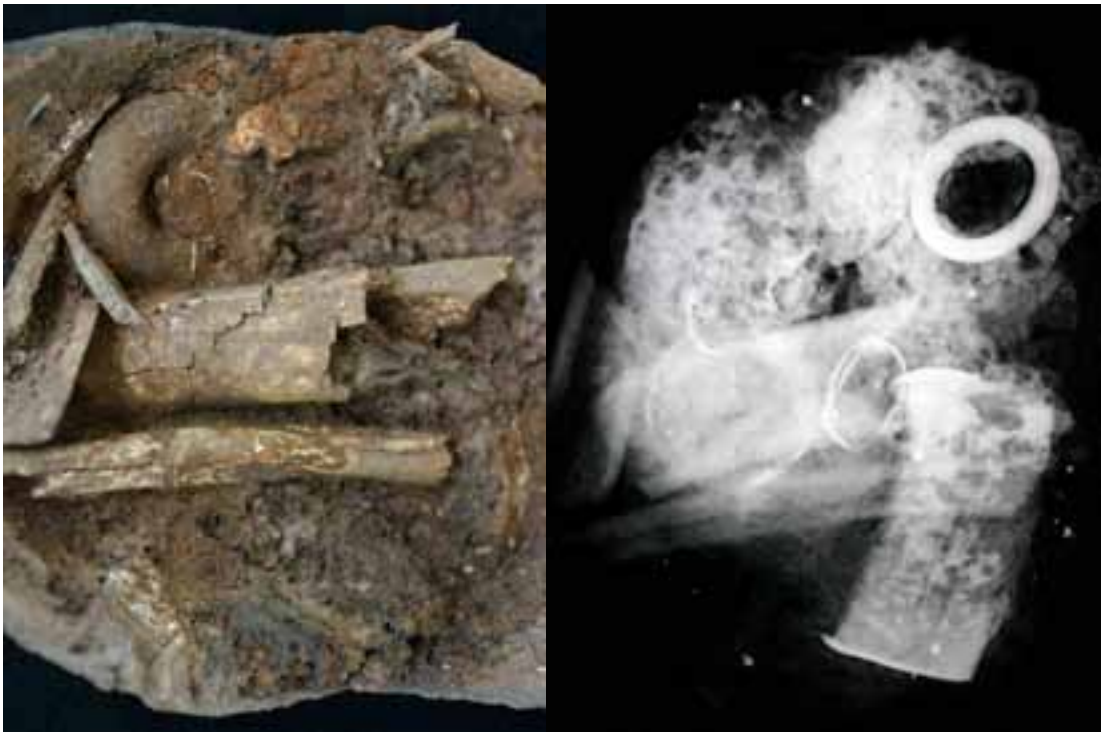
Bandaging and lifting the earlier of the two pottery vessels for later excavation in the lab.

scraps of bone veneers from pyre furniture. A small triangular stone base for a figurine was also found. One square pit also contained half a cooking pot, over 50 iron nails and fragments of a glass vessel that had been distorted by fire, and had clearly been on the pyre. Careful excavation showed no order to deposition – as in other pits, this was simply material taken from the pyre and shovelled willy-nilly into the hole. A few of these pits were partially stone-lined. One had flat stones in the base, another had irregular flat stones from a single broken slab around the sides. These were probably meant as versions of cist burials. Two of these were excavated, both of which retained their stone slab covers. The larger of the two was a rectangular pit 0.57 x 0.28m lined with flat stone slabs. It contained a complete pot laid on its side, and small deposits of charcoal and burnt bone. The cist was then filled with soil and capped. This was a high status burial, surrounded by two ditches, and would have been covered with a mound. There was evidence that it was marked by a tombstone. Despite its status, the contents were not the entire cremated remains of an individual, but a representative sample of material from the pyre. Similarly, a tiny but well made cist contained virtually no cremated bone. This trend was seen throughout almost all of what we have termed 'commemorative deposits'; it does not seem to have been important to inter more than a representative deposit of pyre material in order to commemorate the deceased. Perhaps the important part of the funerary ritual was the cremation event, rather than the deposition, the variety of which probably reflects a range of choices and beliefs.

