Where water wells up from the earth: excavations at the findspot of the Late Bronze Age Broadward hoard, Shropshire

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The paper begins by considering the importance of springs as a focus for votive deposits in Bronze Age Britain. This is not a new idea, but nowhere has this association been examined by excavation of one of these features. There are important lesson to be learned from such work in Scandinavia. The point is illustrated by excavation at the findspot of a famous group of Late Bronze Age weapons, the Broadward hoard, discovered in 1867. Little was known about the site where it was found or the character of the original deposit, but a study of contemporary accounts of the hoard, combined with geophysical and topographical surveys, led to small-scale excavation which showed that the deposit had most probably been buried in a pit on the edge of a spring. Other finds associated with the spring included an Early Bronze Age macehead, a Roman pot, and a variety of animal bones dating from the Saxon and medieval periods. The latest, which has a radiocarbon date in the post-medieval phase, included a wooden knife or dagger. An adjacent palaeochannel provided an important environmental sequence for this part of the English–Welsh borderland and suggests that the Late Bronze Age hoard had been deposited not far from a settlement. A nearby earthwork enclosure was associated with a clay weight which may be of similar date. Despite the limited

scale of the fieldwork undertaken in 2010, it illustrates the potential of treating springs associated with finds of artefacts on the same terms as other archaeological deposits.

The archaeology of natural springs

The dictionary definition of a spring is both evocative and precise. It is 'a place where water … wells up from the earth' (Oxford Concise English Dictionary). It refers to a natural resource and describes a mysterious process.

Both those elements can be found in two papers published at the end of 2014. The anthropologist Veronica Strang[1] is concerned with the water supply as a critical resource. Access to fresh water plays a central part in the organisation of many societies. She also refers to the spiritual significance of water, and this concern is echoed by some of the commentators on her article. The other study is by the prehistorian Helle Vandkilde.[2] She discusses the beliefs that were shared between central and northern Europe during the Bronze Age. One is how water could form a link between the living and the dead. That is evidenced in several media, from the ship symbolism that permeates the ritual life of Scandinavia to the deposition of valuables in rivers.[3] Neither perspective is sufficient on its own, for water sustains life just as it can bring life to an end. It is because it was crucial to human survival that it was imbued with spiritual significance. That is particularly obvious where wells contain votive offerings. Perhaps they were deposited there as these features went out of use.

Springs had a similar significance in other periods, but because they are rarely associated with structural remains they have received less attention from archaeologists. The most convincing evidence is actually rather exceptional. In Roman Britain, temples were established in such places, including the Great Spring at Bath,[4] the recently excavated complex at Springhead[5] – the place name is revealing – and Coventina's Well on Hadrian's

[1] Strang 2014.

[2] Vandkilde 2014.

[3] Vandkilde 2014, 618–23.

[4] Cunliffe and Davenport 1985; Cunliffe 1988.

[5] Andrews *et al* 2011.

Wall which was excavated through a natural spring at the centre of a walled enclosure.[6] In Gaul, a major sanctuary developed at Fontes Sequanae, the source of the River Seine.[7]

Recent work has emphasised the importance of fresh water as a focus for deposits of Bronze Age metalwork. In an earlier paper in this journal David Yates and one of the writers examined the findspots of a hundred hoards in south-east England.[8] These finds came from dry land, but a surprisingly high proportion of them had been buried beside streams or confluences. Others were located very close to springs. They complemented the discoveries of prehistoric metalwork in rivers, lakes and bogs which formed part of the more general tradition discussed by Vandkilde. Three findings of research in Sussex and Kent were especially intriguing. The distribution of metalwork deposits followed the course of freshwater streams and did not extend to the coastal sections in which they contained a mixture of salt water. Tributaries were more closely associated with the finds of hoards than the major rivers, and there was a particular concentration of discoveries along the spring line where the South Downs overlook the Weald.

Such relationships were striking but by no means conclusive. Because nearly all the metalwork consisted of chance discoveries, very little was known about their original contexts or their disposition in the ground. In some cases it seemed likely that these hoards were not far outside settlements, but this relationship was usually postulated on the basis of surface finds rather than excavation. Reports of such discoveries rarely supplied sufficient information, and most accounts of these collections were devoted to the metalwork. It is not clear whether it had been associated with other items that were overlooked.

Springs have hardly been excavated as research projects in Britain and surprisingly few have been recorded in the course of development-led archaeology. The main exception has been research on the Mesolithic period. As current excavation at Amesbury shows, sources of fresh water were important for hunter gatherers and their prey.[9] Unfortunately, this emphasis on the sites of springs is not found in later prehistoric studies. There have been suggestions that these features were associated with henge monuments[10] and rock carvings,[11]

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[6] Allason-Jones and McKay 1985.

[7] Deyts 1994.

[8] Yates and Bradley 2010a.

[9] Jacques and Phillips 2014.

[10] Leary and Field 2012.

[11] Darvill *et al* 2004, 106; Darvill *et al* 2006, 102–3.

but the springs themselves have not been subjected to excavation, so that these relationships are persuasive but not entirely conclusive.

The situation contrasts with research in northern Europe where in 1997 the late Berta Stjernqvist published an important monograph on *Spring-cults in Scandinavian Prehistory*.[12] Although she considered the association between votive deposits and water, her main concern was with fieldwork at the springs themselves. She reported the excavation of a site at Röekillorna in southern Sweden where artefacts and animal bones had been discovered in digging a well. Both the spring and its surroundings were excavated. The project led to the discovery of stone, metal and wooden objects in the sediments, together with pottery and a large number of animal bones. The Röekillorna spring was used for a very long period and Stjernquist's excavation identified deposits whose history extended from the beginning of the Neolithic period until at least the Roman Iron Age.

Sternjqvist's research has had no influence in Britain where the only springs that have been investigated from this perspective are associated with public monuments, and yet it demonstrated what could be achieved by studying the site of a more isolated example where archaeological material had been recorded. Her work at Röekillorna provided an important model for the research considered here. It also suggested a series of questions that ought to be addressed by a project of this kind:

- Did the spring already exist during the prehistoric period?
- Could it be demonstrated that the deposits of artefacts focused on the spring itself?
- What was the full range of artefacts and animal bones associated with the spring? Were some items represented that would be have been overlooked at the time of the original discovery?
- Could the sediments associated with the spring provide dated environmental evidence? Might this shed light on its surroundings during the prehistoric period?
- Would it be possible to show whether the spring was isolated, or was it located in a settled landscape?

These questions can only be answered by targeted research of a kind that has never been undertaken in the British Isles.

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[12] Stjernquist 1997.

Not long after the completion of fieldwork at hoards sites in south-east England, a suitable location for such a project presented itself by chance. At the invitation of the landowners Professor Brian Wilkinson and members of the Leintwardine History Society investigated the findspot of a collection of Late Bronze Age artefacts found at Broadward in Shropshire in 1867. Their project employed coring, geophysical survey and the use of ground penetrating radar.[13] Their work shed considerable light on the topography of the bog and its stratigraphy. The metalwork was obviously discovered in a waterlogged environment as wood was still preserved inside the sockets of several spearheads. Indeed the location of the metalwork is marked on the first edition of the Ordnance Survey map by a symbol indicating a spring. It is not shown on subsequent revisions perhaps because the water supply was altered by drainage work that took place soon afterwards. It was during that process that the hoard was discovered. This was a site where it might be possible to address some of those questions by excavation. In an attempt to locate the hoard site and retrieve materials for palaeo-environmental analysis, the authors carried out an excavation in summer 2010.

The Broadward hoard: composition, chronology and context

In 1867 a large hoard of metalwork was found during drainage and water management in a field known as 'Lower Moor' at Broadward Hall, on the Shropshire–Herefordshire border (fig 1). When the work was carried out, a concreted mass of metal was discovered, broken apart and found to comprise bronze artefacts, including at least 53 spearheads, 11 fragments belonging to at least two leaf-shaped swords, five ferrules, two 'bugle-shaped objects', a tanged chisel, a chape, and part of a tubular armlet or ring. The collection was subsequently dispersed, but 76 implements were presented to the British Museum; a box of finds kept at the Hall has since disappeared. It seems possible that a second group of objects was found in 1912–13, but nothing is known about them. Even so, it is likely that the hoard originally contained over a hundred objects. All the surviving artefacts were published by Burgess, Coombs and Davies in 1972. Further information is available in two files in the Lily F. Chitty Collection (Shropshire Record and Research, 1992, Files 194 and 195).

There are four accounts of the original discovery but they provide little information on the circumstances in which it was discovered and contradict one another at several

[13] Wilkinson 2010.

points.[14] The first is the position of the findspot. One source refers to a 'tumulus' adjacent to the hoard site. It had been levelled some time before the metalwork was found. There were supposedly three such mounds at Broadward, and this particular example was located 'in a nearly straight line with the other two'.[15] In fact, one of these features was probably of glacial origin, although is enclosed by a shallow ditch, whilst another can be identified as a medieval motte. A line linking these features would extend well to the east of the findspot marked on the first edition Ordnance Survey map as 'Bronze Spear Heads found 1867'. No trace of a third mound can be recognised today.

