YORKSHIRE ARCHAEOLOGY TODAY

No.18

Early Medieval Enigma

A newly discovered hanging-bowl from Yorkshire

Inside:

Hungate: its third year

JORVIK: its third incarnation

Buildings of Yorkshire

YORK ARCHAEOLOGICAL TRUST

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Contents

Cover Photo

Enamelled basal escutcheon from hanging-bowl found near Wetherby (p.4). Photo: Mike Andrews

Number 18

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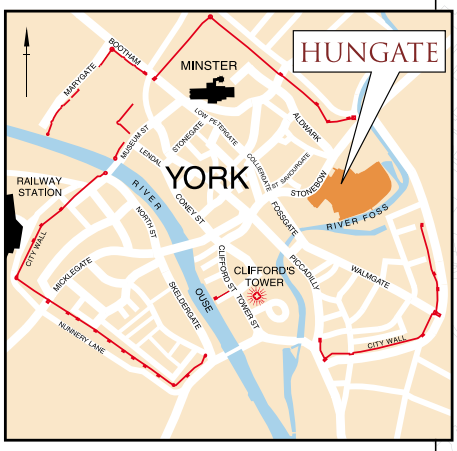
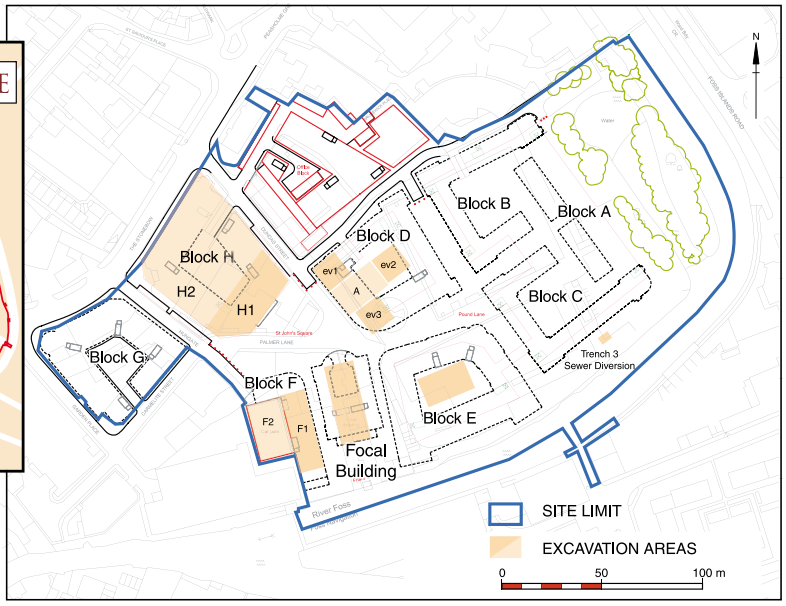
Three Is The Magic Number!

An Update On The Hungate Excavations

The large scale and long-running excavation at Hungate, a street and area close to the River Foss in the heart of York, has finished its third year and is now well into its fourth year of five; and the project continues to make landmark discoveries and achievements.

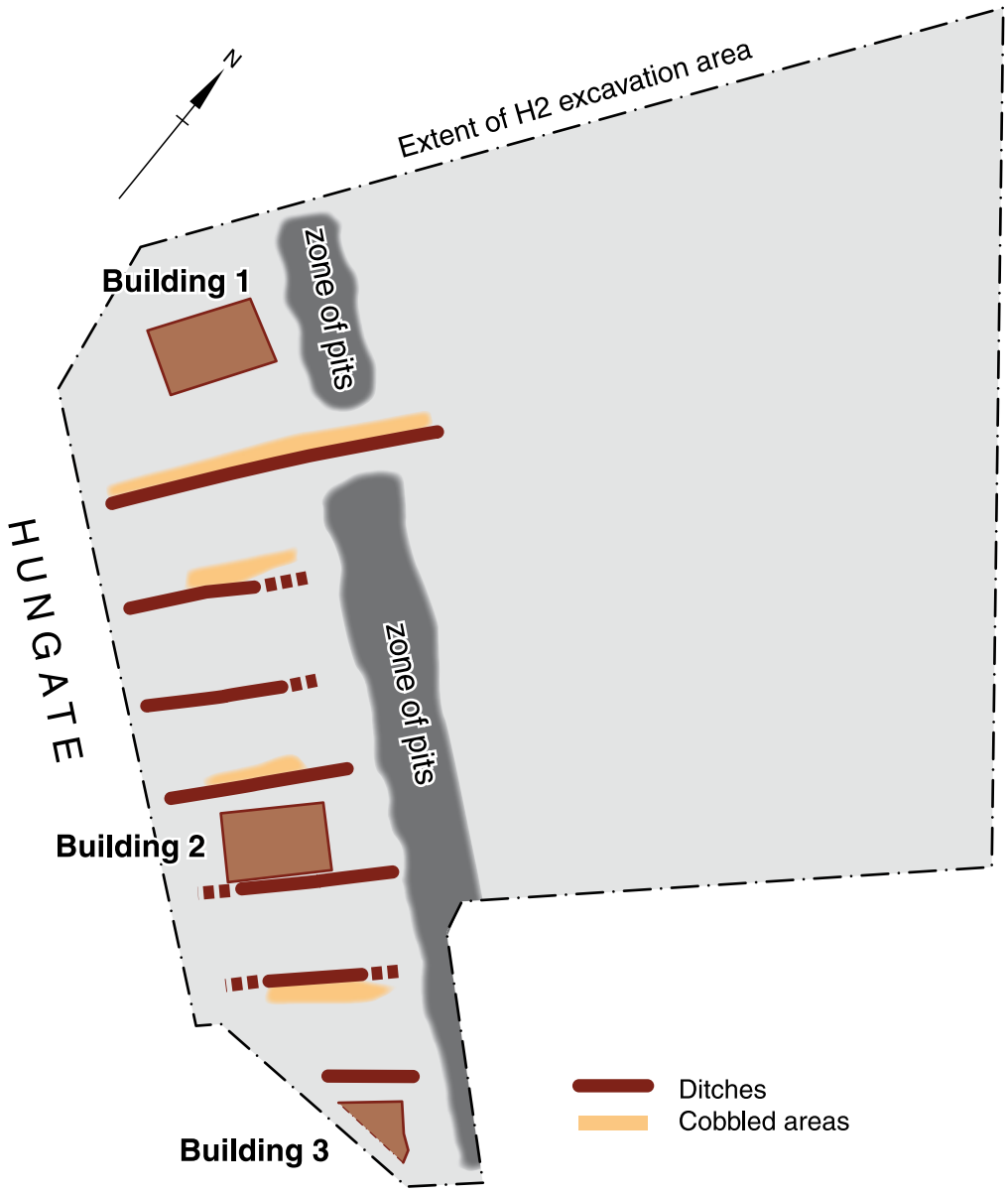




The second half of 2009 and the opening months of 2010 saw the Hungate team focus their endeavours on the 10th – 11th-century Anglo-Scandinavian archaeology immediately to the east of the street Hungate, within the excavation area known as Block H. The picture that the team has been revealing is of the development and expansion of the Viking-Age city of Jorvik along the River Foss, undoubtedly reflecting the successes of this important urban centre in the Viking and Anglo-Saxon world. Some preliminary interpretations of this archaeology are outlined below:

Early to Mid 10th century: The initial early 10th century activity appears to be a deliberate raising of the ground surface by the laying down of a multitude of well defined 'tiger stripe' layers consisting of

Early to mid 10th century 'Tiger Stripe' deposits.