Earlier of the pair of black burnished ware vessels showing the acute lattice decoration, and the contents of the vessel as first x-rayed



There were several contained deposits. In two cases, human bone was selected from the pyre and buried in a container that has not survived – probably a fabric or leather bag. One deposit was contained in a wooden box. Though the wood had disappeared, the shape of the box was retained by the positions of iron nails around the deposit. The box had been placed in a roughly built stone cist, which incorporated a small pottery vessel, probably originally used to contain an offering of oil or wine. Most of the contained deposits were in pottery vessels. Twelve complete or partial urns were taken to Fort Cumberland for X-radiography, and careful excavation under laboratory conditions by Karla Graham and Angela Karsten. The examination of some of these is still to be completed. The most thoroughly examined to date is the earlier of two intercutting urned deposits, both of which were contained in Hadrianic black burnished ware vessels. The similar date of vessels implies that there was not a long period between the two, and that their burial close together was deliberate. The earliest contained bone and a number of objects which have yet to be identified. A mass of iron in the base of the pot appears to be fine chain mail.



Pair of images from the same viewpoint showing the partially excavated vessel, and an x-ray of the contents at this stage. Note the small rings of chain, possibly a fragment of chain mail

A further type of deposit was a pair of *busta*. Here a rectangular pit was dug, and a pyre supported on ground-fast stakes built over the pit. The cremation took place and the ash and debris dropped into the pit. These are rare in the north, but were exactly like one excavated at the cemetery of High Rochester, north of Hadrian's Wall.

During the very late 4th century the enclosure ditch was filled, and two inhumation burials were placed blocking the entrance. Though no bone survived in the acid clay, these comprised a typical pebble lined cist and a double burial, in one part of which were pillow stones. These two burials were probably 5th century in date, and the ritual of inhumation rather than cremation indicates that they would have been Christian. The graves are the burial counterpart of the early post-Roman timber buildings excavated on the fort site in the 1980s. Their position blocking the entrance to a pagan burial area might represent a ritual closing of the enclosure.

Only the north and east sides of the enclosure were found. The north side survived to a length of only 8m before meeting the cliff edge. This cannot have been anything like its original length, and this is clear evidence that a great deal of archaeology has been lost to previous erosion.

Tony Wilmott

Below: ***Bustum*** cremation. The white tags around the rectangular pit mark stake-holes representing the construction of the pyre

RETROSPECTIVE

Archaeology & illustrators: a history of the Ancient Monuments Drawing Office

How the Ancient Monuments Drawing Office came to influence archaeological illustration in this country.

From the early 1960s to the mid-1990s, the Ancient Monuments Archaeological Drawing Office in London created work that has had a lasting influence on, and set standards for, archaeological illustration in this country. Two members of that drawing office who are still hard at work in the Research Department's Archaeological Graphics team, Judith Dobie and Chris Evans, have recently completed the first detailed study of the origins and development of the Ancient Monuments Archaeological Drawing Office, looking particularly at how the styles of illustration that are now so familiar to us from English Heritage excavation reports were perfected. Much of the information came from the personal recollection of those who worked in the Drawing Office, particularly two of its former heads, David Neal who left in 1976 and his successor Frank Gardiner, who retired as head of the Drawing Office in 1993.

David recollected that his test for any would-be illustrator wanting to join the Drawing Office was the quality of their pen line. He expected illustrators to have an art school education and be able to draw accurately in a linear style. Such exacting requirements meant that the Drawing Office quickly gained a reputation for excellence in its published

David Neal working on the Woodchester mosaic painting in the drawing office at Fortress House

