Proceedings of the Cambridge Antiquarian Society

(incorporating the Cambs and Hunts Archaeological Society)

Volume XCV
for 2006

Proceedings of the Cambridge Antiquarian Society

(incorporating the Cambs and Hunts Archaeological Society)

Volume XCV for 2006

Editor Alison Taylor

Published by the Cambridge Antiquarian Society 2006
ISSN 0309-3606

Contents

Roman tumuli or medieval industry? Moulton Hills, Bourn, reconsidered

David Baxter

In the early 20th century, the excavator, FG Walker, interpreted Moulton Hills as Roman burial mounds, rebuilt by a passing Danish army. His work is reviewed in the light of new evidence derived from fieldwalking in the vicinity and re-examination of artefacts from the original excavation. The hypothesis is advanced that the mounds are medieval earthworks constructed for the purpose of smelting iron.

Introduction

Three prominent mounds in Bourn, Cambridgeshire, known as Moulton Hills, have long attracted the interest of archaeologists. None have been properly convinced by Walker's (1911) interpretation of the earthworks as Roman burial mounds, but no satisfactory explanation of their origin has yet been produced.[1] A former owner of the site, Lord de la Warr, cut a trench through each mound in 1857, probably in search of buried treasure, but found nothing except 'an old sheep's head' (Walker 1911). FG Walker excavated two of the mounds in 1909;[2] his finds are preserved in the Museum of Archaeology and Anthropology, Cambridge, and his excavation report was published in *PCAS* 15, 166–177. His plans and sections are particularly valuable: they are reproduced here as Figures 2 and 3. This article presents a critique of Walker's report, and discusses the origin of the mounds in the light of recent surveys of the site, and of fieldwork in the vicinity.

Walker's excavation

FG Walker, a Cambridge archaeologist who had excavated Roman sites in many parts of Britain, was invited to investigate Moulton Hills when the site was threatened with destruction to make way for a cemetery. He cut trenches through two of the mounds, finding quantities of Romano-British and medieval pottery in each of them, together with animal bones and other occupational debris, and concluded that the earthworks were occupied (however briefly) in two distinct periods. He was able to make an accurate distinction between medieval and Roman pottery types because he was the first archaeologist to recognise a particular vessel form – the shallow basin illustrated in Plate XII in his report – as medieval in date. Walker had found a similar shallow basin during his excavation of the manor of Barton Moats, Cambridgeshire, but was unable to date the piece, other than to assign it broadly to the medieval rather than the Roman period. His find of a shallow basin in one of the 'tumuli' in Moulton Hills enabled him to propose a date for the vessel form in the ninth or tenth centuries (p175):

> *We can take it for granted that no tumulus like this has been constructed in England since about the year A.D. 1000, for no people in this country later than the Danes would be likely to pile up such a thing.*

Modern research into the chronology of medieval pottery has shown that Walker's dating of the shallow basin (and the pottery type which it represents) was in error by several centuries. Paul Spoerry recently examined Walker's assemblage of artefacts in the museum, and dated all the medieval pottery to the 12th to the 14th centuries (pers comm).

Walker considered the south mound ('Tumulus 1') to be a Roman burial mound visited, and perhaps added to, by the Danes. He found that 'Tumulus 2' was complex in construction, with an inner mound and ditch inside the visible mound. His section (Fig. 3) shows the inner mound defined at the sides by a ditch full of black earth, and at the top by a heap of ashes. He interpreted the inner mound as a Roman tumulus, covered by an outer mound of Danish construction. He accounted for the surprising discovery of one tumulus inside another in this way (p175):

> *... on the top of this inner tumulus a sacrifice was offered, or a feast was made, for no human bones, only animal, were found here. Over the remains of this sacrifice or feast was raised the outer tumulus, in all probability to commemorate some notable person or event, but not as a sepulchre.*

Evidence for dating the mounds will be discussed later but we should first consider two more of Walker's finds: many tons of burnt matter, and a large quantity of lava millstone. A great deal of burnt matter was found in both mounds during the 1909 excava-

Figure 1. Two of the three Moulton Hills as they appear today, viewed from the south. Tumulus 1 is in the foreground, Tumulus 2 behind.