Location and layout of mid-10th to 11th century Anglo-Scandinavian land divisions and associated buildings.

charcoal, ash, burnt clay, fragments of daub and soil altogether giving an appearance of alternating black and orange layers. In places this build up can be over 1 metre thick, with a greater depth closer to Hungate. Currently the source of these deposits still has not been determined, but the raising of the land levels is probably a response to land requirements along the edge of the River Foss, which would have been situated immediately to the southwest of Hungate.

Mid 10th century: The landscape was partitioned during the middle decades of the 10th century. This partitioning is represented by the laying of river-borne cobbles to make what appear to be narrow lanes aligned at right angles to Hungate, and spaced c. 10m apart (or, sometimes, half of that distance). This divides the land up into at least five separate plots.

Late 10th century: During the second half of the 10th century sunken feature buildings were erected in the back of the plots. Two of these buildings have been fully excavated and a small portion of a third has also been excavated (the large majority of the third lies under Palmer Lane). The initial interpretative work suggests that these buildings represent basements/cellars without floors at ground level. To determine what is happening inside these basements will require further work, but the lack of any obvious large-scale evidence for occupation or manufacturing would suggest that they were not used as houses or craft workshops. Also, during this period the back of the plots

Archaeology Live 2009 training school busy at work.
Inset: Edward III Quarter Noble, minted in London between 1361 and 1369

were defined by a long row of cess pits, rubbish pits and wicker lined 'soaking' pits. This line of pits is aligned parallel to Hungate.

11th Century: During the 11th century the sunken feature buildings fell out of use and were eventually infilled and levelled off. After this point the larger plots were subdivided with ditches and the earlier cobbled lane boundaries were also cut by new ditches. These new plots measured a relatively consistent c.16.5 feet (5.03 metres) wide.

Excavation work and analyses of this Anglo-Scandinavian archaeology will continue throughout 2010 and with this the phasing and interpretation of this data will undoubtedly be refined and we expect more discoveries to be made.

Elsewhere in Block H the Community Archaeology Team (working in the northern corner of the site) has been making some astounding medieval and early post-medieval discoveries. During November 2009 the excavation of a medieval rubbish pit recovered the first, and to date only, gold coin from all of the Hungate excavation areas. This rare gold coin is an Edward III Quarter Noble, minted in London between 1361 and 1369 (above right). The discovery of such an item by a member of the Community Archaeology Team goes to show that grand discoveries are not only the preserve of professional archaeologists.

The Community Archaeology Team has also been excavating a substantial mid-17th century brick- and stone-lined square pit located on the edge of the site. During the removal of the backfill from this pit an almost complete and intact green glazed jar and a complete purple glazed two handled cup have been recovered. Such mid-17th century finds tend to be rather rare in York as mid/late 17th-century deposits generally lie close enough to the contemporary ground surface to have been truncated by the vast

amounts of building work that took place in York from the late 18th century and through the 19th century. Such finds, and the structure that they were contained within, give us a rare glimpse into the archaeology of York during the period of the English Civil War.

Alongside all of the excavation work the outreach, training, education and public participation elements of the project have also continued to be successful. Our work with young people involved with the City of York Council Youth Offending Team is still well supported by YAT staff and our external partners, and we have had our first success in taking archaeology out to Residential Homes in North Yorkshire. The Residential Homes visits allow people who aren't able to visit Hungate to find out about our excavation, handle some of the artefacts from the site and have their questions answered by a professional archaeologist.

The summer Archaeology Live 2009 training excavation proved to be the most popular Archaeology Live season that YAT has provided to date. With a 93% uptake on places, over 250 trainees and placements gained hands-on experience of Anglo-Scandinavian and later medieval archaeology during the 12 week long summer training season. Including all of the other training seasons, opportunities and various ways to get involved with Hungate, we can safely say that over 1000 people have now taken part in the Hungate dig.

The project continues to hold regular free open days throughout the year. The most recent open day coincided with the 25th JORVIK Viking Festival, and swelled the number of visitors to the site, so that we can now say that about 16,500 people have visited the Hungate project. This undoubtedly makes Hungate the most visited developer-funded archaeology site in Britain.

Altogether the third year of Hungate has proved to be extremely successful and the project reveals the depth of knowledge and talent that YAT has to achieve such great results. With a completely overhauled website, the progress of Hungate can be followed at www.dighungate.com , and updates on the Archaeology Live training school can also be followed on Facebook.

Peter Connolly

Other remarkable discoveries that have been made during early 2010 include the recovery of an intact shale bracelet (above) from a Roman burial found in the southern corner of Block H. At the more recent end of the chronological spectrum, we have also uncovered ten early 19th-century one-up/one-down, back-to-back houses in a new trench towards the River Foss. There will be more on these discoveries in upcoming issues of *Yorkshire Archaeology Today*.

Just hanging on

A newly-discovered hanging bowl

One of the most unexpected opportunities of recent years came to staff at YAT recently when we were able to have a brief look at a well preserved large copper alloy vessel which was brought in to us by a metal detectorist. He had recovered the object a couple of years previously in a field somewhere in the vicinity of Wetherby, North Yorkshire. Much of the base of the vessel was missing, although decorative enamelled roundels – or basal escutcheons - and their frames from the centre of the base had survived separately. Most of the body and rim of the bowl was in good condition, as were a series of three circular hooked escutcheons, which were decorated and enamelled to complement the design on the basal escutcheon; the hooks appeared to represent stylized animal heads. Three small suspension rings, and larger rings which probably framed the circular hooked escutcheons, were also found with the bowl. All these elements lead to the identification

One of the three hooked escutcheons embellished with enamel

Above, top row; hooked escutcheons for suspension: bottom row, top and bottom view of basal escutcheon
Below; reconstruction of hanging bowl showing positions of escutcheons

of the vessel as a hanging-bowl: these thin-walled vessels would have hung via chains from three (or occasionally four) hooks which projected from the escutcheons which were positioned around the rim at regular intervals and which were soldered into place.

The design of these enamelled escutcheons includes an ornamental repertoire commonly labelled as 'Celtic'; and one of the major bones of contention among experts has been where the bowls were made, with Ireland being canvassed by some experts. Others have suggested that they were made in Anglo-Saxon England by British craftsmen. Recently, an origin in the British areas of Britain has been proposed; and this might include the British kingdom of Elmet, in West Yorkshire.

It seems that although at least 168 hanging bowls and/or separate escutcheons have been recorded as being found in Britain (and an unknown number unrecorded), there is still some doubt as to their function. They clearly were intended to be suspended, probably at about eye level, so that any decoration could be appreciated; possible uses that have been suggested include as containers for water, perhaps for hand washing, or for containing some other liquid to be used at table. It is thought that they could have been hung up out of the

Metal fragments and suspension rings

way when not in use, and then lowered via the chains when required. It is highly unlikely that they were used in association with heat or flames: the lead solder which attaches the escutcheons to the bowls would melt in such circumstances.

Most hanging bowls have been found in the east and south of England, often in Anglo-Saxon burials dated to the century c. AD 570-670, and it has been noticed that many were old, repaired or incomplete when they were buried. This suggests that, whatever their function, they were prized possessions or heirlooms. The famous Sutton Hoo, Suffolk, Anglo-Saxon ship burial of c. AD 625 contained no less than three hanging bowls, in a range of sizes, one of which had been repaired using silver. Another example, dated to the 7th century, excavated from within a stone-lined cist grave at St Paul in the Bail, Lincoln by Lincoln Archaeological Trust, was the sole surviving item, apparently overlooked, when the body or skeleton buried in this grave had been exhumed in antiquity. This bowl too had been in a poor state when buried, with one escutcheon detached and the rim having needed repair.