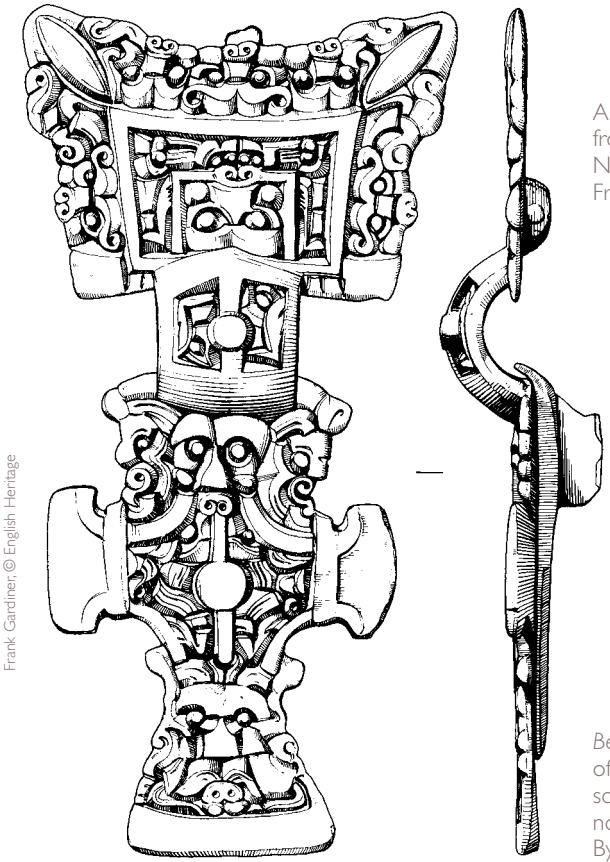
work which in turn set a high standard for illustrating archaeology in this country and beyond. When it came to drawing objects from excavations, a great deal of time was invested in working out the best way to employ pen and ink to represent different materials and manufacturing techniques. Frank Gardiner took the view that it should be possible to recreate an object from a drawing which meant that illustrations had to combine artistry with accuracy with several views often required to show all the surviving detail.

The quality of the work is evident from the wide range of illustrations by the Drawing Office used to illustrate the report compiled by Judith and Chris (RDRS 33-2010). The report is a visual text book in how to illustrate archaeology. Intricate pen and ink line drawings of glass and bronze objects appear alongside stippled drawings of medieval architectural fragments rendered to give a strong impression of form and solidity. We may think that colour illustrations only became possible with the introduction of computer technology but the report reproduces stunning coloured paintings of Roman mosaics created by David Neal in the 1960s and 70s with each tessera carefully coloured by hand to create a stunning work of art in its own right.

David Neal recollected that there was reluctance in the early years of the Drawing Office to produce reconstruction drawings of archaeological and historic sites largely due to the fear of being proved wrong. But with the advent of English Heritage came an increasing focus on explaining the past to the public which created a demand for reconstruction drawings for use in publications and on site ranging from long-distance 'atmospheric' views to the details of how a building was constructed.

The research into the history of the Ancient Monuments Drawing Office helps us to appreciate why archaeological illustrations are done in certain ways and in certain styles. This has already proved of interest to the HEEP funded research project called 'Visualisation in Archaeology' which hosts an on-line video presentation about the results on its website: http://www.viarch.org.uk/content/research-workshop-2008.asp

Trevor Pearson



A great square headed brooch from Broughton Lodge, Nottinghamshire. Drawn by Frank Gardiner

Below: Reconstruction painting of a slip decorated dish with scraffito motifs, probably north Italian, 17th century. By Christine Boddington

RETROSPECTIVE

Over half a lifetime in ancient technology

Justine Bayley recalls some highlights of a long and varied English Heritage career.

I started working in the Ancient Monuments Laboratory (AML) in the summer of 1973 as a 'Temporary Student Vacation Worker', to do pollen analysis from a group of sites on the St Austell granite, incidentally expanding my MSc dissertation at the Institute of Archaeology. At the same time Susan Limbrey left the AML for Birmingham University. The environmental archaeologists played musical chairs, and the job left over (which became mine) was working with human remains. The permanent post was advertised in early 1974 in a small ad in the *Evening Standard* for someone who could deal with both human remains and pollen analysis, and I was appointed, I think from a field of one! This was the time when the Directorate of Ancient Monuments and Historic Buildings, English Heritage's predecessor in the Department of the Environment, had just moved into Fortress House; everyone was coming to look and the Lab had three royal visits within a year or so.

I wasn't an environmental archaeologist for long. When a vacancy came up in the Technology Section, working with Leo Biek, I asked John Musty, Head of the AML, how he intended to fill it. This was the sort of archaeological science that had originally attracted me to the subject; I'd regularly been to the annual Archaeometry conference at Oxford while I was an undergraduate. JM said that Leo was 'difficult' but I could transfer to work for him for six months, returning to the Environmental Studies Section if it didn't work. I enjoyed what I was doing and stayed with Technology, working with rather than for Leo.