The earliest references to the hoard refer to the local microtopography. 'The Lower Moor, in which the bronze was found, has been up to the time of the discovery one of the most wet …. of the Valley of the Clun'.[16] 'The cutting [that revealed the metalwork] was at the extreme edge of the swampy ground, where it rises rather abruptly to a higher level'.[17] The hoard was 'on the very edge of [a] former morass'.[18] This description accords with the findspot recorded by the Ordnance Survey (SO 39007625), but not with the site suggested by Burgess, Coombs and Davies[19] who were influenced by Banks's reference to a line of barrows further to the east (SO 391762).

Nineteenth century sources also shed light on the contents of the hoard. 'Spear-heads and fragments of various patterns lay in a confused heap … Many were taken from the earth cemented together with the gravel into large solid lumps, the points laying in all directions'.[20] One author records that 'large teeth … chiefly of a small equine species' were found with the metalwork;[21] others say that 'whole skulls of ox and horse ... were taken up with the spears and other bones of the animals, as if the beasts of burden and their freight had been swamped in the bog'.[22] 'Bones of oxen and pigs [were] found in the same locality'.[23] They were not confined to the position of the hoard, as Rocke and Barnwell record that 'the number of

[14] Jackman 1868; Rocke and Barnwell 1872; Banks 1873; Barnwell 1873.

[15] Banks 1873, 202.

[16] Rocke and Barnwell 1872, 343.

[17] Ibid, 343.

[18] Ibid, 343.

[19] Burgess *et al* 1972.

[20] Rocke and Barnwell 1872, 344.

[21] Barnwell 1873, 80.

[22] Rocke and Barnwell 1872, 343.

[23] Jackman 1868, 64.

animal bones dug up in every part of the field is remarkable'.[24] With the Late Bronze Age metalwork were 'the imperfect remains of a small urn'.[25] It has been lost, but an illustration of the pot (fig 2) shows that it dates from the Roman period.

There is even more confusion about the circumstances of the original discovery. It is clear that the main group of metalwork was encountered in draining the bog. One account implies that the deposit was found in digging a land drain and that part of it might have remained intact. 'The extent of the deposit was not ascertained, as it was not disturbed much beyond the width of the cutting, being an ordinary drain'.[26] Their description of the discovery also states that the 'bronze was found at a depth of five or six feet below the surface'.[27] It was 'in a deposit of clayey alluvium'.[28] The hoard was recovered under difficult conditions, as the excavation flooded once it reached the water table. That is why it was impossible to observe the relationship between the metalwork and the pot. In fact the two statements contradict one another. The trenches dug to install the drains were considerably less than five feet [*c* 1.52m] deep, but this was not true of the wells that they connected. They provided a source of fresh water which was pumped to Broadward Hall. The findspot recorded on the earliest Ordnance Survey map is shown as a spring. It was replaced in the same position by one of the wells.

These accounts raised the possibility that a Late Bronze Age hoard had been associated with a deposit of animal bones. More were found in draining other parts of the bog. The unusual size of the barbed spearheads encouraged the view that the hoard was a votive deposit. For both these reasons Burgess, Coombs and Davies suggested that 'excavation of the site … would be desirable'.[29] In the end that did not happen for nearly forty years.

Chronology and field survey

Two tasks were important from the outset: to establish the precise age of the metalwork and to elucidate the positions of nineteenth century drains on the site.

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[24] Rocke and Barnwell 1872, 343.

[25] Barnwell 1873, 82.

[26] Rocke and Barnwell 1872, 343.

[27] Ibid, 343.

[28] Banks 1873, 204.

[29] Burgess, Coombs and Davies 1972, 212.

Two spearheads from the hoard held by the British Museum retained fragments of ash hafts within their sockets. Samples of the wood were submitted to SUERC for radiocarbon dating. They returned the following dates:

2740 ± 30 BP; 980–830 BC cal BC at 94.5 % confidence level (GU26038)
Almost complete barbed spearhead (fig 3), acc. no. 1902, 0515,1[30]

2760 ± 30 BP ; 940–820 BC cal BC at 94.5 % confidence level (GU26039)
Fragmentary spearhead socket of the same type, acc. no. 1902, 0519, 9[31]

These dates are consistent with the scheme put forward by Burgess, Coombs and Davies in 1972 and with subsequent research by Needham *et al.*[32] They would place the hoard towards the end of the Late Bronze Age.

The most likely findspot for the hoard was examined by David Thornley and Darko Maricevic using ground-penetrating radar. They plotted the positions of the drains cut into the surface of the bog. Their work was supplemented by a topographic survey undertaken by Jo Dyson and undergraduate students of the University of Worcester, using a global positioning system (fig 4). Both investigations suggested that the most likely position for the hoard was on low-lying ground and agrees with the position recorded by the Ordnance Survey. Several palaeochannels join this area from the north and may have led from other springs that were replaced by wells during the nineteenth century. Similar channels extend further to the east and would originally have discharged into a tributary of the Clun. The river itself is 600m east of the site.

Fieldwork in 2010

The new project had two distinct foci: the likely findspot of the hoard and its surroundings; and a nearby earthwork enclosure. The work was directed by David Mullin, Jodie Lewis and Richard Bradley.

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[30] Burgess *et al* 1972, 241, no. 1, fig 4, 1.

[31] Burgess *et al* 1972, 241, no. 50, fig 7, 50.

[32] Needham *et al* 1997.

Excavations around the findspot of the hoard

Trench 1 focused on the area of the location of the hoard shown on the first edition Ordnance Survey map. The excavation was subsequently extended to the south and west, using a mini-digger with a toothless bucket. Rocke and Barnwell stated that the bronzes were found at the extreme edge of swampy ground where there was an abrupt rise in the ground.[33] For that reason the trench encompassed the higher, dryer land to the north and east and the low-lying boggy grassland to the south and west. Selected areas within this trench were selected for deeper excavation (figs 5 and 6). The individual contexts are discussed in greater detail in the project archive.

Disturbed deposits

A palaeochannel just over 6m wide ran across the middle of Trench 1 and cut into a series of alluvial clays as well as the natural bedrock. It was filled by loose greyish-black silt mixed with stones, burnt clay, charcoal and a few pieces of post-medieval tile and brick which resulted from land reclamation. It also contained a fragment of a shale bracelet. A land drain had been dug through this deposit and contained a flint scraper. Other deposits of dumped material were found in the west of the excavated area where one of them contained part of an Early Bronze Age macehead. Perhaps these artefacts had originally been deposited in one of the springs or streams associated with the site, but if so they had been disturbed.

The main feature in Trench 1 was a brick well with a ceramic drain leading into it from the west (fig 7). To its south was a peaty deposit lapping against the natural rise in the ground level. Stones and pieces of bone were visible in the top of this deposit. Again this material must have been disturbed as individual bones have dates of 2040–1880 BC, AD 760–900, and AD 1480–1650. Beside the well, the peat was 0.4m thick, but it thinned towards the west where a single sherd of Late Bronze Age pottery was found. Closer to the well, it was partially overlain by stony clay covered by peat. An animal bone recovered from this deposit was dated to AD 680–880. Again radiocarbon dates indicate that even the best-preserved animal bones must have been moved from their original contexts. The only features visible in the subsoil were a series of drains of different dates. As geophysical survey had predicted, none lay ‘at a depth of 5 or 6 feet’.[34]

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[33] Rocke and Barnwell 1872.

[34] Rocke and Barnwell 1872, 343.

Intact deposits

Beneath the peat was the edge of a pit, much of which had been destroyed by the well. The surviving part measured 800mm by 900mm and was 350mm deep (fig 8). It did not extend further north than the well, suggesting that it could never have been more than 2m long. The steep sides of the pit were dug into alluvial clay that underlay the peat, whilst its base cut into sandy gravel deposits. A spring was found to issue through the sandy gravel adjacent to the pit, causing the excavation to fill with water.

The pit contained two deposits: the lower was up to 200mm thick and consisted of dark grey charcoal-rich silt with occasional fragments of quartz. The upper level was up to 150mm thick and consisted of yellow-brown stony clay. A bone gouge (fig 8), dated to 1220–1010 BC, was discovered near the base of the primary fill, but there were no other finds from this context. Stones, one of them a piece of flaked quartzite, and smaller pieces of quartz lined the top and sides of the pit; others were distributed around its edge. Several small fragments of cremated bone were found beneath them. A thin layer of peat covered the stones to the south of the pit and contained a number of animal bones, one of which has been dated to AD 1430–1530.

The top of the pit was covered by 0.4m of peat (context 1031). Approximately 0.2m above it a wooden knife or dagger was recovered, lying horizontally in the peat. It has been dated to AD 1540–1640. Next to it, but dug from a higher level, was a small stake- or post-hole. It postdates the deposition of the blade but its date and function are unknown.

A few other areas remained undisturbed. Excavation on the higher ground to the east of these deposits was uninformative, but a flint core trimming flake was found on its surface. Five metres to the west of the pit there was a second peat-filled hollow. In this case the turf and topsoil lay directly over a deposit of peat which was only 80mm thick. It contained no animal bones, but a flint burin was recovered. Beneath the peat the natural alluvial clay was excavated by machine to a depth of a metre.

Lastly, there was a palaeochannel 25m to the west of the pit. A deep machine trench was excavated, from which pollen samples were taken. On the edge of the channel animal bones were found a metre down in the peat. One of them returned a date of AD 1300–1375.