The bowl, inverted

As with the functions of the bowls, their dating is also the subject of much discussion. Recent research points to the origins of these bowls around the mid-6th century A.D. Some later examples are also known from non-burial deposits, however; several escutcheons, including one enamelled with a cross motif, were found during clearance at Whitby Abbey, and an unenamelled bowl from the Castle Yard, York, dated c. 700, found in 1829, which is in the Yorkshire Museum. Other Yorkshire finds include a pair of rather plain bowls from Finningley, South Yorkshire, discovered in the early 19th century and now in the Yorkshire Museum, a complete but, again, rather plain, unenamelled bowl dug out of a barrow at Hawnby, North Yorkshire in the 19th century, and an enamelled mount from Dunnington near York. As the find spot of the 'Wetherby' bowl was not investigated archaeologically, the circumstances of its deposition are unclear, although the finder told us that he did not recognise any other objects or any traces of a burial.

In summary, then, this tantalizing find represents a significant addition to the list of hanging bowls found in England; and will doubtless be much discussed in the future, both as an object of beauty, made with great skill, and one which has much potential for further research to shed light on a period of Yorkshire's history which is still the subject of much debate.

Nicky Rogers and Richard Hall

The best days of your life?

Oral history update

Local oral historian and writer Van Wilson is currently busy at work on the Trust's latest oral history project, examining secondary education in York up to 1985 when the city became fully comprehensive. A book, based on Van's interviews, will provide an overview of secondary education in the city, as well as exploring a number of schools in greater depth, including grammar schools such as Nunthorpe, Mill Mount and Archbishop Holgate's, secondary modern schools including Lowfield, Knavesmire and Manor, and independent schools such as York College for Girls, Bootham and the Bar Convent. Many aspects of school life will be explored, including teaching methods and daily life, bullying and corporal punishment, and perceptions of school. The critical 11-plus exam and its effects on individuals and families will be examined in some detail.

Of course the joy of such studies is to be found in the detail and the eclectic nature of the material. Dr Ian Stead, an ex-pupil of Nunthorpe School, and previously Deputy Keeper of Prehistoric and Romano-British Antiquities at the British Museum, was interviewed for the project. He explained that it was a visit of Peter Wenham to the school after the pupils had taken their 0-level examinations, following a change of headmaster, which led to him becoming an archaeologist.

'The other thing that he'd done was, after you'd taken the O level or School Certificate, under the old headmaster we were allowed to go out and play cricket or muck around, it would have been a fortnight, three weeks. And this new fellow announced that when we'd finished taking the exams, we would do library work. That went down like a lead balloon. It was at

Peter Wenham (foreground) and Ian Stead excavating together at Riccall in 1956

Bootham Gala 1906

that point that an archaeologist came to the school, Peter Wenham, and said he was doing an excavation at Trentholme Drive, and he wanted volunteers. This was the way out. So I was one of the first volunteers. There were four of us. We went down and saw this site of a Roman cemetery. Both sides of the road, the corners of Trentholme Drive, were open plots. And there were all these other students who were scraping away at skeletons and whatnot and we thought, "This is the life". Then he took us to the other side of the road and said, "This is what I want you to do". He took us into a corner where there was an enormous bed of nettles and he wanted a trench digging, so we had to clear this bed of nettles, then we found the remains of an air raid shelter, concrete and whatnot, we had to get rid of all that. Then we had to dig this great trench and at the end of it, we found nothing at all. He came across and said, "Excellent, just what we wanted, that's negative evidence. The cemetery mustn't have extended as far as that". And then the next year he offered to pay me something so I went and worked with him at Blossom Street, on the Roman road. That's how I got into archaeology'.

The book on York's secondary schools, the fourth in YAT's popular oral history series, will be published in the autumn. We are now planning the fifth volume in the series, and propose studying the Clifton area of York. This area boasts a rich historical background but has never been brought to life with an oral history study. Clifton Green was the site of the old Clifton Feast, and Clifton Ferry (which preceded the present bridge) was in operation for many years. The area housed the famous Clifton Cycling Club, as well as Clifton Carriage works, the Society Club and the Bootham Gala. It promises to be yet another excellent project.

We are most grateful to the following organisations who have so generously continued to fund our oral history work: Friends of York Archaeological Trust, Yorkshire Architectural and York Archaeological Trust, Robert Kiln Charitable Trust, Patricia and Donald Shepherd Charitable Trust, Sheldon Memorial Trust, York Common Good Trust and Yorkshire Philosophical Society.

Christine Kyriacou and Van Wilson

Current Thinking on the Heslington Brain

Regular readers will recall the announcement in No.16 of the discovery of a human brain within a skull found in isolation during our excavations on behalf of the University of York in their new Campus 2 site at Heslington, York. In No.17 we outlined a programme of research into 'Britain's Oldest Brain' which dates from about 600-500BC; here Dr Sonia O'Connor, Principal Investigator for this project, brings us up-to-date with progress.

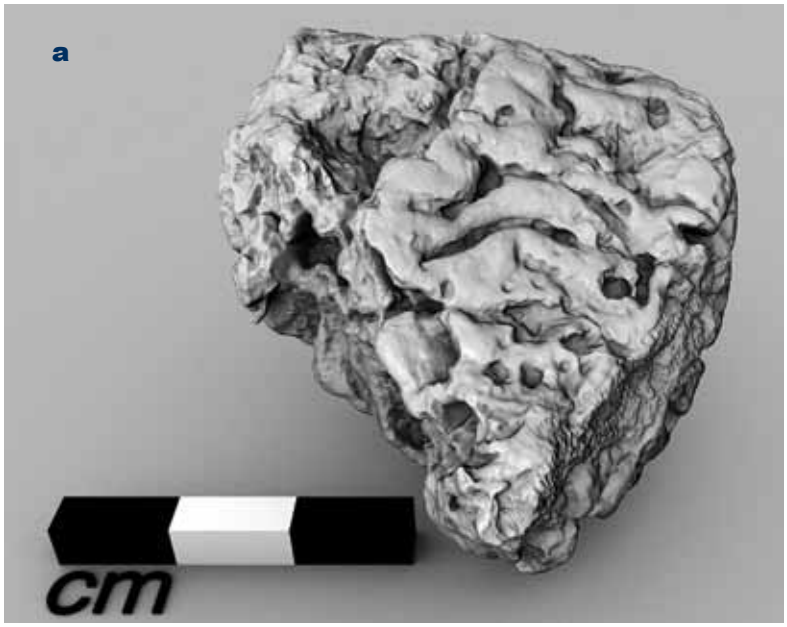
Why has the Heslington brain survived burial for over two and a half thousand years? Why has no other soft tissue been preserved? What is the archaeological significance of this and similar finds of brain tissue from otherwise skeletonised human remains? Can we predict where we might find them in the future? These are just some of the questions that the combined research team drawn from the Universities of Bradford, York, Manchester and Hull, University College London and York Hospital, are attempting to answer.