One of the joys of the new job was the analytical equipment. There was a 'Milliprobe' XRF system, designed by Teddy Hall, Director of the Research Lab at Oxford. When it broke down he had to come and mend it as no-one else knew how it worked! This was before the days of Health and Safety; you were just told not to walk round to the 'live' side while the machine was turned on! Later some lead shielding was installed, but gaps had to be left so the machine could be adjusted while it was turned on. It was temperamental and slow to use, but was a revelation in identifying the surface platings and bulk composition of artefacts.

Much less idiosyncratic was the almost unused atomic absorption spectrometer, although having acetylene cylinders right next to the machine added a certain trepidation to lighting the burner. My instructions were to find a project in which to use it. I talked to Ian Cross, one of the conservators in the Lab, about what might be useful and he suggested we worked with Sarnia Butcher, a Principal Inspector with Roman interests, on analysing finds from Richborough that were being re-conserved. We decided to look at brooches as there was a relatively well-defined typology against which variations in composition could be compared. This was in the days when any object that came out of the ground looking green and furry was automatically described as 'bronze', so expectations for the analysis

Justine operating the Milliprobe, the Lab's first XRF system, in the basement at Fortress House in 1975. You had to watch the pen on the drum recorder all the time as it tended to lift off, leaving you with nothing to show for the 10 minutes it took to acquire a spectrum

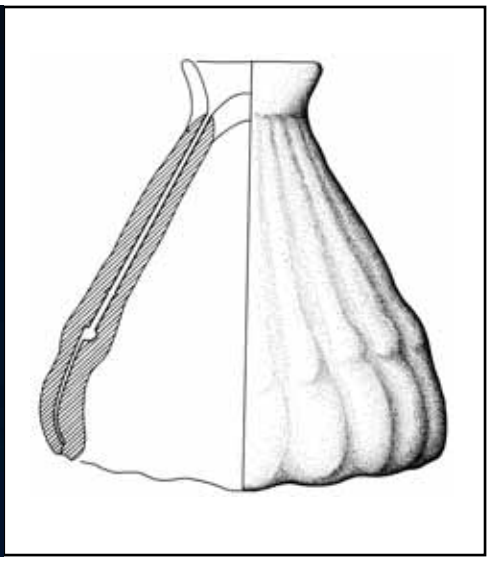
programme were not high. The results were most exciting, as a whole range of different copper alloys were present, and there was good correlation of composition with typology. So began my crusade to persuade archaeologists to abandon their old terminology, replacing 'bronze' with 'copper alloy' if the object had not been analysed as confusion could arise when an increasing number of objects were being analysed, both in the AML and elsewhere. A classic example is Ian Stead's Baldock report.

The brooches project itself kept growing. All 450 or so brooches from Richborough were eventually analysed, as were over 3,000 more from sites all over the country, with Sarnia and myself providing typological and analytical reports for dozens of excavations. Eventually we decided enough was enough and drew together all the work in a monograph (which was noted in *Research News* 2) though there are still unresolved questions that I may go back to.

Alongside all the analytical work I developed interests in a range of high-temperature technologies, especially metal- and glass-working. These have been the mainstay of my work, and once again I was lucky enough to be in near the beginning of the scientific investigation of residues from crafts and industries. Others working in this area have focused their attention on the production of metals, especially iron, while my interests leant towards the secondary working of non-ferrous metals. Although crucibles and moulds are not unfamiliar to archaeologists, other types of finds that were previously unrecognised have now been identified, and the processes producing or using them understood, often by comparing archaeological finds with medieval treatises describing what was then known and done. Examples are cupellation and parting, processes used to refine precious metals. In the 1970s archaeological finds were almost unknown though I identified both cupels and parting vessels from the Coppergate site in York and from Flaxengate in Lincoln, two large assemblages of early medieval metal- and glass-working finds that occupied me intermittently for many years.

Justine showing Prince Charles and Andrew Saunders, Chief Inspector of Ancient Monuments (CIAM) some of the human bones she was recording in the AML in 1974

Even easily-recognised finds such as clay moulds are worth investigating. Sometimes, as at Castleford, the large quantities allowed reconstruction of multi-object moulds used for casting late Roman spoons, and there were also earlier moulds for enamelled vessels, which helped settle the question of where at least some of these gaudy Roman



Below, from left: Justine recording a skeleton on excavation at Empingham

Some of the spoon-mould fragments from Castleford

Reconstruction of spoon mould

souvenirs were made (*Research News* 3). More surprising were the bronze moulds for casting Roman brooches found by a metal-detectorist at Old Buckenham in Norfolk. Two other Norfolk sites have subsequently produced more bronze moulds for 1st-century Roman brooches.