Commentary

The fieldwork undertaken in 2010 sheds new light on accounts of the original discovery. The findspot recorded in the first edition Ordnance Survey map not only conforms to Victorian descriptions of the natural topography, it corresponds exactly to a peat-filled hollow containing animal bones and other artefacts. With the exception of a few examples from the western edge of the excavated area, they were confined to the immediate surroundings of the spring shown on the earliest Ordnance Survey map. The well – one of a series linked to a pumping house by a system of drains – had been excavated *at precisely the same point*. This area contained deposits of clay and peat, but they must have been disturbed by water issuing from the bedrock as the radiocarbon dates on the best-preserved animal bones showed no evidence of a coherent sequence.

The well cut *the only subsoil feature that can be dated to the prehistoric period* anywhere in the excavation: a pit containing a bone gouge with a radiocarbon date in the Middle to Late Bronze Age. Although only part of that pit survives it seems to have been large enough to have held the concreted mass of artefacts found in 1867. This feature must have been dug on the edge of the spring, and that may account for the poor quality of the original record. The hole dug for the well soon flooded, so that it would have been impossible to tell how the metalwork was related to the Roman pot from the same site. It is surely no coincidence that Rocke and Barnwell stated that the hoard was found 'five or six feet below the surface'.[35] That is not true of the Bronze Age pit, but it is the depth of the well, and the workmen may have emphasised the difficult conditions they experienced on the site.

With the exception of the bone gouge, a Late Bronze Age sherd and possibly a shale bracelet, the remaining artefacts found in 2010 relate to other phases in the history of the spring and its surroundings. The same is the case with all the animal bones submitted for radiocarbon dating. Their significance is considered in a later section of this paper.

Excavations at a nearby earthwork enclosure

Three hundred metres to the north-east was a roughly circular mound, 33–38m in diameter (fig 9). The two sites cannot be seen from one another and are separated by a spur of higher ground. Early maps depict a 'tumulus' in this location, but field observations suggested that it was of glacial origin.

The summit of the mound was bounded by a ditch approximately 3m wide which was most apparent within the SSW–ESE quadrant, and only visible as a scarp around much of the northern perimeter. There is a break in the ditch just south of its easternmost point. It follows the break of slope. Also apparent are a series of broad parallel ridges oriented NNW–SSE and spaced roughly 7m apart, which may represent ridge-and-furrow.

[35] Ibid, 343.

The enclosure ditch was sectioned at three points. It was 2.3m wide and only 400mm deep and had a U-profile. To the south of the entrance, it contained two distinct fills, the upper a 250mm thick sandy-loam deposit with much gravel, and the lower 100mm thick orange-brown silt with a few charcoal flecks. Neither contained any finds. Elsewhere, the ditch contained a single fill: a sandy-loam deposit with gravel.

The south-eastern causeway or entrance was about 4m wide. A pit was discovered just inside the southern ditch terminal (context 3006). It extended beyond the excavated area and its exact shape and dimensions are unknown. The part that was excavated had gently sloping sides and a concave base and was 25cm deep. It contained a single fill of rounded gravel in a brown sandy-loam matrix. Within this was the lower part of a fired clay weight which had been placed upside down in the ground (fig 10).

A machine trench measuring 17m by 4m was opened across the interior of the enclosure and extended across the entrance and the southern ditch terminal. This area was left open to weather, but no subsoil features were observed.

Commentary

The earthwork is surprisingly slight and its position is unusual, for the land around it floods, even today. At the same time this work has shown that part of the interior that was excavated was free of any features or finds of artefacts. The only exception was a clay weight which may be of Late Bronze Age date. This raises the possibility that the site played a specialised role and might have been in use at about the time when weapons were buried beside the nearby spring.

Radiocarbon dates on archaeological samples

A series of animal bones from the excavation were submitted for radiocarbon dating, together with two artefacts: the bone gouge found in the pit, and the wooden ‘dagger’ from the overlying peat (table 1). The bones that were sampled were in fresh condition and quite distinct from others which had been eroded. The object of the exercise was to compare their chronology with the dates of two spearheads from the original hoard. It was also to relate their chronology to the long sequence in an adjacent palaeochannel which were sampled for pollen analysis. Sediment samples taken from its filling were also submitted for radiocarbon dating.

It was recognised from the outset that the bones could have moved vertically and horizontally as water issued from the spring. For that reason they were employed to assess the principal periods in which the site was in use and not to calibrate a clear stratigraphic sequence. The project achieved its main objective by showing that, in addition to the phases dated by the Roman pot and the Late Bronze Age hoard, there were peaks of activity in the Middle to Late Saxon phase, and again in the late medieval and early post-medieval period. There was also an Early Bronze Age radiocarbon date which agrees with the likely age of the macehead found in 2010.

Pollen analysis (Nicholas P. Branch, Naomi G. Riddiford and Philip Stastney)

Introduction

The investigations at Broadward Hall presented an opportunity to reconstruct the environmental context of the archaeological findings and to enhance our knowledge of the Holocene vegetation history of Shropshire.[36] The geology of Broadward Hall is complex with the main north–south axis of the valley comprising alluvium, but with head deposits (clay, silt, sand and gravel) to the west of the site (probably within a minor tributary valley), and till and moraine (diamicton) occupying higher ground to the north and south.[37] The main archaeological site is located in a narrow east–west strip of alluvium, and the peat deposits encountered during the archaeological investigations and discussed here probably formed within, and on the margins of (back-swamp), a former river channel.

Methods

The field investigations involved the excavation of a trench to the west of the main archaeological site, and within the suspected area of the palaeochannel, to recover column samples suitable for radiocarbon dating and pollen analysis. The physical properties, composition and humification of the sediments within the column samples were recorded using the Troels-Smith procedure.[38] Sub-samples were removed for organic matter determination using the loss-on-ignition method.[39] Pollen grains and spores were extracted following standard procedures, involving sub-sampling 1cm^3 using a volumetric sampler, dispersal in 1% Sodium pyrophosphate, sieving through 5μm and 150μm meshes to remove

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[36] See Hardy 1939; Beales 1980; Twigger and Haslam 1991.

[37] Toghill and Chell 1984; British Geological Survey.

[38] Troels-Smith 1955.

[39] Bengtsson and Enell 1986.

fine and coarse mineral and organic matter, removal of mineral matter using Sodium polytungstate (specific gravity of $2g/cm^3$), acetolysis and mounting in glycerol jelly.[40] Pollen grains and spores were identified using type collections and the following sources of keys and photographs: Moore, Webb and Collinson[41] and Reille.[42] Plant nomenclature follows the Flora Europaea as summarised in Stace.[43]

A total of 300 pollen grains (excluding aquatics and spores) were recorded for each sub-sample. The results are expressed as a percentage of total land pollen (trees, shrubs and herbs), and presented using TILIA2 software (Grimm 1991–2011). The pollen diagram has been divided into four Local Pollen Assemblage Zones (LPAZs BH-1 to BH-4). Zonation of the pollen diagram into LPAZs was carried out using constrained cluster analysis within TILIA2 (calculated using Edwards and Cavalli-Sforza chord distance [square root transformation]), coupled with visual discrimination of the main changes in pollen stratigraphy.[44] Microscopic charred particles (>20µm) were counted during the pollen analysis and the results expressed as a percentage of total land pollen.[45]

Radiocarbon determinations were made on humic acid extracted from peat sub-samples at key lithostratigraphic horizons through the sedimentary sequence. The radiocarbon determinations were calibrated using the maximum intercept method,[46] OxCal version 4.2,[47] and the internationally agreed dataset for terrestrial samples from the northern hemisphere.[48] The full age range (rounded to 10 years) is quoted as 'cal yrs BP'. An age-depth model was created using OxCal version 4.2 with a *P-sequence* algorithm and *k* factor of 5.[49]

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[40] Branch *et al* 2005.

[41] Moore *et al* 1991.

[42] Reille 1992.

[43] Stace 1997.

[44] Grimm 1991–2011; see also Birks and Gordon 1985.

[45] See Clark 1982; Clark 1988; see also Finsinger and Tinner 2005.

[46] Stuiver and Reimer 1986.

[47] Bronk Ramsey 1995, 2001, 2008, 2009.

[48] Reimer *et al* 2009.

[49] Bronk Ramsey 2008; Blockley *et al* 2007.

Lithostratigraphy and radiocarbon dating (tables 2 and 3)

The basal mineral-rich fine-grained sediments (137–123cm; see fig 11; table 2) were deposited prior to 14,982–14,145 cal yrs BP (13,032–12,195 cal yrs BC; table 3) during the Late Devensian Lateglacial. The presence of calcium carbonate in the sediments from 137–126cm suggests that they were at least partially derived from weathering and erosion of the nearby Limestone bedrock (eg Much Wenlock Limestone Formation).[50] Organic sedimentation commenced at 14,982–14,145 cal yrs BP (123cm; 13,032–12,195 cal yrs BC), and continued until after 2108–1899 cal yrs BP (158 cal yrs BC–AD 51; table 3). The organic sedimentary units mainly comprise herbaceous peat (sedge and grass) and wood peat, which indicate fen swamp and wooded fen carr respectively. The only exception is a 2cm thick unit of moss peat deposited from ~4173 to ~3996 cal yrs BP (35–33cm; ~2223 to ~2046 cal yrs BC), which suggests an increase in bog surface wetness at that time.

Pollen-stratigraphical analysis

The pollen analysis focused on the upper 80cm of the sedimentary sequence (8cm resolution) with a higher resolution study (4cm intervals) of the uppermost 50cm (~5300 to ~1200 cal yrs BP; ~3350 cal yrs BC to AD ~750), which spans the period of greatest archaeological interest (see fig 11).