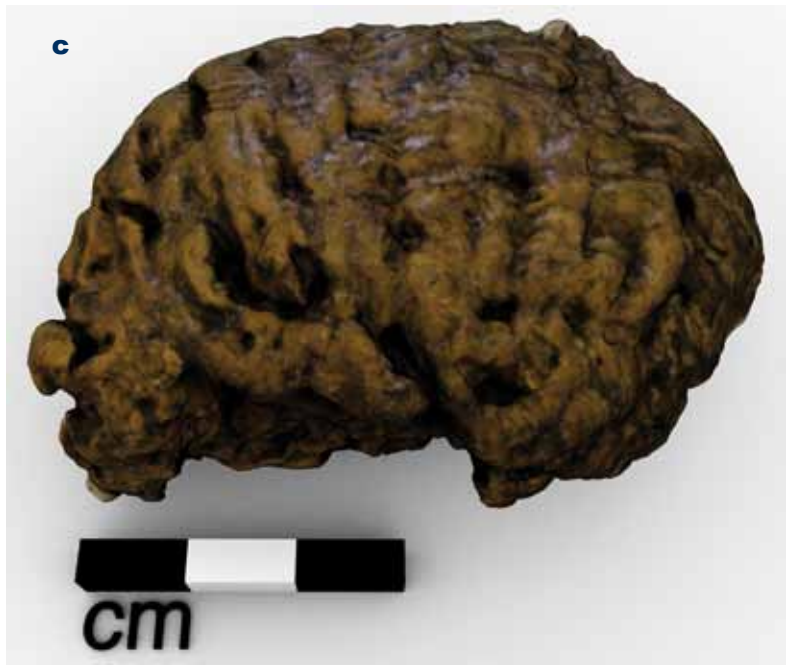
Although rare, brains have previously been found in skeletons from submerged environments and waterlogged ground. Despite past research, we still do not understand why they should survive when no other soft tissues are preserved. The brain tissue seems to change into a material that is resistant to decay. Following excavation, the Heslington brain has survived months in wet, chilled storage conditions, in which fresh brain would have rotted in a matter of weeks.

At death, bacteria in the gut normally travel out though the blood vessels and nervous system, spreading decay. The brain is a very fatty organ, so once infected it is quick to putrefy, even in the cold storage of a hospital mortuary. To prevent soft tissues rotting, something has to occur that inhibits the growth of the bacteria and fungi normally involved in this process. This might be deliberate, such as the embalming of Egyptian mummies, or accidental, as in the case of Ötzi the Bronze Age Iceman preserved by freezing due to exposure above the snow line on a mountain. Bog bodies are another example of burial in an environment that preserves soft tissues. Acid bogs exclude oxygen, and the water is rich in tannins and other chemicals from rotted plants. Together these conditions prevent putrefaction. It has been suggested that the Heslington brain might have been preserved in this way, and bits of wood and other plant remains recovered from the pit in which the skull was found do show that the environment had always been waterlogged. However, two things do not support this idea. In bog bodies the skin and even the hair and fingernails are preserved but the bones are largely destroyed. This is quite opposite to the Heslington skull and brain, where no skin survives and the bone is in good condition.

With funding from the University of York and English Heritage, and through the kind offices of York Hospital and Konica Minolta, it has been possible to record the skull and brain remains in 3D and to undertake a comprehensive study of their condition, structure and chemistry which is now beginning to reveal the story of this individual. Every aspect has been investigated, including the bone and deposits from inside and outside the skull.

The skull belongs to a man, 25 to 45 years old, whom DNA suggests may possibly have originated outside Britain. There is evidence that his neck was fractured before he was decapitated, using a small blade to cut through the flesh of the throat and between the second and third vertebrae of the neck. No insect remains have come to light from the deposits around or inside the skull. The brain remains have a resilient, tofu-like texture and well defined features, but are shrunken to perhaps a quarter of their original size. Histological study reveals that although autolysis (self-destruction





triggered in dying tissue) occurred, there is little evidence of putrefaction. There is no chemical evidence of deliberate mummification or embalming but we have found traces of brain-specific proteins and lipids, and their breakdown products. These include neurofilament proteins from the neurons (brain nerve cells), isolated using a ground-breaking immunological technique. Electron microscope images reveal what appear to be nerve fibres (axons) and features reminiscent of the insulating myelin sheaths that surround them in life. Most important, it seems that some of the persistent material has been formed from the proteins and lipids that, instead of breaking down, may have combined to form a cage-like framework.

From all these data we are beginning to form a picture of the events surrounding the deposition of the Heslington Skull. The evidence is consistent with hanging followed by a swift decapitation and burial in a relatively sterile environment. The clay-rich, waterlogged ground may have largely excluded oxygen and lacked the usual organisms, found in more aerated soils, which are so active in the recycling of organic waste. Cold ground would also have helped to slow decay. But something about this environment seems to have been the trigger that tipped the balance from gradual but inevitable destruction to the formation of a very persistent material. Now we know what the brain has become, the next stage is to understand that trigger.

My thanks go to the York Archaeological Trust and all the project team members who have so generously shared their knowledge, expertise and time.

Dr Sonia O'Connor
University of Bradford
Principal Investigator
Heslington Brain Project

A sample of the brain reconstructed by combining the laser scan data, taken by Konica Minolta, and the 3D photography. a, laser scan rendering, b, photo textured rendering, c, another view of the sample using the same laser scan and photo data. (reconstructions by Anthony Masinton).

Re-discover Coppergate:

JORVIK Viking Centre's new £1,000,000 refurbishment

On February 12th 2010 the Jorvik Viking Centre re-opened its doors to the public, revealing a new look which allows visitors to rediscover 'The Viking Dig' at Coppergate which, over 30 years ago, unearthed the remains of Viking-age York on this very site. This large-scale excavation, unmatched in archaeological terms in York, was what initially prompted the development of the Jorvik Viking Centre, which was opened in 1984.

The centre-piece of the refurbishment at JORVIK is a reconstruction of part of the Coppergate excavation. Here we display the remains of Viking-age houses, both the earlier post-and-wattle type and the later timber-framed sunken buildings, together with associated finds. This entire area, some 538 square feet (c. 50 square metres), has been glassed over to allow visitors to walk over the reconstruction and literally see the past beneath their feet.

Around the walls of this new gallery, entitled "Discover Coppergate", visitors are able to see, up close, some of the 1,000-year-old timbers from one of the buildings and also to discover, through an audio-visual display, how these remains were unearthed and preserved for future generations. Videos are used to explain more about the remains that were discovered at Coppergate, and new finds, never before seen by the general public, are displayed in a set of new cases accompanied by graphics panels and audio installations. Through these additions, visitors are able to discover where the Vikings came from, why they came here, how they lived, how they traded and where they travelled to on their voyages of exploration.

All of this new information is used to create a storyline for visitors so that they can piece together the evidence revealed through archaeology, which then has been

used to recreate part of the Viking-age city of Jorvik on the ride area at the Centre. This experience, which was installed in 2000, has now been enhanced using new state-of-the-art animatronics, built in Ohio, USA, but based on the original evidence from Viking-age York. A series of seven new figures have been installed on the ride, all of which talk in Old Norse to the visitors as they travel around the city. These voices have been provided by tutors and students from the Department of English and Related Literature of the University of York. In addition, an entirely new house has been added at the end of the ride. This depicts the living conditions of an amber worker and his family, and also displays the entire length of its back yard, complete with a scavenging red kite perched and overlooking an offal pit, livestock and an occupied toilet.

A second phase of redevelopment is now planned for later in 2010, using £150,000 of funding made available by the Wolfson Foundation. This very generous grant will be used to redevelop the final three galleries, and will broadly explore the role of science within archaeology, using new techniques, research and objects. Further news on this exciting phase of refurbishment will be revealed throughout the year, so you are encouraged to watch this space.