There was relatively little archaeological evidence for glass technology when I started. A few medieval furnaces had been excavated and published, but evidence for glass-working at other periods has mainly been found more recently. There are now numerous collections of Roman glass-working finds, and new excavations on medieval, and especially post-medieval, glass-working sites (eg Silkstone, *CfA News* 4), but I've focused on the Saxon period. I'd written to Donald Harden enquiring about his research on the glass-working at Glastonbury Abbey, and when he finally retired he gave me the material and records he'd made while excavating there. Reconstructing what had been found in the 1950s was like doing a jigsaw with half the pieces missing, but I'm happy that the half-truths that had got into the literature can now be compared with what was really found. I've also looked at Saxon glass trinkets. I started by identifying the colorants in early Saxon beads and then discovered that high-lead glass, which was known in eastern Europe in the 9th-10th centuries, was also being made into beads and rings in England at the same time (*Research News* 6).

The first crucibles containing high-lead glass that I saw came from Gloucester, with others from Lincoln and York, and most recently from Dublin. Objects made of this dense but lustrous golden, green and black glass are now being recognised all over the country.

Knowledge of ancient technology has certainly moved forward by leaps and bounds since the 1970s, but even more important than understanding the technical details is integrating the new knowledge back into mainstream archaeology, so questions about how and where things were made in the past are both asked and answered. Raising awareness of past technologies has been a continuing thread running through my working life. Together with those who've worked with me I've organised 'Slag Days' and written datasheets and guideline documents. These aim to help field archaeologists recognise what they've found and excavate it better – so we can all learn more from their discoveries.

In 1981 I took over as Section Head when Leo retired, and now I'm leaving too after more than 29 years in a single job and nearly 37 years working for the AML and its successors. So, what'll I do now? Carry on, and do more of the same I'm afraid; you can't teach an old dog new tricks!

Justine Bayley

Top left: Moils are evidence for glass blowing; traces of iron from the blowpipe survive on the glass waste. From Glastonbury Abbey

Bottom left: Glass on crucible sherds from Glastonbury Abbey

Right: The first bronze mould for a Roman brooch found in England: the two-piece mould from Old Buckenham