Results

Local pollen assemblage zone BH-1 (80–49cm; ~12,252 to ~8960 cal yrs BP; ~10,302 to ~7010 cal yrs BC) spans the Late Devensian Lateglacial and Early Holocene. The pollen record is characterised by high percentage values of herbaceous taxa, notably *Sinapis* type (48% at 80cm), Cyperaceae (50% at 56cm) and Poaceae (31% at 80cm), as well as *Artemisia* and Caryophyllaceae. Dominating the tree and shrub pollen taxa are *Corylus* type (26% at 64cm), *Tilia* (16% at 64cm) and *Alnus* (12% in 64cm), as well as *Betula*, *Quercus* and *Ulmus*. Aquatic and spore taxa are poorly represented but include *Sparganium* type, *Dryopteris* type and *Sphagnum*.

Local pollen assemblage zone BH-2 (48–35cm; ~5321 to ~4262 cal yrs BP; ~3371 to ~2312 cal yrs BC) spans part of the Middle Holocene; the abrupt changes in pollen percentages and taxa indicate a major hiatus between zones BH-1 and BH-2, possibly lasting for ~3500 years. The record is characterised by high percentages of tree and shrub taxa,

[50] Toghill and Chell 1984.

notably *Alnus* (44% at 44cm), *Quercus* (14% at 44cm) and *Corylus* type (15% at 40cm), as well as *Tilia* and *Calluna*. Poaceae (22% at 36cm), Apiaceae (7% at 40cm) and *Filipendula* (7% at 40cm) dominate the herbaceous taxa. Aquatic and spore taxa include *Dryopteris* type (22% at 44cm), *Pteridium* (4% at 36cm) and *Sphagnum* (7% at 36cm). Microscopic charred particles are present at 44cm (1%).

Local pollen assemblage zone BH-3 (35–15cm; ~4262 to ~2500 cal yrs BP; ~2312 to ~550 cal yrs BC) spans the latter part of the Middle Holocene and the transition to the Late Holocene. The record indicates a reduction in tree pollen percentages by comparison to LPAZ BH-2, and a modest rise in shrub taxa, notably *Alnus* (40% at 28cm), *Quercus* (14% at 21cm), *Corylus* type (19% at 28cm) and *Calluna* (4% at 21cm), as well as *Betula* and *Pinus*. Herb taxa are dominated by Poaceae (31% at 24cm), Cyperaceae (11% at 16cm), *Filipendula* (6% at 24cm), *Galium* type (6% at 24cm), Lactuceae (2% at 24cm), *Plantago lanceolata* (2% at 32cm), Poaceae >40 microns (2% at 32cm) and *Ranunculus* type (3% at 24cm). Aquatic and spore taxa include *Dryopteris* type (19% at 21cm), *Pteridium* (2% at 28cm) and *Sphagnum* (6% at 28cm).

Local pollen assemblage zone BH-4 (15–0cm; ~2500 cal yrs BP / ~550 cal yrs BC onwards) is dominated by herbaceous taxa, notably Poaceae (20% at 4cm), Cyperaceae (18% at 8cm), *Filipendula* (4% at 8cm), *Cirsium* type (3% at 4cm), Lactuceae (3% at 4cm) and *Plantago lanceolata* (3% at 8cm), as well as Poaceae >40 microns (1% at 12cm), *Potentilla* type (2% at 12cm), *Rumex* (2% at 8cm) and *Succisa* (3% at 12cm). Tree and shrub taxa include *Alnus* (24% at 12cm), *Quercus* (10% at 12cm), *Tilia* (3% at 12cm), *Ulmus* (2% at 8cm), *Corylus* type (13% at 4cm) and *Calluna* (3% at 12cm). Aquatic and spore taxa include *Dryopteris* type (15% at 12cm), *Pteridium* (2% at 4cm) and *Sphagnum* (11% at 4cm). Microscopic charred particles are present at 12cm (1%) and 4cm (3%).

Interpretation

During LPAZ BH-1 (~12,252 to ~8960 cal yrs BP; ~10,302 to ~7010 cal yrs BC), the pollen record indicates that the local wetland comprised vegetation typical of a fen with Cyperaceae (sedge family), Poaceae (grass family), *Sparganium* (bur-reed) and *Sphagnum* moss, together with *Alnus* (alder) and *Salix* (willow) carr woodland. The dryland vegetation was initially dominated by herbaceous taxa, notably *Sinapis* (Brassicaceae / mustard family) and *Artemisia* (eg glacier wormwood), indicating the presence of short turf grassland and tall herb plant communities. These are consistent with the Late Devensian Lateglacial age for the lower part of the sedimentary sequence (~137–69cm; ~15,000 to 11,500 cal yrs BP), and the presence of cold, harsh climatic conditions (eg tundra and semi-desert). This record is also consistent with pollen data from the UK spanning the Late Devensian Lateglacial including nearby Crose Mere.[51]

Mixed deciduous woodland and shrubland comprising *Corylus* (hazel) and *Tilia* (lime) with lesser amounts of *Quercus* (oak), *Ulmus* (elm) and *Betula* (birch), succeeded the herb dominated plant communities, which is broadly consistent with other pollen records for the Early Holocene in Shropshire.[52] The possible dominance of *Tilia* within the woodland cover during the Early Holocene has been suggested by several of these studies despite the low percentages often recorded due to its poor pollen dispersal.[53]

The transition to LPAZ BH-2 (~5321 to ~4262 cal yrs BP; ~3371 to ~2312 cal yrs BC) was marked by a major hiatus in the sedimentary sequence, possibly lasting ~3500 years. The renewal of peat formation and presence of *Alnus*, *Polypodium* (polypody fern), *Sphagnum* and a range of herbaceous taxa is consistent with the presence of fen carr woodland. The surrounding dryland comprised mixed deciduous woodland and shrubland dominated by *Corylus* and *Quercus* suggesting the presence of open (‘parkland’) rather than closed woodland. Supporting this interpretation is the presence of dwarf shrubland (heathland), grassland and disturbed ground comprising *Calluna* (heather), Apiaceae (carrot family) and *Plantago* (eg common plantain). The declining *Tilia* pollen values are consistent with the age proposed for LPAZ BH-2, and suggests that the evidence from Broadward Hall for a decline in lime woodland may be correlated with the classic ‘*Tilia* decline’ of north-west Europe during the Late Neolithic and Bronze Age from ~5000 to ~3000 cal yrs BP (~3050 to ~1050 cal yrs BC).[54] Supporting this interpretation are the low values of *Ulmus* pollen indicating that LPAZ BH-2 post-dates the classic ‘*Ulmus* decline’ of north-west Europe during the Neolithic from ~6347 to ~5281 cal yrs BP (~4397 to ~3331 cal yrs BC).[55]

From ~4262 to ~2500 cal yrs BP (~2312 to ~550 cal yrs BC), LPAZ BH-3 indicates a local wetland dominated by fen carr woodland but with a slight reduction in the proportion of *Alnus*, and a corresponding increase in Poaceae, Cyperaceae and especially *Sphagnum* moss. This suggests an increase in bog surface wetness, which is confirmed by the formation of

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[51] Beales 1980.

[52] Eg Hardy 1939; Beales 1980; Twigger and Haslam 1991.

[53] Twigger and Haslam 1991.

[54] Turner 1962; Grant *et al* 2011.

[55] Parker *et al* 2002.

moss peat from ~4173 to ~3996 cal yrs BP (~2223 to ~2046 cal yrs BC). The reason for this hydrological change remains unclear but given the evidence presented below for localised human activity, the increase in wetness may have been initiated by increased overland flow due to woodland clearance. The dryland vegetation shows a marked reduction in mixed deciduous woodland cover, especially *Tilia*. This coincides with the first clear evidence for human activity characterised by the presence of cereal pollen (undifferentiated), suggesting localised cultivation. The increase in herbaceous taxa is consistent with this signature for human impact on the environment; especially those taxa associated with disturbance and cultivated ground such as *Plantago lanceolata* (ribwort plantain). The Late Bronze Age spearheads from Broadward Hall, which have been radiocarbon dated to 2921–2765 cal yrs BP (980–830 BC cal yrs BC; 2740 ± 30 BP) and 2943–2780 cal yrs BP (940–820 BC cal yrs BC; 2760 ± 30 BP), may be correlated with the upper part of LPAZ BH-3 (~21–18cm). Therefore, we can state with increased certainty that the environmental changes recorded during this zone correspond to localised human activities.

Finally, LPAZ BH-4 (~2500 cal yrs BP / ~550 cal yrs BC onwards) indicates a significant increase in herbaceous and spore taxa associated with both dryland and wetland vegetation, and an overall reduction in tree and shrub taxa. The wetland comprised Poaceae, Cyperaceae, *Sphagnum* moss, *Succisa* (devil's bit scabious) and *Potentilla* (tormentil) but with lesser amounts of *Alnus* by comparison to previous zones. This suggests a retrogressive development to grass-, sedge- and moss-dominated fen swamp. On the dryland, herbaceous taxa increase in diversity, notably Poaceae, *Anthemis* (chamomile), *Artemisia* (mugwort), *Cirsium* (thistle), Lactuceae (eg dandelion), *Plantago lanceolata* and *Rumex* (docks and sorrels). These taxa indicate open conditions and, together with the presence of cereal pollen and microscopic charred particles, provide further evidence for human impact on the local environment characterised by clearance, cultivation and the possibility of deliberate biomass burning. The transition to more open conditions during zones BH-3 and BH-4 (from ~4262 cal yrs BP / ~2312 cal yrs BC onwards) seems to be consistent with pollen data from other Shropshire sites,[56] and therefore supports the interpretation from Broadward Hall of increasing human impact from the Bronze Age onwards.