Sarah Maltby

HRH The Duke of York visits the new *Discover Coppergate* gallery, 28th April 2010

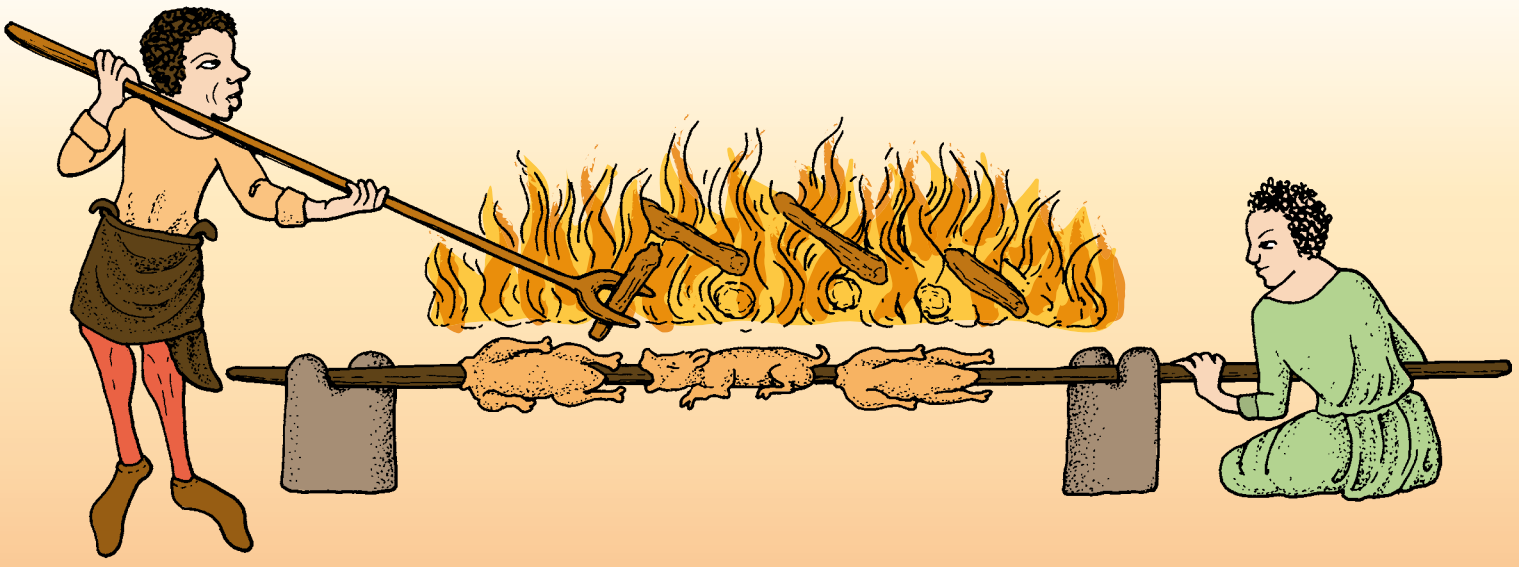
First take your chicken.....

Skewering meat on a spit to cook it over a fire has no doubt been practised from the earliest days of cooking. Ideally the spit needs to be supported, preferably in a way that allows it to be turned regularly to enable even cooking of the meat. Spits can be supported on anything from a convenient rock to a forked branch, but by medieval times depictions of spits in manuscripts generally show the supports being made of iron, often in the form of a vertical bar with notches so that the height of the meat above the flame could be controlled to prevent burning. An alternative to using metal supports was to use fired-clay supports; examples of this type are depicted in an illustration from the Luttrell Psalter, an English manuscript dating to c. 1340. This type of support was first recognised archaeologically in the Netherlands in the early 1980s by H. A. Heidinga and E. H Smink, and examples have since been recognised in Britain. Among these are three from York; two from the excavations at the site of St Leonard's medieval hospital, and one from the current Hungate excavations.

Although brick spit-supports were made in a variety of shapes including rectangular blocks and tapering pillars, the majority are in the form of tapering blocks. In all cases there are hollows along the upper edges to carry the spit, and in many examples the spit-supports are also pierced, either to support additional spits or, alternatively, to carry a bar supporting a suspended dripping-pan designed to collect the meat juices for basting. Brick spit-supports would only have been capable of carrying the weight of small joints of meat or small animals; the Luttrell Psalter illustration shows three small animals on the spit, two of which look like fowl while the third may be a rabbit or suckling-pig.

All three examples from York are incomplete, and so their full heights are unknown. Two were plain and one was decorated; it is possible that this may imply that one of the fragments was designed to be seen, and therefore merited decoration, whereas the remaining two fragments were from lower status buildings or rooms, where decoration was not required.

The decorated fragment from the site of St Leonard's Hospital is rectangular in cross-section and tapers from 151 to 113mm in width, and from 25mm at the top to c.75mm thick at the surviving base. There are two semi-circular indentations on the top of the fragment, the smaller of which is 32mm wide and 19mm deep, and the larger of which is 33mm wide and 28mm deep. A third socket with straight sides and a rounded end is present, piercing one of the narrower edges; this socket is 24mm wide. One narrow end of this fragment is undecorated, but



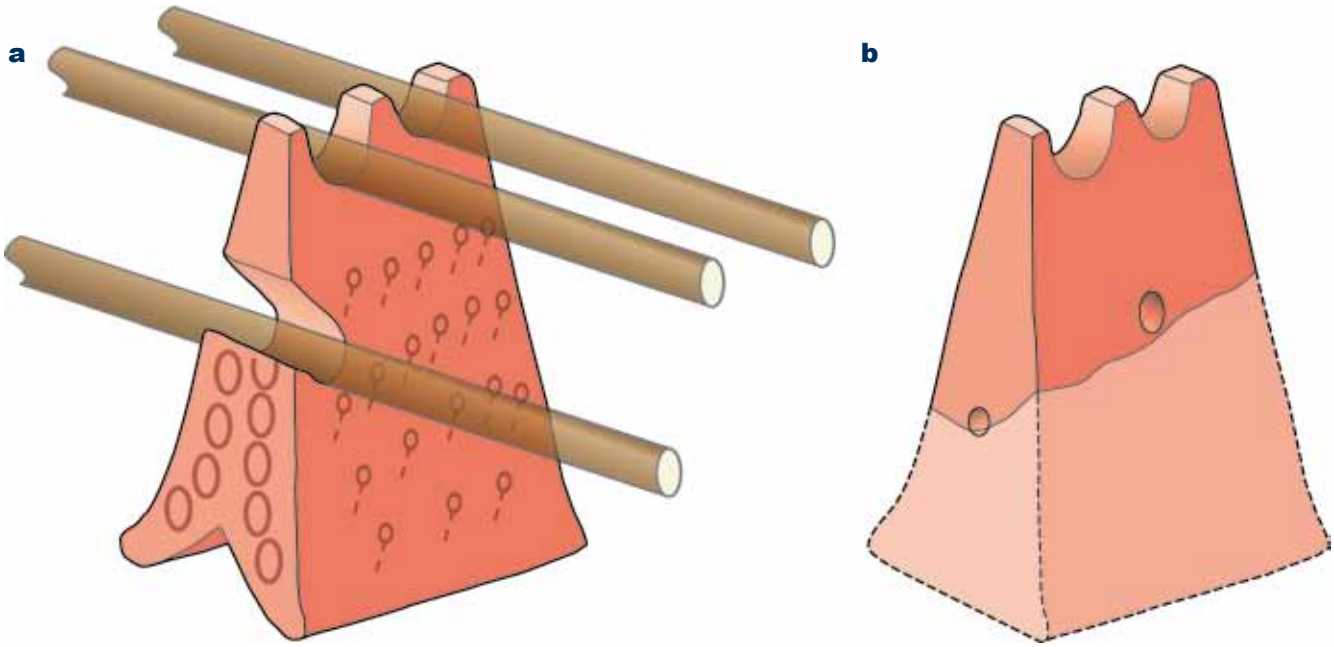
Cooking meat on a spit with fired clay supports, from the Luttrell Psalter