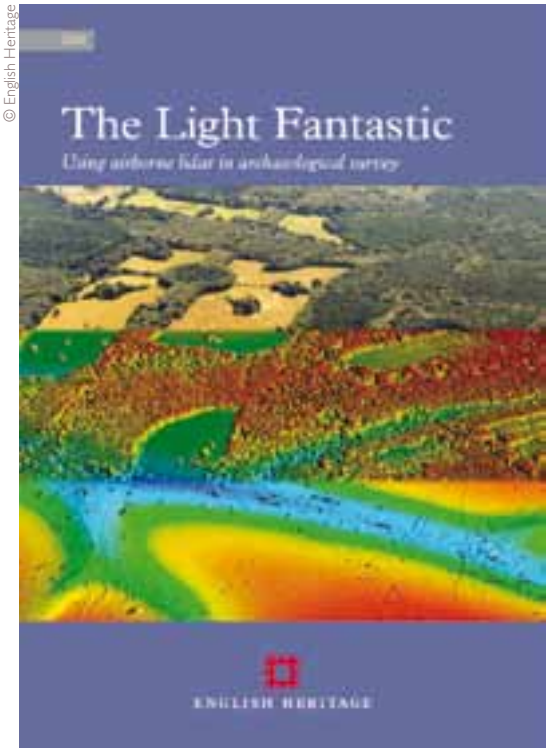
NOTES & NEWS

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

THE LIGHT FANTASTIC

In England, aerial photography has been used for the recording and interpretation of sites and landscapes for over 40 years, but in the last decade the potential of using lidar for archaeological survey has become apparent. As greater interest developed in the technique and its use became more widespread it became clear that there was a need to produce guidance to help those intending to use the data for archaeological survey. Lidar data can be immensely useful and has unrivalled capabilities for mapping in certain environments, such as within particular types of woodland. There are, however, still lots of uncertainties within the broader archaeological community about just what it can and cannot do. There are also many aspects of the data collection that need to be clearly understood and correctly specified if the data provided is to be as useful as possible. To this end English Heritage has produced a set of guidelines to help those intending to use lidar for archaeological survey. These cover the major aspects of data collection (ie issues of resolution and data formats), as well as issues related to using the data in day-to-day survey, ranging from producing viable hard copy printouts for use in the field, to mapping with fully interactive raster surfaces in CAD and GIS. They will shortly be available both as hard copy and as a PDF download from the English Heritage web site.

Simon Crutchley



Cover of the Lidar guidance document

BURNING BRIGHTER

We are pleased to announce that Laura McParland (Royal Holloway, University of London) successfully completed her viva for her Ph D on '*Utilisation of quantified reflectance values to determine temperature and processes of formation for human produced archaeological charcoal*'. This work was part funded through the Historic Environment Enabling Programme.

Laura's research focused on using mean random reflectance of charcoal assemblages as a means of determining the temperature of formation of a charcoal assemblage. The reflectance, or shininess, of the cell walls of charcoal increases as the temperature and duration of heating increases. Charcoal fragments are embedded in polyester resin and polished before being studied using standard techniques for coal petrography. Mean random reflectance is measured and the values obtained can be used to infer the temperature of formation of the charcoal assemblage.

This allows charcoal assemblages from wild fires to be distinguished from those produced from domestic hearths as the former tend to have a larger spread of reflectance values including very low values indicating charring

at low temperatures. Similarly it should be possible to tell whether archaeological charcoal assemblages are derived from industrial hearths or domestic hearths as charcoal from the former will have higher reflectance values.

The research also established that where charcoal is re-charred, as would occur when charcoal is used as the initial fuel in a process, the resulting charcoal takes on the reflectance value of the highest temperature it experienced. In addition the investigation also showed that the 'vitrified charcoal' is not produced as a result of charring at high temperatures as the reflectance values obtained from vitrified charcoal fragments were low, showing that other factors must be responsible for this phenomenon.

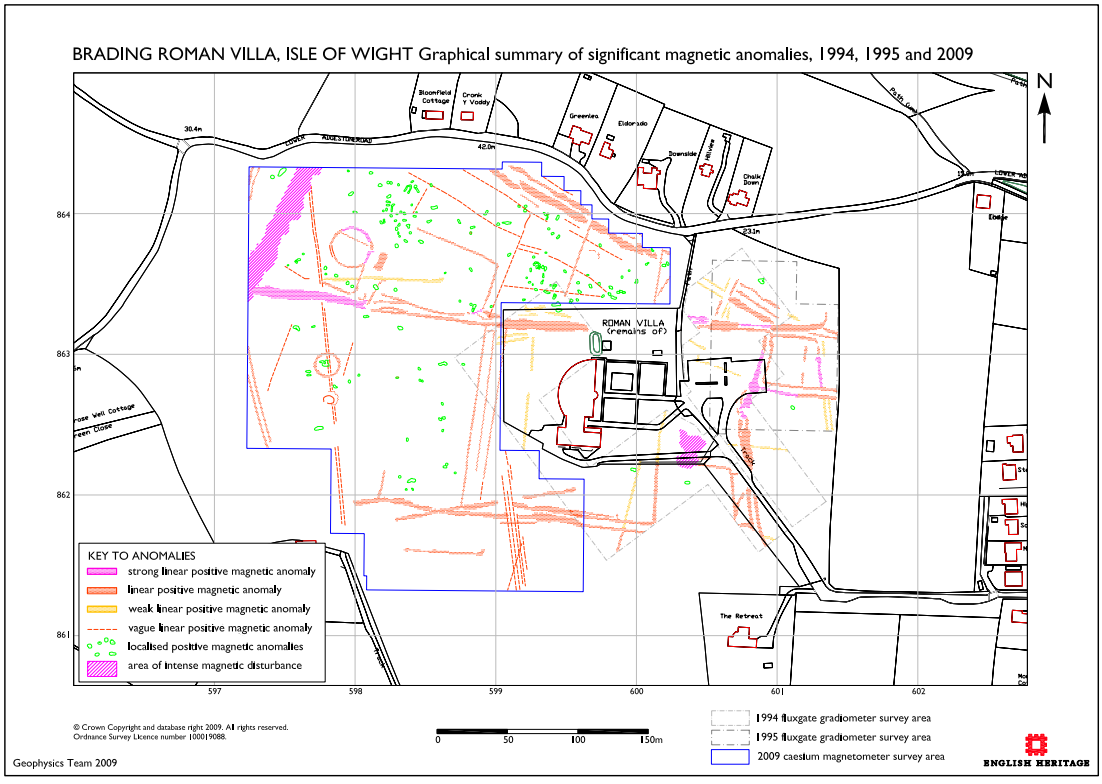
Two papers related to this research have now been published, and are listed among the new publications on the back page of this issue.