[56] Turner 1964; Beales 1980; Twigger and Haslam 1991.

Discussion of the environmental history

The radiocarbon-dated sedimentary sequence from Broadward Hall provides a record of environmental change from at least 14,982–14,145 cal yrs BP unmatched in the region for its long chronology. Further pollen-stratigraphical analysis of the lowermost part of the sequence (137–50cm) will provide an important contribution to our understanding of the Late Devensian and Early Holocene vegetation history of Shropshire. The preliminary results reported here for the period spanning ~12,252 to ~8960 cal yrs BP (LPAZ BH-1; ~10,302 to ~7010 cal yrs BC) are broadly consistent with other sites in western parts of the UK.[57] For example, at Crose Mere, the record of declining *Betula* woodland recorded after 12,601–11,351 cal yrs BP (10,310 ± 210 BP; ~10,651–9401 cal yrs BC), and the maximum expansion of *Corylus* shrubland attained at 10,266–9310 cal yrs BP (8730 ± 200 BP; 8316–7360 cal yrs BC),[58] is compatible with the results obtained from Broadward Hall. The higher than expected proportion of *Tilia* woodland recorded during LPAZ BH-1 is less consistent with the majority of other sites, and may be attributed to the small, localised depositional environment and close proximity of nutrient-rich, freely draining soils suitable for *Tilia* growth.[59]

The sustained decline of *Tilia* woodland recorded from ~5321 cal yrs BP (LPAZ BH-2; ~3371 cal yrs BC) at Broadward Hall is consistent with the national picture for the classic 'lime decline' from 5000–3000 cal yrs BP.[60] Given that the decline occurred during a period of sustained peat formation, the cause may be equated with paludification Type I of Grant, Waller and Groves.[61] It is highly likely, however, that the further decline in *Tilia* from ~3900 cal yrs BP (LPAZ BH-3; ~1950 cal yrs BC) was due to the impact of human activities and, in particular, clearance of woodland for cereal cultivation. This suggestion is consistent with the findings of Grant, Waller and Groves,[62] who indicate that 56% of the 164 *Tilia* declines recorded in the UK can be attributed to human activity.[63] At Crose Mere, for example, the lime decline was recorded at 4421–3720 cal yrs BP (3714 ± 129 BP; 2471–1770 cal yrs BC) during a period of sustained human activity, including cereal cultivation, which resulted in

[57] Eg Twigger and Haslam 1991.

[58] Beales 1980.

[59] See also Brown 1988.

[60] Grant *et al* 2011.

[61] Ibid; see also Waller 1994.

[62] Grant *et al* 2011.

[63] See also Turner 1962.

the expansion of grassland.[64] At Fenemere, localised clearance of lime, oak and elm from 3566–3266 cal yrs BP (1616–1316 cal yrs BC) corresponds to an increase in herbaceous and fern taxa (eg bracken, ribwort plantain, docks and sorrels) with accompanying evidence for cereal cultivation and pastoralism.[65] These data are also broadly consistent with the record from Whixall Moss where the *Tilia* decline has been recorded at 3822–3169 cal yrs BP (1872–1219 cal yrs BC).[66]

At several Shropshire sites, including Broadward Hall, this period also records a sustained increase of plant taxa indicating heathland, notably *Calluna* and *Erica (*eg Fenemere).[67] This suggests an accompanying change in soil status on the freely draining substrates (eg head deposits and diamicton), which was probably associated with a reduction of woodland cover on brown earth soils. Although the cause of heathland formation during the Middle Holocene may be due to natural processes of soil degradation and climate change to wetter conditions, at many sites, palaeoecological and archaeological evidence for Bronze Age human activities clearly indicates that anthropogenic disturbance of the environment was a probable cause.[68]

Deposition of the spearheads at Broadward Hall therefore occurred during a sustained period of human activity that commenced prior to ~2900–2700 cal yrs BP (~950–750 cal yrs BC) and continued throughout the main period of archaeological interest. Similar evidence for woodland clearance and cereal cultivation, and an expansion of grassland, during the later Bronze Age has been recorded at several sites (eg Fenemere) and was accompanied by localised increases in bog surface wetness and changes in wetland vegetation, which is consistent with those recorded at Broadward Hall. According to Twigger and Haslam, 'The extent of woodland clearance in north Shropshire appears to have varied between ca. 800 [~2900 cal yrs BP] and ca. 600 [~2750 cal yrs BP] BC … Averaged over a wide area of the lowlands, possibly a third of the tree cover was removed with up to three quarters of the woodland cleared in favoured localities … such as the drier, well-drained brown earth soils on the sand and gravel deposits'. [69] Whether a similar interpretation can be applied to south Shropshire remains uncertain without further pollen studies. However, the results from

[64] Beales 1980.

[65] Twigger and Haslam 1991.

[66] Turner 1964.

[67] Twigger and Haslam 1991.

[68] Groves *et al* 2012.

[69] Twigger and Haslam 1991, 750.

Broadward Hall seemingly provide a record for human activity and environmental change during the Bronze Age that is consistent with the findings from the northern part of the county.

The excavated material

Faunal remains (Aleks Pluskowski)

Introduction

A total of 132 bones were recorded, of which 79 were identifiable to species (table 4). The assemblage was generally in poor condition with the majority of bones eroded, weathered and fragmented. Given the small number of fragments divided over six contexts, all quantification was based on NISP (Number of Identified Specimens Present) rather than MNI (Minimum Number of Individuals). They came from a number of separate contexts, details of which are provided in the project archive. Their dates are suggested on the basis of radiocarbon dates. Where more than one determination comes from the same context, the later date is used.

Two tentative conclusions can be drawn from the element distribution of the individual species (table 5). Firstly, that some fragments are most likely derived from the same animal (for instance the cat from context 1031 associated with a late medieval carbon date, the mustelid from context 1042 which came from a deposit with another medieval date, and the horse from context 1045). Secondly, in the case of the cattle remains, elements from across the cranial and post-cranial skeleton are represented, particularly in context 1031 where the largest number of cattle bones were identified (N=27).

The largest assemblage was represented by context 1031, where 79 bone fragments were recorded, followed by context 1042 where 29 fragments were recorded (table 6). Context 1045 consisted of a single, fragmented left mandible from a horse. This deposit was probably late medieval.

Osteometrics

Due to the poor preservation of the assemblage, only a limited number of measurements could be taken. These are tabulated in Table 7.

Cattle

The largest quantity of cattle bones (N=27) was derived from context 1031, dated to the late medieval period. These bones, recovered from a single fill, represented a range of cranial and post-cranial elements, most likely linked to food waste in the absence of evidence for manufacturing marks. Lower limb bones are particularly represented, and in one case may derive from an Associated Bone Group (a partially articulated foot). Epiphyseal fusion indicated that the majority of elements derived from mature individuals, at least two years old on the basis of the unfused metacarpals and tibia fragments.[70] The unfused proximal end of a second phalanx indicated the presence of a neo-natal animal.

Sheep/goat

Fourteen sheep/goat bones were recovered from context 1031, dated to the late medieval period. They too are represented largely by lower limb bones. The distal ends of four metacarpals were unfused, indicating the presence of animals younger than 18–24 months, whilst two unfused first phalanges point to individuals no older than 16 months.

Pig

A single pig bone consisted of a badly preserved metapodial from a possible Late Bronze Age context (1042).

Horse

Eleven horse bone fragments, recovered from context 1045 (dated to the medieval period), largely derived from a single left mandible, which was fragmented and in very poor condition. The extant teeth (five incisors, three molars and three premolars) were loose and it was possible to measure crown heights (table 8). On this basis, it was possible to tentatively estimate the age of the animal using Levine's method,[71] resulting in a median score of 6 years (range 5–7).

Other mammals

Five domestic cat bones from a late medieval context represent a fragmented pelvis, whilst four dog bones from late medieval and possible Late Bronze Age contexts were derived from disparate cranial and limb bones. This included a fragment of maxilla from context 1042 with a heavily worn M1 and M2. The dog tibia fragment from context 1046 contained pathological osteophytes on the proximal end of the bone, which had linked the condyles. This is typically

[70] Silver 1969.

[71] Levine 1982.

indicative of osteoarthritis. Four fragments from a mustelid jaw (context 1042; Late Bronze Age) could not be positively identified to species but were larger than a stoat and close to the size of a polecat or marten.

Discussion

This very small assemblage of bones from six discrete contexts is dominated by domesticates. No cut marks were observed on any of the bones and it is difficult to link these bones to specific forms of human activity, other than depositional. The presence of a partial horse mandible may indicate that cranial or carcass parts were deposited here, which is more evident with the element representation of cattle, and the character of the bone fragments from the main domesticates is typical of rubbish deposits, pit and trench fills from various periods. The deposits may have been related to what can be broadly and generically described as 'ritual' activity associated with the spring. Domestic animals, not only horses and dogs, but also cattle and sheep, are widely associated with ritual killing and depositional procedures across northern Europe.[72]

Cremated bone (Fiona Catherine Shapland)

Cremated bone was recovered from three contexts at Broadward: context 1031 (one fragment), context 1046 (two fragments) and context 1048 (one fragment). The cremated bone was macroscopically examined in the laboratory. Bone colour and condition was recorded for the information this can provide on the cremation process.[73] All bone fragments identifiable to an area of the skeleton or specific bone were separated out for analysis.