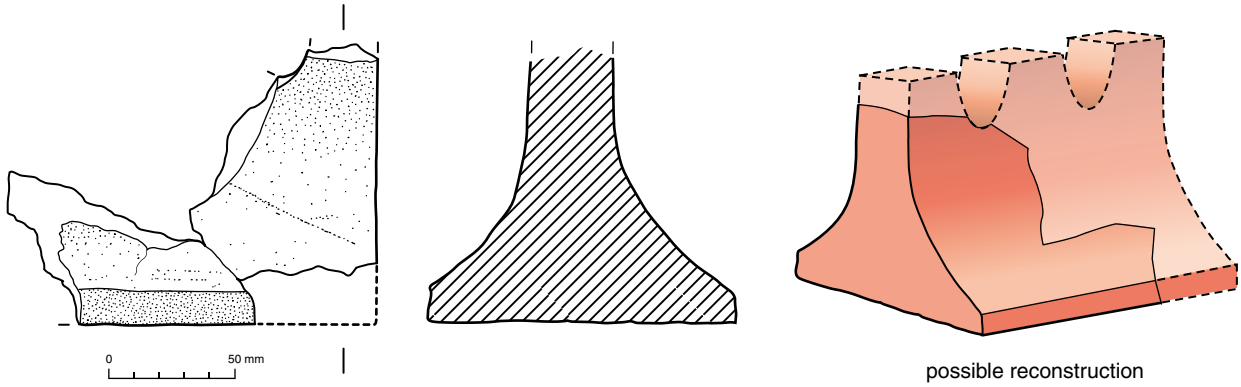
Fragment of spit support from St Leonard's Hospital showing (left) signet ring impressions on one face of the fragment and (right) key impressions on opposite face of the fragment.
Below, centre: Detail of stamped impression

the opposing narrow end is stamped with what may be a signet ring depicting a bird. This same stamp was also used on one of the wider sides, the opposite side being decorated by pressing the end of a key into the clay. The use of a stamp and an impressed-key for decoration is paralleled in examples from the Netherlands. It is possible, given that the decoration is only present on three faces of this object, that the fourth side was not designed to be seen in its original position; this might imply that the fourth side originally faced a wall which would be the case if the spit was positioned within a chimney-breast. The positioning of the spit during cooking is shown in (a) below.

The second example from the excavations at St Leonard's Hospital (b, below) is of similar form, tapering from 73-22mm in thickness and 141-115mm in width. There are two semi-circular indentations on the top, both 28mm wide and 14mm deep, and in addition the fragment is pierced by a hole

Reconstructions of the St Leonard's spit supports, with alternative spit positions show in (a)





Possible spit support fragment from Hungate with tentative reconstruction

15.5mm wide, the upper edge of which is 67mm below the top edge of the fragment. The fragment is also pierced between the two narrower ends ['in the narrower face', surely?], but most of this piercing is broken off, making its original diameter uncertain. The function of this piercing is unclear. The fragment is sooted on one of the longer sides, unsurprising given its use by a fire. This piece is undecorated, though vertical smoothing lines are visible on both the longer sides. The absence of decoration on this fragment and presence of piercings suggests that it did not originally form a pair with the more elaborate decorated fragment from the St Leonard's Hospital excavations.

The example found on the Hungate excavations was badly broken, but two adjoining fragments survived. The first fragment is part of the base; it is 118mm wide at the base tapering to 59mm wide at the point where it is broken off. The top and both ends of this fragment are missing. The second fragment is part of a the upper section of the object, it ranges from 33-92mm thick; the top base and one end are broken off, with one original narrow end surviving. This fragment is almost certainly from near the original top of the block, as there are the partial remains of a semi-circular notch cut into the uppermost side. Sooting is visible on all the original exterior faces, and the piece is undecorated, though horizontal smoothing lines are visible on the longer sides.

The spit-supports from York all seem to be of medieval date; both examples from the St Leonard's Hospital excavations were found as residual material in a 17th-century dump of rubble resultant from the demolition of the medieval hospital, while the example from the Hungate excavations was dumped in a pit containing pottery of late 15th-century date. Hopefully as more of these unusual objects are recognised from excavations it may become possible to work out a typology, or even to find an example still *in situ* to clarify their dating.

I am indebted to K. Hunter-Mann for pointing me in the direction of H. A. Heidinga and E. H Smink's research, thus enabling the correct identification of these fragments.

Jane McComish

Recording Yorkshire's Historic Buildings

York Archaeological Trust's Historic Buildings Team has been busy over the last few months as YAT continues to develop its capacity in this field. The team's recent work throughout Yorkshire, from Ripon to Sheffield, has included buildings of many different periods and archaeological genres, from the 'traditional' territory of medieval churches to industrial complexes and civilian buildings of the Second World War.

St William's College, York

A limited scheme of building recording was undertaken by Mark Johnson and Michael Andrews during remedial works in St Williams College, necessitated by movement in the first-floor jettying of the SE range. The flooring in two first-floor rooms was lifted, exposing much of the original, 15th-century timber framing for inspection, including the wallplate, joists, jetty bressumer, posts, studs and ceiling hangers, which were all recorded. Additionally, evidence for 18th- and 19th-century re-ordering of the rooms was identified, including partition walls, some replacement joists and a narrow staircase, subsequently capped off beneath a later version of the floor.

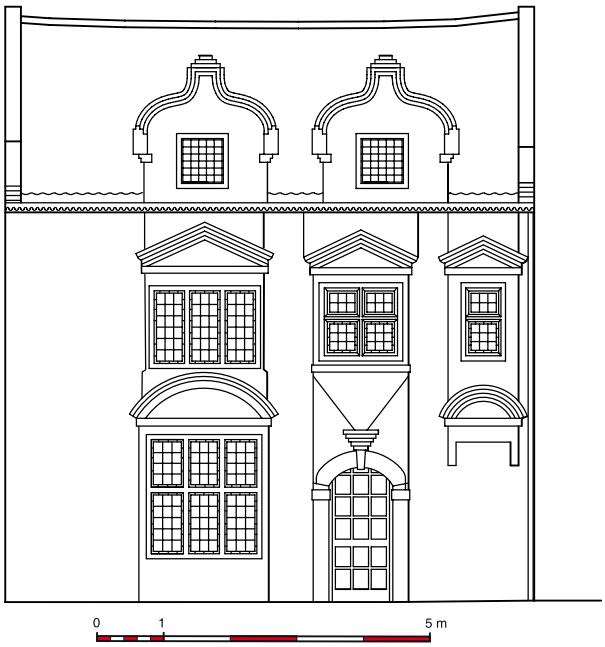
Ripon Cathedral

Mark Johnson and Michael Andrews recorded structural elements of the nave south wall and south aisle in advance of the proposed replacing of the 20th-century flat aisle roof. Some evidence for a probable re-ordering of the nave wall from triforium level upwards was identified. Stylistically of the 15th century, these alterations may be associated with the early 16th-century addition of the south aisle. At that time a doorway was inserted into the northern part of the west face of the 12th-century south transept, in order to provide access onto the new 16th-century roof, whilst parts of vertical orders of the same transept wall were cut off in order to accommodate this new roof-line. Curiously, one of these vertical orders had been re-finished in a cushion moulded style to match that of the original 12th-century work. Additionally, vestiges of the 16th-century aisle roof were preserved in the form of mortar-filled scars in the fabric of the west face of the south transept and south face of the nave wall, indicating a mono-pitched, lead sheeted roof. This roof was of a pitch of approximately 13.5 degrees and sloped downwards from north to south. A series of eighteen corbels were preserved in the fabric of the nave wall and relate to the

16th-century roof. It is probable that these corbels originally supported the principal rafters of the roof directly, with three in every bay of the nave. Alternatively, the corbels may have supported a wallplate upon which the rafters were seated. The corbels had subsequently been cut back when the roof was removed and the current roof constructed.