Gill Campbell

BRADING ROMAN VILLA, ISLE OF WIGHT

Caesium magnetometer surveys were undertaken by the Geophysical Survey Team of English Heritage between February 2009 and 2010 to investigate the landscape setting of the nationally important Roman villa remains at Brading, Isle of Wight (NGR SZ 599862). The survey was carried out in support of a five year programme of excavation (under the direction of Sir Barry Cunliffe in association with the Oglander Roman Trust) designed initially to re-evaluate the Victorian excavations of the main villa ranges (1879-1885) and then explore the relationship of the villa with the wider surrounding landscape in the Roman period. The geophysical data will inform the future stages of excavation focused on examining the landscape setting and the eventual aim is that the combined results of the new research will be used to improve the interpretation of the villa remains on display in the visitor centre building. The magnetometer survey indicates a complex of ditch-type anomalies defining field boundaries, enclosures and track-ways extending out into the wider landscape beyond the villa. The principal villa structures appear to occupy a focal point in this arrangement of boundaries and roadways and this activity most probably represents successive phases of occupation from the later Iron Age continuing into the Roman period. The survey also located a previously unknown group of ring-ditches 150m west of the villa, suggestive of prehistoric funerary monuments or perhaps, a series of outlying Romano-British shrines.

Andy Payne



Graphical summary of magnetic anomalies detected at Brading revealing an extensive network of enclosures, boundaries and trackways in the villa landscape. The interpretation is based on caesium magnetometer survey in 2009 together with earlier fluxgate gradiometer coverage from 1994-95. Additional survey in February 2010 has since provided further evidence of activity to the south of the villa complex

RESEARCH DEPARTMENT REPORT SERIES: January 2010 – April 2010

2008 SERIES

55. Jones, J, 'Ferry Fryston, Site D, Yorkshire: Freeze-lifting, Conservation and Analysis of Grave Goods from an Early Bronze Age Burial'
60. Fell, V, Watson, J, and Peacock, Z, 'Groundwell Ridge, Swindon, Wiltshire: Investigative Conservation of Finds Recovered During Excavations 2003-2005'
71. Hambleton, E, 'Review of Middle Bronze Age / Late Iron Age Faunal Assemblages from Southern Britain'
73. Brown, G, 'Richmont Castle, East Harptree: An Analytical Earthwork Survey'
76. Tyers, I, 'Hartlebury Castle, Near Stourport-on-Severn, Worcestershire: Dendrochronological Analysis of Oak Timbers'
78. Tyers, I, 'Hoarstone Farm, Bewdley, Worcestershire: Dendrochronological Analysis of Oak Timbers'
93. Howard, R E, and Arnold, A J, 'Turton Tower, Chapeltown Road, Turton, Blackburn with Darwen: Tree-Ring Analysis of Timbers'