They may be human or animal. The largest (from context 1031) measures 14mm by 7mm, and the remaining three fragments all measure less than 7mm by 5mm. None is identifiable to a specific skeletal element. All four are white/grey in colour, indicating that a temperature of over 900c was maintained during the cremation process.[74]

Wooden knife or dagger (Steven J Allen and Richard Bradley)

A piece of worked oak from the peat overlying the Bronze Age pit was submitted to the York Archaeological Trust for conservation (fig 12). It is dated to 365 ± 30 BP, which calibrates to

[72] See Pluskowski 2011.

[73] McKinley 2000.

[74] Walker *et al* 2008, 133.

AD 1540–1640 (GU-22233). It consists of a section of a radially faced lath, one end of which is shaped to a crude point, and resembles a roughly carved knife or dagger. The hilt is slightly worn, as if it once had a handle. Because it is comparatively crude, it would not be appropriate to compare it with metal artefacts of similar date.

Macehead (Fiona Roe)

Part of a macehead was found in a nineteenth century deposit consisting of dumping into the fill of a stream (fig 13). The surviving end is flattened, while the macehead is broken across the shafthole and was also split in two lengthwise so that the fragment now measures just 52.5 by 45 by 30mm, with a weight of 117g. It is light brown in colour and the surface is smooth but with a series of small cracks that are suggestive of burning; this may also have caused further damage at the more complete end. The shafthole is basically cylindrical and smoothly made but bored at an angle. The macehead was not thin sectioned but appears to be made from a quartzite pebble and this may account for the slightly uneven shape, with one side more curved than the other, while the hardness of the material would have caused some difficulty in boring the hole, so that it is not quite central. Quartzite was used to make 20% of maceheads for which petrological identifications are available, so the choice of material is not unusual.

The flattened end is a decisive feature, since it differs from the rounded ends of Neolithic Ovoid, Pestle and Cushion maceheads[75] and this detail suggests that the fragment belongs within a smaller number of Early Bronze Age maceheads with central, straight-bored shaftholes.[76] The most recent review of these later examples commented on the disparate forms that appear after about 2000 cal BC.[77] It seems most likely that the fragment from Broadward could belong in the Largs group,[78] which encompasses a dozen or so maceheads with flattened ends and is named after a Scottish find associated with a tripartite cinerary urn. This however has incised decoration around the shafthole, reminiscent of the grooved ornament found on some later Scottish battle-axes. A better comparison can be made with the macehead found in barrow C39 at Towthorpe, Yorks East Riding.[79] This macehead is

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[75] Roe 1979, 30 and fig 9.

[76] Ibid, 30 and fig 10.

[77] Needham and Woodward 2008, 24–5.

[78] Roe 1979, 30 and fig 10, B.

[79] Mortimer 1905, 6 and fig 9.

somewhat problematical however, since Mortimer does not state that it was restored at one end, and the plaster remodelling is barely shown in his illustration, although it may approximate to the outline he must originally have seen in the ground. This macehead was found with an inhumation burial and associated with a flint knife and a bronze dagger that is related in form to one of those from the Bush Barrow assemblage.[80]

It appears more usual for Largs group maceheads, when associated, to be found with cremation burials. Three Scottish examples are known but these maceheads are all larger and relatively broader than the Broadward one, as is the example found in a cist at Cleughead Farm, Glenbervie, which has been dated to 1730–1540 cal BC,[81] placing it within Needham's period 4.[82] Another of these maceheads occurred with a cremation in a Cordoned Urn at Cambusbarrow[83] while at Larg a number of cinerary urns containing cremations were found, although the macehead and further cinerary urn sherds were recovered separately. Other centrally bored maceheads of varying forms have also been recorded in association with cremations.[84] If the find from Broadward belonged with another such cremation burial, the cremation process could account for the traces of burning that have been noted above.

It is only possible to suggest a wide dating range for Largs group maceheads, which are likely to fall within Needham's Early Bronze Age periods 3 and 4 between around 1950 and 1550/1500 cal BC[85] and so some thousand years later than the main series of maceheads. If the comparison with the macehead found at Towthorpe holds good, the Broadward macehead could also be approximately contemporary with the grave group from West Overton G. 1, which included a bronze axe of Willerby type comparable with that from the Bush barrow assemblage.[86] The West Overton grave group is now dated to 2020–1770 cal BC,[87] providing a link with period 3 or slightly earlier than that, while other Scottish Largs group maceheads could belong within period 4, as does the one from Cleughead Farm. At Broadward the macehead cannot be contemporary with the hoard of bronze objects, which must be later. Maceheads with centrally positioned shaftholes do not generally occur within

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[80] Gerloff 1975, 71, no.111 and pls. 10 and 45A

[81] Needham and Woodward 2008, 26 and 51.

[82] Needham *et al* 2010, 365, table 1.

[83] Roe 1979, 30 and fig 10, F.

[84] Needham and Woodward 2008, 26, table 5.

[85] Needham *et al* 2010, 365, table 1.

[86] Needham *et al* 2010, 367.

[87] Ibid, 369.

Wessex itself,[88] the Bush Barrow example being a somewhat anomalous find, as is that from Clandon, Dorset[89] so that a burial with one of these uncommon maceheads on the Shropshire–Herefordshire border would not be out of place.

Bone gouge (Richard Bradley)

In the lower filling of the pit cut by the well was a slightly eroded gouge made from a long bone identified as *bos*. It provided a radiocarbon date of 1220–1010 BC (fig 14). This kind of artefact is not particularly diagnostic but appears at Middle and Late Bronze Age settlements where bone is preserved.

Worked flint and other stone – unillustrated (David Mullin)

Only three pieces of worked flint were recovered from the excavation: a thumbnail scraper on good quality dark brown flint from context 1003; a microburin from context 1017; and a core trimming flake from context 1021.

A large flake of chipped quartzite measuring 120mm by 90mm with scars along one edge was recovered from Trench 1, context 1033, a deposit of alluvial clay underlying a peat deposit. This may have been used as a rather crude chopping or scraping implement. Barfield[90] has identified similar expedient use of raw materials to manufacture crude tools at other sites in Shropshire, such as Meol Brace where fine grained meta-siltstone and altered alkali dolerite, probably local glacial erratics, were used to produce flake tools.

Shale bracelet (Richard Bradley)

A single piece of worked shale was recovered from a nineteenth century deposit. It is semi-circular in cross section and is polished on the exterior but not the interior (see fig 13). It has an estimated diameter of 80mm. It is difficult to date such a small fragment but its cross section is a little unusual and is not represented among the artefacts from Iron Age and Roman shale-working sites in Purbeck. On the other hand, a bracelet of similar form and size comes from a Late Bronze Age context at Eldon's Seat in the same region.[91]

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[88] Needham and Woodward 2008, 25.

[89] Ibid.

[90] Barfield 1997, 67.

[91] Cunliffe and Phillipson 1968.

Pottery (David Mullin)

A single sherd of pottery (33g) was recovered beside the pit. It is a body sherd from a large vessel, although it is not possible to be certain of the diameter or form. The fabric contains frequent rock inclusions up to 4mm in diameter and the external face appears to have been smoothed. Such fabrics are fairly well known in the Welsh Marches from sites such as Bromfield[92] and Beeston Castle[93] and span the Middle to Late Bronze Age.

Clay weight (Richard Bradley)

The only find from the excavation of the enclosure (Trench 3) was a broken clay weight from context 3007. It had a flat base and a circular cross section (fig 15). It was extremely friable and had been placed upside down in the ground. The surviving fragment lacked a hole for suspension, showing that it did not form part of a cylindrical loom weight. On the other hand, Late Bronze Age and Iron Age examples from the Marches are usually perforated horizontally towards the top. This fragmentary artefact was probably of that type. It is significantly larger than intact examples from Iron Age contexts at the Breiddin, Croft Ambrey and Sutton Walls, and is much more like the clay weights from a Late Bronze Age context at Beeston Castle. In a recent paper Best and Woodward suggest that such artefacts may not have been associated with weaving and might have functioned as kiln furniture; there are examples with traces of burning towards the base.[94] That might explain why only part of this object has survived.

The implications of the project

From the outset the project had two aims. The first was to relocate the findspot of the Broadward Late Bronze Age hoard and to investigate its setting in the ancient landscape. The second was to characterise a circular enclosure located not far from the bog in which the metalwork was discovered. The project did not involve a new analysis of the original artefacts, but wood samples from two of the spearheads were dated by radiocarbon.

[92] Stanford 1982.

[93] Ellis 1993.

[94] Best and Woodward 2012, 231–4.

The first aim was achieved, albeit with some difficulty. It became clear that numerous wells and land drains were excavated during the nineteenth century, making it particularly hard to establish which of these structures was associated with the original discovery of the hoard. In the event only one convincing candidate was identified. It was precisely where the discovery had been shown on the earliest Ordnance Survey map. Not only was the position of the pit consistent with the information provided in the first accounts of the site, it contained a bone gouge which dates from the Middle to Late Bronze Age.