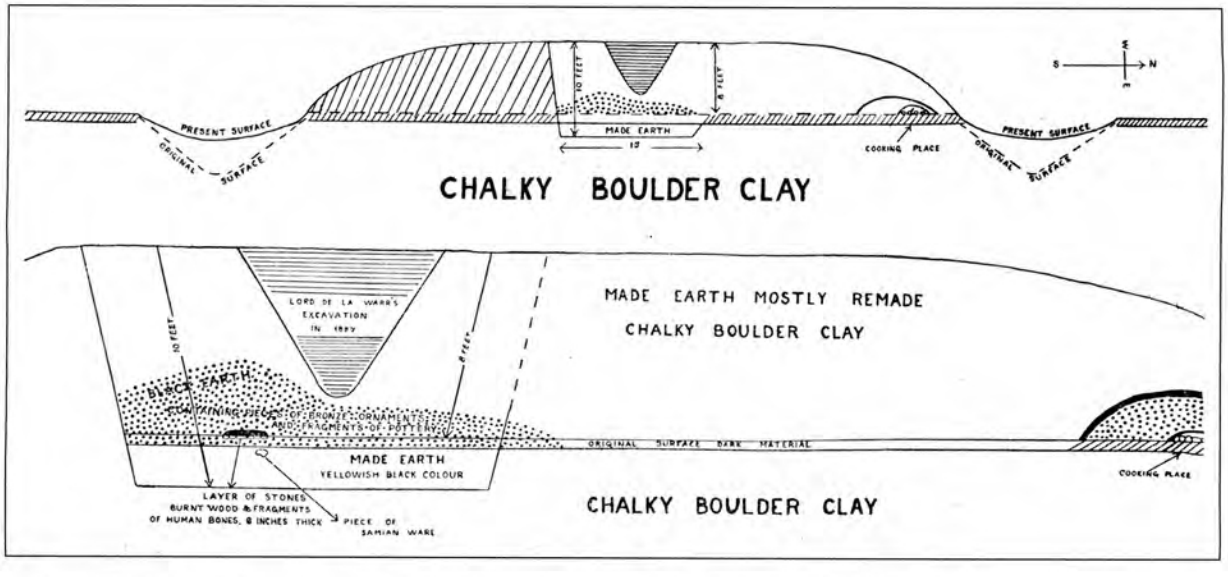

Figure 2. "Section of Tumulus No. 1" from Walker's report published in PCAS *15: 166–177.*

tion, but few samples were taken, and we have to rely on Walker's verbal descriptions. For example, in 'Tumulus 1' he noted (pp168–70):

> *At ground level, 2 feet in from the fosse, a deposit of later date than that of the original hill was touched. It was a rounded patch of black earth about 10 feet in length and 2½ feet at its highest point. A few blackened boulder stones, with greasy black earth round them and a vessel of yellowish ware of early medieval date with sooty grease on its outer sides, occurred at its northern end. A few bones of sheep and pig were lying in the dark earth near the vessel. This was a cooking and not a burial place.*

In the centre of the same mound (Fig. 2) he found:

> *another patch of black earth, quite 12 to 15 feet square and varying from 1 foot to 3 feet 6 inches in depth.*

The inner ditch of 'Tumulus 2' (Fig. 3) was nearly full of black earth. The 'inner tumulus' also contained burnt matter at ground level, on the south edge, and in the centre. The volume of burnt material can be roughly calculated from Walker's measurements: it amounts to more than 80 cubic metres, about 80 tonnes. A modern archaeologist might suspect that these quantities are industrial in character rather than the result of cooking, feasting, or sacrifice.

The other material that can be quantified from Walker's report is Rhineland lava millstone. It was found in every part of the earthworks (p170):

> *One fact that soon forced itself upon our attention was the very great quantity of fragments of Niedermendig lava mill-stones, which occurred everywhere in both No. 1 and No 2. tumuli and in their fosses. These fragments varied in diameter from half an inch up to 6 or 8 inches.*

Millstone was also found in the inner mound of 'Tumulus 2' (pp172–3):

> *In this case again almost every spadeful of earth contained fragments of Niedermendig stone as mentioned above. In all the diggings I have been engaged in I have never seen so much of this material in one place. If all could have been picked up out of the two mounds, I estimate its weight at over half a ton.*

Walker's trenches cut through only a small proportion of Moulton Hills. If half a ton of lava millstone could have been picked up out of the soil he disturbed, then the total amount must be very large. Half a ton is about 2000 pieces of the size of his samples in the museum, weighing on average half a pound each.

Walker's conclusions can be summarised as follows: the tumuli are Roman burial mounds, visited in passing by a Danish army, which commemorated a feast or sacrifice by heaping two hundred tons of boulder clay on the smallest mound.

Walker's excavation report

Walker's careful observations, and his well-preserved assemblage from Moulton Hills allow an interpretation of his finds that differs widely from his own. His chronology is wrong. The Danes had no part in constructing the earthworks: the medieval pottery found in them is 12th to 14th century in date. There is no reliable evidence that the mounds are Roman in origin. The site at ground level certainly contained Romano-British pottery and Roman coins; but the only deposits in which Romano-British material was found unmixed with medieval pottery, lay below the original ground level. All the Roman material contained in the mounds themselves could have been thrown up with earth from below the surface. Evidence of human cremation is also unsatisfactory. At ground level in 'Tumulus 1' Walker found (p170):

> *... a very few fragments of human bones, such as one finds in cinerary urns, so very friable that they mostly crumbled away to dust during their carriage to Cambridge, even though I carried them in a box in my hand the whole way.*