The Dutch House

In February 2009 the Dutch House, Ogleforth, York was subject to a historic buildings survey by Huw Pritchard and Michael Andrews. This was as a condition of a Listed Building consent to bring the building back into use as a domestic dwelling. The building, listed Grade II*, is best described as artisan mannerist in style and is dominated by a flamboyantly decorated main façade facing the road. Built almost entirely of brick, it is generally considered to be of mid-late 17th century date, and takes its name from the distinctive Flemish dormer gables on the main elevation. Little is known of its historic uses but by the early 19th century it was probably divided into three tenements before being acquired by the adjacent brewery of Johnson and Marsh in 1872 when the ground floor was used as stables.



In the 1950s the building was in a poor state of repair and radical renovation work took place. including completely rebuilding the eastern front and the northern gable as far as the wall plate, recovering the roof and inserting an up-and-over garage door in the north gable.

The YAT survey was able to identify a number of hitherto unknown aspects of the building. The 1950s restoration was found to be more extensive than was first apparent. A comparison of photographs before and after that work showed a number of significant differences, in particular in alterations to the fenestration on the east façade. Internally, part of the first floor had been raised, completing removing any evidence of the original first floor access. Evidence of the conversion to stables in the 19th century was identified, and earlier 18th century details were revealed such as decorative dressing to the timberwork hidden behind 19th-century lath and plaster, and the presence of joiners' marks on some roof timbers. Whilst the survey allowed for the recording of this important building it also flagged up some interesting questions, such how the first floor was accessed and why a building with clearly high status origins became a lowly tenement block. Further documentary work and analysis should provide greater understanding of this important York building.

Shepherd Wheel, Hangingwater Road, Sheffield

YAT, via ArcHeritage, our South Yorkshire office, was recently awarded the contract to provide archaeological services to the major project restoration of the Shepherd Wheel, Sheffield. This important site, a scheduled ancient monument, comprises a large dam and a pair of Grade II* listed stone buildings which include an 18ft x 6ft overshot water-wheel for powering edge-grinding stones. There are references to a wheel in this location from the mid 16th century until the current example ceased active life in 1930, and the in situ survival of the wheel and its pentrough is now comparatively rare. The new project will see the wheel restored to working order, during which YAT will conduct the building recording and archaeological investigations, as well as developing and managing the public interpretation of the site.

The first element of our work involved Jane McComish and Sean Bell, who conducted a photographic recording survey of the dam wall – an immense structure some 130m long and standing over 2m high in places – during the worst of the poor winter weather. This survey demonstrated no major alterations to the structure, and helped to identify modern repairs. More recently, Ian Milsted recorded two test pits dug through the courtyard of the main buildings, and further work is to follow as the programme gets fully underway.

Boston Spa Weir

Ian Milsted, together with Malcolm Barnes of The Boston Spa Archaeology and Heritage Group (BSPARCH), maintained a watching brief on behalf of the Environment Agency during the insertion of a fish pass through the Boston Spa weir. Of chief interest are the remains of an 18th-century industrial structure known as Dam House, which is built into the south-western bank of the River Wharfe and connected to the weir. BSPARCH have conducted research into Dam House which can be viewed at www.bsparch.org.uk ; the structure is thought to have been originally used for flax retting and was fed via a culvert that was the subject of a YAT excavation in 1996.

Much of Dam House has been washed into the river, and the first objective of the watching brief was to recover the structural stonework from the river bed so that it could be recorded by members of BSPARCH. Following this, a 3.5m wide section of the weir was broken through, which established that a single-faced dry stone revetment wall apparently connecting Dam House to the weir is actually a continuation of the weir itself rather than an addition to it. The weir wall abutted the external wall of Dam House, which changed from finely dressed blockwork construction to crude course stone work where there had formerly been soil over its face, giving the overall impression that the basement of Dam House and this part of the weir are contemporary structures.

Box Tree House, 67 High Street, Hatfield

A small two-storey barn and adjacent pig sties were recorded by Mark Johnson and Michael Andrews prior to the conversion of the barn and demolition of the pig sties. The barn is of 18th-century date and retains much of its original fabric. The walls are of handmade bricks with dentilated work at eaves level. Opposed ground floor doorways to either side suggest that the original purpose of the structure was as a threshing barn. The roof is of particular interest, with most of the original structure surviving, comprising timber wall-plates, trusses, rafters and a tie-beam connected with a combination of iron bolts and wooden pegs and employing some unusual jointing techniques. The whole gives the impression that an original rafter-type roof has been augmented with tie-beams, thus explaining the variation in construction technique. The barn was converted for livestock use during the 19th century, and subsequently the upper floor was used as a hen loft. This conversion involved the insertion of a series of walls at ground floor level, sub-dividing what was originally a single open space. Many of the original details of the barn had been blocked up or replaced. This included the blocking of many of the barn vents and other openings at ground and first floor level, whilst new windows had been inserted to both floors. The adjacent pigsties appear to be 19th-century conversions of earlier structures. As a whole, these farm buildings are of some local interest, serving as a tangible reminder of the rural origins of Hatfield and as examples of local building techniques.

Osborn Mushet Works, 100 Penistone Road, Sheffield

Mark Johnson, Michael Andrews and Marcus Abbott conducted a digital building survey and photographic record survey of the former Osborn Mushet machine tool works building in Sheffield. This structure, known locally as 'The White Building', forms a significant landmark on the Penistone Road and is due for demolition. The site was the location of an 18th-century cutlers' grinding wheel which was re-developed as the Philadelphia steel works in the mid 19th century. Structures and mill pond silts associated with this phase were found during the excavation of test pits behind the main building. The site was acquired by local company Samuel Osborn Steel after 1900. Osborn was closely associated with a Robert Mushet,

inventor of a particularly hard type of steel known as 'Mushet steel', which was prized for machine parts, and especially for drill bits. In 1943 the demands of wartime production led to the government-supported expansion of the site, including the construction of the White Building, to increase its production of machine parts.

The main building has a nearly symmetrical façade, with stylistic elements reminiscent of art deco. The structure is made of steel-reinforced concrete, and is designed in three conjoined sections, each of which could be separately accessed. Such structural sub-division may have been intended as a means of maintaining operation in the event of partial bomb damage. More evidence for the building's wartime origins lay in the design of the large basement as an air-raid shelter (possibly for the entire works), complete with 10mm thick steel blast doors, and a 'fire-watcher' observation structure on the roof, protected by a blast wall. Internally, all the machinery and fittings associated with the building's use had been removed, but most of the building fabric remained virtually intact in its original configuration. This permitted a detailed digital survey to be made of the entire structure, preserving by record a significant part of the history of Sheffield's wartime industry.