The introduction to this article posed some specific questions that might be answered through the excavation of a prehistoric spring. It is worth returning to them now.

Did the spring already exist during the prehistoric period?

This is the implication of the environmental evidence from Broadward. Although this part of the bog had been disturbed in the nineteenth century, it is clear that the pit was located right beside a spring which was replaced by one of the wells excavated in 1867. Despite the damage caused by Victorian land drainage, palaeochannels were identified only a few metres from the findspot. One of them produced environmental evidence that the immediate area had been a wetland since the early Postglacial period, and there seems no reason to doubt that there had been a spring there throughout that time. This is also indicated by the character of the surviving deposits and the unusual position of the findspot at the base of a natural bluff on the junction between two geological deposits.

Could it be demonstrated that the deposits of artefacts focused on that spring?

To a large extent this was shown by the fieldwork carried out in 2010. Apart from the hoard itself, the material of prehistoric date consists of a stone macehead, a bone gouge, a few fragments of worked stone, a single sherd, and part of a shale bracelet most probably of Bronze Age date. They were scattered throughout the disturbed contexts around the edge of the spring and were not found in other parts of the excavation, including a second area of waterlogged deposits.

What was the full range of artefacts associated with the spring?

The project shed new light on the character of the hoard discovered in 1867. Not only had it been buried beside an active spring, it was probably associated with a number of items that would not have been collected, or even recognised, in the nineteenth century. That cannot be proved, as no metalwork was found in 2010, and the case depends on the position of the pit in relation to the earliest map showing the position of the hoard. The surviving part of the pit in which the metalwork appears to have been deposited included a bone gouge, which may have predated the bronze artefacts by a century or more, a few tiny fragments of bone which had been burnt to a very high temperature, flaked stone, and fragments of quartz. Unfortunately, it was impossible to establish whether the bone came from a human cremation, although 'token' deposits of this kind are common on Late Bronze Age sites.[95] Such discoveries recall antiquarian accounts of metalwork deposits associated with finds of human bone, but they provide too little detail to allow a closer comparison.[96]

An early account of the Broadward hoard suggests that the metalwork was also found with 'whole skulls of ox and horse'.[97] Such an association is entirely possible, but the only horse bones found in the recent excavation come from the late medieval period, and none of those belonging to other species have radiocarbon dates in the Late Bronze Age. Of course, only the best-preserved bones were selected for dating, and the possibility remains that other phases were not represented.

Could the sediments associated with the spring provide a dated environmental evidence? Would it be possible to show whether the metalwork hoard was isolated, or was it located in a settled landscape?

Pollen analysis also showed that the area had been farmed during the phase in which the metalwork was deposited. In fact the earliest evidence of agriculture at Broadward is assigned to the Early Bronze Age. Although a settlement must have existed somewhere in the vicinity, its location remains unknown, and the project reported here did not identify any other features close to the spring itself. Only one Late Bronze Age sherd was found beside this feature.

On the other hand there was a circular enclosure located not far away on the summit of a glacial mound. It was separated from the hoard site by an area of higher ground, but the earthwork shares the distinctive feature that the surrounding area is often flooded. Despite a campaign of land drainage which began a century and a half ago, there are times when the site resembles an island. The excavation showed that the enclosure was relatively insubstantial, but had a precisely circular outline: a feature that is quite common among the

[95] Brück 1995.

[96] Burgess 1976.

[97] Rocke and Barnwell 1872, 343.

later prehistoric earthworks of the Welsh Marches.[98] Excavation within the interior did not produce any finds, and only one artefact was discovered in the entrance. It was a clay weight which had been deposited in a pit. It cannot be dated as accurately as the deposit of metalwork, but, like the hoard, should date from the Late Bronze Age. Its siting is so distinctive that the enclosure is unlikely to have been an ordinary settlement.

The new fieldwork suggested that the spring was a focus for human activity over a longer period than had been suspected. The worked flints found close to the spring may relate to hunting or grazing in a productive environment, but the other finds raise problems. The first is the Early Bronze Age macehead found on the edge of the spring in a nineteenth century context. Although it might have come from a barrow levelled in the nineteenth century, accounts of the site are confusing. Unlike most of the finds from prehistoric graves, this object seems to have been deliberately broken and only half of it is represented. For that reason it is tempting to suggest that it was more directly associated with the deposits in the spring. They included an animal bone with a radiocarbon date in the same period. It was at about this time that the surrounding area was first farmed.

The Late Bronze Age hoard itself typifies a wider pattern. Like other examples from the English–Welsh borderland, it was associated with a tributary of a larger river and not with the principal watercourse.[99] Its location in an area of boggy ground is one of the characteristics of finds of metalwork in this region. Recent studies of the siting of hoards in Wales,[100] south-east England and the Fenland[101] illustrate the same connection between streams, springs and deposits of Bronze Age metalwork, even when the artefacts themselves were buried in dry ground. They also show that hoards could have been outside, but close to, settlements. That would be consistent with the environmental evidence from this project.

Although artefacts of different dates have been recovered from rivers, there is little evidence from the excavation of springs in Britain. The one exception comes from current work at Amesbury in Wiltshire, where excavation of a similar deposit has found not only Mesolithic artefacts but a dagger made from the tip of a bronze rapier, a Middle Bronze Age

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[98] Whimster 1989, ch 5.

[99] Mullin 2012.

[100] Gwilt *et al* 2005, 44–5.

[101] Yates and Bradley 2010a and b.

chisel and a Roman lead curse tablet. An Anglo-Saxon disc brooch was discovered in a similar context nearby.[102]

Later activity at the Broadward spring

Later activity on the Shropshire site poses more difficult problems. They are discussed only briefly as they were not the focus of this project. Some confusion attaches to a complete Roman pot discovered with the Late Bronze Age hoard. Although it no longer survives, it was illustrated in 1873 and can be dated to the second or third century AD. There is no evidence of other activity in the vicinity, although there was a series of forts at Leintwardine.[103] Again it seems possible that the vessel was deposited in the spring as an offering, but of course that cannot be proved.[104] It could have been contemporary with part of a shale bracelet found in the excavation, but this artefact is more likely to date from the Late Bronze Age.

Radiocarbon dating suggests that deposits of animal bones accumulated around the spring during two main periods: between about AD 680 and 900, and again between AD 1430 and 1650. The bones from a palaeochannel are little earlier and have a date of AD 1330 to 1430. Although they could be interpreted as chance finds, it may be more than a coincidence that their distribution should emphasise the position of the spring and that, with one exception, no other material of the same date was represented in the excavated areas.

The radiocarbon dates from context 1031 which contained the wooden knife / dagger and the bones of a cat fall between about AD 1480 and 1650. That may be significant as Sir Keith Thomas's book *Religion and the Decline of Magic* shows how witchcraft and magic remained important in England until the seventeenth century AD.[105] It may be no coincidence that this was when the Broadward spring appears to have lost its significance. There is no need to argue that the site was used continuously. The distinctive character of the sites and their secluded location might have attracted attention more than once.

The seventeenth century deposit has features in common with those in standing buildings. They includes knives and the remains of cats which seem to have been intended as

[102] Jaques *et al* 2012.

[103] Stanford 1980, 136–8; Welfare and Swan 1995, fig 51.

[104] Fulford 2001.

[105] Thomas 1971.

protection against witchcraft,[106] but until recently similar material had not been discussed in relation to springs. A new development is the discovery of a series of pits in a similar environment at Saveock Water in Cornwall.[107] They contain deposits which are far more striking than any of those described in this paper. Among their contents are feathers, birds' claws, eggs, pieces of quartz, human hair and nail clippings, fragments of textile, and pins. There are the bones of pigs and dogs, and one remarkable deposit contains the teeth, whiskers and claws of a cat: a species which is also represented in the latest phase at Broadward. The two sites can be compared with one another as there are post-medieval dates for some of the pits at Saveock. In this case there is circumstantial evidence that the deposits were associated with witchcraft.

Final reflections

This paper began by advocating the archaeological investigation of springs as a contribution to Bronze Age studies. It also posed some questions that might be investigated in the field. They were pursued in detail in the case of the Broadward hoard, one of the best known collections of metalwork dating from the end of this period.

To a large extent these specific questions could be answered by excavation, but the process proved to be more difficult than anticipated. Not only had the findspot of the hoard been damaged at the time of the original discovery, it required a detailed environmental analysis to place the site in its local context. The field evidence was richer than expected, but it was harder to interpret. Not surprisingly, the deposits around the spring had been disturbed by running water and it is clear that the animal bones associated with them were no longer in chronological sequence. The age of this material was determined by radiocarbon dating of the best preserved examples. Further projects of this kind will be worth undertaking, but perhaps they should focus on sites about which more is known in advance. They should also budget for a full programme of scientific dating.

It was known that a complete Roman pot was discovered in 1867 at the same time as the metalwork at Broadward, but what could not have been anticipated was the presence of deposits of faunal remains and a wooden artefact, associated with the same spring but dating from the medieval and post-medieval periods. They pose problems that go well beyond the

[106] Gilchrist 2012, 228–31; Hutton 2013, 382–91; cf. Merrifield 1987.

[107] Wood 2011; for further discussion see Hutton 2013, 390–1.

scope of the original project, but the evidence has been presented here as it deserves to be considered by specialists on those phases. It cannot sustain an ambitious interpretation in its own right, but it seems possible that in the future similar finds will be recognised in places where water wells up from the ground.