2009 SERIES

34. Howard, R E and Arnold, A J, 'Oak House, Oak Road, West Bromwich, Sandwell, West Midlands: Tree-Ring Analysis of Timbers'
55. Oswald, A, Burn, A, and Jecock, M, 'Cockersand Abbey, Thurnham, Lancashire: An Analytical Earthwork Survey'
63. Menuge, A, Hunt, A, Sinton, P, Jecock, M, Dunn, C, Archer, N, Bentley, M, Berry, T, Goodall, I and Taylor, S, 'Gatebeck Low Gunpowder Works and the Workers' Settlements of Endmoor and Gatebeck, Cumbria. An Archaeological and Architectural Survey'
75. Howard, R E, Arnold, A J, Tyers, C, and Hurford, M, 'The Old Hall, West Auckland, County Durham: Tree-Ring Analysis of Timbers'
84. Bridge, M C, 'Boreham Henge, Old Hall, Boreham, Near Chelmsford, Essex: Dendrochronological Analysis of Oak Timbers'
87. Howard, R E, and Arnold, A J, 'Willimoteswick, Bardon Mill, Northumberland: Tree-Ring Analysis of Timbers'
88. Howard, R E, and Arnold, A J, 'St Mary's Church, Church Road, Barnes, London: Tree-Ring Analysis of Timbers'
89. Ainsworth, S, and Went, D, 'Whitley Castle, Tynedale, Northumberland: An Archaeological Investigation of the Roman Fort'
90. Dungworth, D, 'Chatsworth House Greenhouse, Chatsworth, Derbyshire: An Investigation of the Flat Glass'
91. Dungworth, D, 'Basing Grange, Old Basing and Lychpit, Hampshire: Chemical Analysis of Excavated Window Glass'
92. Dungworth, D, 'Basing House, Old Basing and Lychpit, Hampshire: Chemical Analysis of Excavated Window Glass'
103. Howard, R E, and Arnold, A J, 'Yarde Farmhouse, Malborough, South Hams, Devon: Tree-Ring Analysis of Timbers'
104. Payne, A W, 'Brading Roman Villa, Isle of Wight: Report on Geophysical Surveys, March 1994, April 1995 and February 2009'
105. Linford, P K, Payne, A W, Linford, N T, and Martin, L, 'Silbury Hill, Wiltshire : Report on Geophysical Surveys, 2005-2008'

2010 SERIES

1. Tyers, I, 'Old Duchy Palace, Lostwithiel, Cornwall: Dendrochronological Analysis of Oak Timbers'
2. Tyers, I, 'Storeton Hall Farm, Storeton, Wirral: Dendrochronological Analysis of Oak Timbers'
3. Howard, R E, and Arnold, A J, 'Monks' Hall, Eccles, Salford, Greater Manchester: Tree-Ring Analysis of Timbers'
4. Tyers, I, 'Old Manor House, Manningham, Bradford: Dendrochronological Analysis of Oak Timbers'
5. Dungworth, D, Belford, P, and Ixer, R, 'Upper Forge, Coalbrookdale, Telford, Shropshire: The Examination of Crucibles, Copper Ore and Slag'
6. Dungworth, D, 'Newent Glasshouse, Newent, Gloucestershire: Examination of Glass and Glassworking Waste'
7. Tyers, I, '18 North Street, Exeter, Devon: Dendrochronological Analysis of Oak Panels'
11. Waugh, H, 'West Hill Works, West Hill, Hitchin, Herts: Historic Building Report'
12. Tyers, I, 'Boscobel House, Near Brewood, Shropshire: Dendrochronological Analysis of Oak Timbers'
13. Franklin, G, 'Laverstoke Mill, Whitchurch, Hampshire: Historic Buildings Report'
14. Tyers, I, 'Scordale Lead Mines, Near Appleby-In-Westmorland, Cumbria: Identification and Dendrochronological Analysis of Softwood Timbers'
15. Tyers, I, 'Manor Farm Barn, Bierton with Broughton, Buckinghamshire: Dendrochronological Analysis of Oak Timbers'
16. Lucas, V, 'An Assessment of Bottle Glass from the Hightown Glasshouse'
17. Dungworth, D, 'Welch Road, Southsea, Portsmouth: An Investigation of Some Window Glass'
18. Dungworth, D, and Wilkes, R, 'Wentworth Castle Conservatory, Stainborough, South Yorkshire: Chemical Analysis of the Flat Glass'
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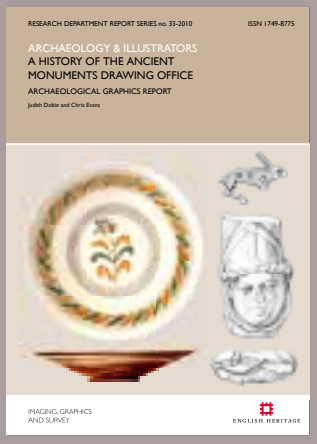

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