In addition to the work summarised here, YAT and ArcHeritage have undertaken similar projects in Derbyshire, investigating the Royal Crescent in Buxton Spa and surveying farm buildings in Hathersage, while in Lancashire we have undertaken a full digital survey of the 1930s public swimming baths in Rochdale. Upcoming projects include the next phases of building recording at the Shepherd Wheel, and more Environment Agency work as they build a fish-pass through the Niagara Weir in Sheffield. Keep abreast of our progress via further updates in future issues of *Yorkshire Archaeology Today*.

Ian Milsted and Huw Pritchard

What's behind a smile?

The Dentist as Archaeologist

Writing the dental report for one of the skeletons in the Trust's Plague, Poverty and Prayer exhibition on medieval life, currently on display at Barley Hall in York, made me think beyond the teeth and bones, and to ask 'What can the physical remains of a mouth possibly tell us about the person?' Nowadays we take a good set of teeth and freedom from pain and sepsis for granted. But before the advent of 'modern' dentistry many people had to tolerate oral pain and discomfort, sepsis, or a change in their appearance. All of these would undoubtedly affect how they felt and what they did on a day-to-day basis. I would not pretend that teeth always provide precise diagnostic information, but they can provide valuable clues about the general health of an individual during their lifetime.

Two key facts which archaeologists want to know about the skeletons they uncover are the age and sex of the people. Just as the status of the epiphyses (the growing ends of bones) helps when determining the age of a skeleton, so too the number and type of erupted teeth are also a good indicator. Eruption dates vary but are still a very useful guide. The extent and degree of wear on the teeth can also provide some evidence of the age of an adult; however, as ancient diets were much coarser than ours, wear was probably more pronounced, and may have been varied by several factors including status and particular living conditions. Determining the sex of a skeleton is usually a matter of looking for key features, such as the morphology of the pelvis and the skull. Males tend to have bigger teeth than females; however, as with the size of skeletons, there is considerable overlap.

Isotopic oxygen ratios in teeth (and bones) can tell you where an individual was from; this is a technique that YAT has used, for example, to identify the geographic origin of individuals buried at the Viking fleet base of 1066 at Riccall, North Yorkshire (*Yorkshire Archaeology Today* No.9, p.3). Additional guidance can come from the presence of white patches (fluorosis) on teeth; these can be the result of high concentrations

Decay and a large cavity in premolar has killed the tooth and caused an abscess, which has spread into and destroyed the surrounding bone. The cavity may have also irritated the tongue!

of fluoride in the tooth, indicating that the individual grew up in an area where this chemical concentration occurs naturally.

Turning to dental ills, a mother's poor diet from conception to the end of weaning, childhood illnesses and malnutrition, or an accident to a baby tooth, even a parent's sexual habits (if they result in the contraction of syphilis) can all literally leave their mark on a tooth or teeth. Subsequently, poor oral hygiene and/or a diet containing fermentable carbohydrates causes the pathological destruction of tooth tissue and bone, loose teeth and pain of varying degrees. Broken or cavitated teeth would not only be painful, but any sharp edges could irritate, lacerate or ulcerate the tongue, lips and cheeks, and eating and speaking would be uncomfortable.

The commonest dental diseases are decay and periodontitis. Tooth decay only occurs if fermentable carbohydrates such as sucrose, fructose or glucose are present in the diet. Poor oral hygiene tends to exacerbate the decay process but is not an essential component. Early decay makes a tooth sensitive to sweet things, but as decay eats its way through the enamel and dentine, until it eventually infects and kills the pulp, the tooth hurts first with cold, then with hot, then with hot and cold (with a decreasing interval between episodes) until the tooth finally hurts all of the time. Death of the pulp (pulpal necrosis) produces pus, which will quite happily munch its way through neighbouring bone, and which might eventually drain into the mouth. Ironically, at this point the tooth stops hurting, but the mouth and breath will be extremely smelly! While pus remains encased in bone the person will be in constant, excruciating pain and suffer sleepless nights. Pus that escapes into the soft tissues, but which does not drain, causes facial swelling and swollen glands. Fever, septicaemia, and sometimes, even death can follow. (See photograph, previous page)

Periodontitis affects the supporting tissues of the teeth, i.e. gums and bone, where inadequate oral hygiene is a prelude to periodontitis. Soft white plaque quickly calcifies into calculus; the gums redden, swell and bleed easily; bone is slowly destroyed. It is a chronic disease that gives rise to a dull ache. Calculus that forms above the gums (supragingival) irritates the gums. Calculus below the gums (subgingival) is often black (stained with blood breakdown products) and will destroy the bone. The affected teeth loosen and pus exudes from around them. Eating with loose teeth is uncomfortable, if not painful, and the presence of frank pus (pus exuding into the mouth) will make the breath reek! One particular form of periodontitis, pyorrhea (pus in the gums) is so vile that you would smell it before the sufferer came into the room! Although soft tissues do not survive in the archaeological record, the morphology of the underlying bone does provide some evidence as to what condition the gums might have been in. (See photographs, above)

A lack of oral hygiene has led to heavy deposits of calculus around all teeth. Periodontal disease has destroyed bone around most teeth.

In the flesh, chronic periodontal disease would look much worse than this!

Chronological EH affecting incisors, canine and first permanent molar.

The term enamel hypoplasia (EH) describes a defect when there is a less than normal quantity of enamel in a tooth's natural crown. Part of a tooth, the whole tooth or many teeth may be affected, and the visible signs of this can range from a barely perceptible white mark to an entire malformed crown. Teeth with EH can be unsightly, sensitive and more prone to caries (decay). Sometimes the quality as well as the quantity of the enamel is affected. Febrile childhood illnesses can affect amelogenesis (enamel formation), causing defects in those teeth that were laying down enamel at that time. Matching observed defects to existing calcification data about the dates at which calcium starts to be laid down on the initial organic matrix during the formation of different teeth is therefore useful in determining when, but not which, illness occurred, and building up a picture of an individual's early health. A pre-natal and/or perinatal calcium-deficient diet, hypocalcaemia, or vitamin D deficiency (rickets), can all compromise the quality of tooth enamel; as with all aspects of human growth, nutrition has a major effect on developing teeth. (See photograph, left)

Non-chronological EH affects individual teeth and could be the result of an intrusion injury to a deciduous [baby tooth] incisor, which damages the immature enamel of the underlying developing permanent successor. (See photograph, bottom)

Specific disease can also be diagnosed through study of teeth. Cogenital (tertiary) syphilis causes two interesting dental conditions: Hutchinson's incisors and Mulberry molars. Hutchinson's incisors have a 'V' shaped notch in the biting edge; Mullberry molars have gnarled crowns. The teeth are often smaller and more widely spaced than normal.

Interpreting archaeological finds, including teeth, sometimes requires a certain amount of imagination. Next time you are looking at a set of jaws and teeth I hope that you can bridge the gap between remains and reality, and imagine what that person's life might have been like when they were alive.

I would like to thank Professor Richard Welbury of The University of Glasgow Dental School, and Michael Andrews, Christine McDonnell and Dominic Hannon, all of The York Archaeological Trust, for their help with the photographs.

Injury to baby tooth at age 3 years caused white patch on crown of permanent tooth.

Dr Mike Young

Dr Mike Young is a volunteer in the Finds Department. He is a former dentist and expert witness, now a writer. He is the author of '*Managing a Dental Practice – the Genghis Khan Way*' and '*How to be an Effective Expert Witness*'.

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