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Tables

Context	Description	BP Date	Cal Date	Sample No
1031	Bos bone fragment	3605 ± 30	2040–1880 BC	GU-24521
1031	Ovicaprid bone fragment	1205 ± 30	AD 760–900	GU-24522
1031	Bos bone fragment	315 ± 30	AD 1480–1650	GU-24523
1031	Oak object	365 ± 30	AD 1540–1640	GU-22233
1045	Pig bone fragment	570 ± 30	AD 1300–1370	GU-22235
1046	Bos bone fragment	1240 ± 30	AD 680–880	GU-24520
1048	Bos bone fragment	395 ± 30	AD 1430–1530	GU-24519
1056	Bone gouge	2915 ± 30	1220–1010 BC	GU-22234

Table 1. Radiocarbon dates for archaeological samples from Broadward.

Depth (cm)	Colour	Troels-Smith Description	Description	Upper Boundary
0–12	10YR 2/2	Sh2 $Th^2$2, Humo3	Very dark brown well humified peat with frequent modern rootlets	TOP
12–33	10YR 2/1	Sh3 $Th^3$1 Tl+, Humo3/4	Black well-humified peat	Grading into
33–35	10YR 2/2	$Tb^2$3 Sh1, Humo3	Band of moss peat (not *Sphagnum*)	Diffuse
35–56	10YR 2/1	$Th^1$2 $Tl^2$1 Sh1, Humo3	Black herbaceous and wood peat	Diffuse
56–58	10YR 3/1	$Th^2$2 $Tl^2$1 Sh1 Ag+, Humo2	Very dark grey herbaceous and wood peat	Diffuse
58–75	10YR 2/1	$Th^1$2 Sh2 Tl+, Humo2	Herbaceous peat with rooting from above	Diffuse
75–104	10YR 2/1	$Th^3$2 $Tl^2$1 Sh1 As+, Humo3	Black fen-type peat, some rooting from above	Diffuse
104–106	7.5YR 2.5/2	$Th^3$4 Tl+, Humo3	Very dark brown herbaceous peat with some woody remains	Diffuse
106–114.5	10YR 2/2	$Th^3$3 Sh1 Tl+, Humo3/4	Very dark brown well-humified herbaceous peat with some woody remains	Diffuse
114.5–119.5	10YR 2/1	Sh3 $Th^3$1, Humo4	Black highly-humified herbaceous peat	Diffuse

Depth (cm)	Colour	Troels-Smith Description	Description	Upper Boundary
119.5–120	10YR 4/1	Sh3 As1	Dark grey lens of organic mud with mineral clay	Diffuse
120–123	10YR 2/1	Sh4 As+	Totally humified black organic material	Diffuse
123–124	10YR 6/1	As4	Grey clay	Sharp
124–125	10YR 3/2	Sh4 As+ Dl+	Very dark greyish brown organic mud with single large fragment of wood	Sharp
125–125.5	10YR 6/1	As4	Grey clay No fizzing with HCl	Sharp
125.5–126	10YR 5/2	As3 Sh1	Greyish brown clay with organics No fizzing with HCl	Grading into
126–129	GLEY1 7/10Y	Ag3 Lc1	Light greenish grey silt with calcareous marl; visible fizzing on application of 10% HCl	Diffuse
129–137	GLEY1 5/10Y	Ag4 As+ Ga+ Th+	Greenish grey silt No obvious bedding Some audible fizzing with 10% HCl Rare rootlets	Diffuse

Table 2. Broadward Hall – Lithostratigraphy.

Laboratory Code	Depth (cm)	Material	$\delta^{13}C$ relative to VPDB	Radiocarbon Age BP	Modelled Cal yrs BP (95.4%)	Modelled Cal yrs BC/AD (95.4%)
SUERC-35398 (GU-24524)	10–11	Peat: Humic acid dated	-29.4 ‰	2030 ± 30	2108–1899	158 BC–AD 51
SUERC-35399 (GU-24525)	30–31	Peat: Humic acid dated	-29.6 ‰	3455 ± 30	3828–3640	1878–1690 BC
SUERC-35404 (GU-24527)	50–51	Peat: Humic acid dated	-28.3 ‰	8140 ± 30	9241–9005	7291–7055 BC
SUERC-35403 (GU-24526)	85–86	Peat: Humic acid dated	-30.1 ‰	10,575 ± 35	12,626–12,423	10,676–10,473 BC
SUERC-35405 (GU-24528)	121–122	Peat: Humic acid dated	-28.3 ‰	12,455 ± 40	14,982–14,145	13,032–12,195 BC

Table 3. Radiocarbon dates for environmental samples.

Species	**ΣNISP**
Cattle (*Bos taurus*)	36
Sheep/goat (*Ovis aries*)	18
Pig (*Sus scrofa*)	1
Horse (*Equus f. caballus*)	11
Cat (*Felis s. catus*)	5
Dog (*Canis l. familiaris*)	4
Mustelid (*mustela* genus)	4
unidentified large mammal (cattle-sized)	4
unidentified medium mammal (sheep-/pig-sized)	12
unidentified mammal (fragments)	37
Total	**132**

Table 4. Species count by Number of Identified Species Present.

Element \ Species	CAT	COW	DOG	HOR	MAR	PIG	S/G
MAN	–	2	1	–	2	–	–
MAX	–	–	1	–	–	–	–
SKL	–	1	–	–	–	–	1
LT	–	13	–	11	2	–	–
ULN	–	–	1	–	–	–	–
PEL	5	–	–	–	–	–	–
FEM	–	2	–	–	–	–	2
TIB	–	1	1	–	–	–	–
AST	–	2	–	–	–	–	–
CAR	–	3	–	–	–	–	–
MC	–	3	–	–	–	–	4
MP	–	1	–	–	–	1	2
MT	–	4	–	–	–	–	6
PH1	–	2	–	–	–	–	3
PH2	–	2	–	–	–	–	–

Table 5. The distribution of elements for individual species. MAN=mandible; MAX=maxilla; SKL=skull; LT=loose tooth; ULN=ulna; PEL=pelvis; FEM=femur; TIB=tibia; AST=astragalus; CAR=carpal; MC=metacarpal; MP=metapodial; MT=metatarsal; PH1=first phalanx; PH2=second phalanx.

Context / Species	1031 (late medieval)	1038 (unstrat.)	1042 (Late Bronze Age?)	1045 (medieval)	1046 (Mid-Late Saxon)	1048 (late medieval)
Cattle	27	1	4	–	4	–
Sheep/Goat	14	–	3	–	1	–
Pig	–	–	1	–	–	–
Horse	–	–	–	11	–	–
Dog	1	–	2	–	1	–
Cat	5	–	–	–	–	–
Marten sp.	–	–	4	–	–	–
ULM	4	–	–	–	–	–
UMM	8	–	3	–	1	–
UUM	20	1	12	–	–	4
Total	**79**	**2**	**29**	**11**	**7**	**4**

Table 6. The distribution of species by context. ULM=Unidentified large mammal; UMM=Unidentified medium mammal; UUM=Unidentified mammal.

Species	Element	Context	Bp	Bd	GL
COW	AST	1046	–	33.2	52.4
COW	MT	1046	43.85	53.22	220
COW	MT	1031	43.37	53.73	219

Table 7. Measurements for three cattle bones from contexts 1046 and 1031. Bp refers to breadth of proximal; Bd refers to breadth of distal and GL refers to greatest length (of a complete bone).

Tooth	Crown Height
M3	64.74
M2	71.08
M1	73.86
P4	70.08
P3	75.47
P2	43.1

Table 8. Measurements for three horse molars and three horse premolars from context 1045.

Captions

Fig 1. The location of the Broadward hoard.

Fig 2. The Roman vessel discovered with the Late Bronze Age hoard. After Barnwell[108]

Fig 3. The better-preserved spearhead from the hoard whose shaft has been dated by radiocarbon. After Burgess *et al*[109]

Fig 4. General view of the area in which the Broadward hoard was discovered, showing a nineteenth century pumphouse in the background.

Fig 5. The microtopography of the areas studied, showing the location of the hoard and the position of the earthwork enclosure.

Fig 6. The area excavated around the findspot of the hoard. The shaded area shows the disturbed area around the former spring, and the symbol marks the position of the pit.

Fig 7. The pit interpreted as the findspot of the hoard cut by the remains of a nineteenth century well.

Fig 8. Profile of the pit interpreted as the context of the metalwork hoard. The drawing also indicates the position of the post-medieval wooden 'knife' or 'dagger'.

Fig 9. The topography of the circular enclosure, showing traces of rig-and-furrow and the extent of excavation.

Fig 10. Details of the ditch terminal (context 3004) and the partly excavated pit (context 3008).

Figs 11a and b. Pollen diagrams for the palaeochannel sampled at Broadward.

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[108] Barnwell 1873.

[109] Burgess *et al* 1972.

Fig 12. The wooden ‘knife’ or ‘dagger’ deposited from the spring deposit.

Fig 13. The shale bracelet (upper) and the stone macehead (lower) from deposits around the spring disturbed during nineteenth century land reclamation.

Fig 14. The bone gouge from the Bronze Age pit on the edge of the spring deposit.

Fig 15. The clay weight from the pit in the entrance to the circular enclosure.