There is no evidence that these bones were ever ex-

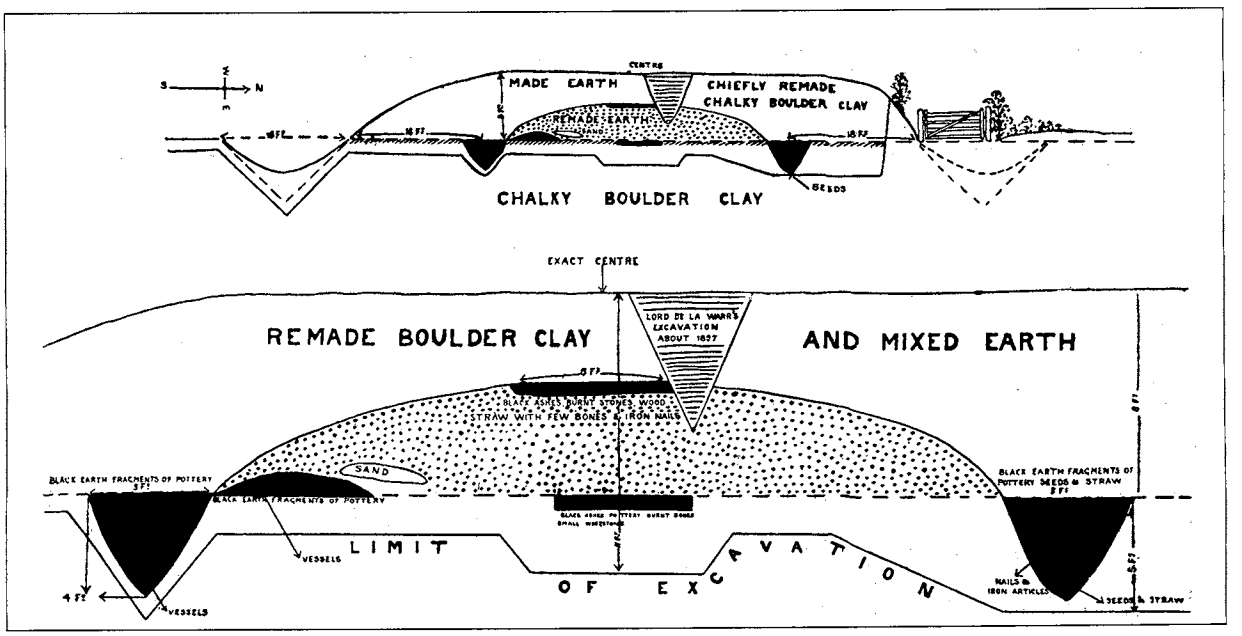

Figure 3. "Section of Tumulus No. 2" from Walker's report published in PCAS *15: 166–177.*

amined to prove that they were human. No urn was found with them. The evidence from 'Tumulus 2' is equally unsatisfactory (p173):

> *At the centre slightly below ground level was another patch of black ashes 5½ feet in length and nearly 6 inches deep containing a few fragments of human bones mostly crumbled in pieces...*

None of the 'human' bones are preserved in the museum assemblage.

Walker gives no adequate explanation of the large quantities of burnt matter in the mounds. Nor is there any explanation of the amount of Rhineland lava millstone found on the site. His report assumes that the mounds are ceremonial in purpose, and asks no further questions about form or function.

The medieval iron industry in Bourn and neighbouring villages

Recent fieldwork in this area has yielded evidence of a substantial iron industry in Bourn valley. About 200m east of the mounds lies the lost medieval settlement of Densett. Four seasons of fieldwalking have located ten crofts along the east side of Densett Street (Fig. 4). All the crofts, with the possible exception of one that has not been ploughed in recent times, contain materials associated with the manufacture of iron, including slag, raw and roasted nodules of limonite ore, burnt clay, vitrified brick, and partly-worked iron. The ore found on the Densett sites is rich in iron – up to 86% Fe – and the ore samples analysed are compatible with the iron slag found there [analysis produced by Charles Turner, Earth Sciences Department of the Open University]. The exact source of the ore is not known, but excavation of one of the crofts in 2005 revealed an extensive deposit of iron-rich silt 80cm deep, part of it sealed between two layers of cobbles: this deposit was probably washed down Bourn Brook from quarries upstream. Woburn Sand, an iron-bearing greensand, has been proved in the valley bottom between Bourn and Caxton.

Densett Street is only one of three lines of medieval croft sites discovered in Bourn valley which show evidence of iron working. Fieldwalking in Caxton to the west and Caldecote to the east has located scatters of slag and other iron residues on sites that are rich in pottery from the 12th to 14th centuries.

From evidence so far gathered it is difficult to estimate the scale of this industry. Scatters of slag and burnt clay are still visible in the fields between Bourn and Caldecote, and may represent former woodland iron sites in what had become arable land by the later 14th century, when the fields were first recorded by

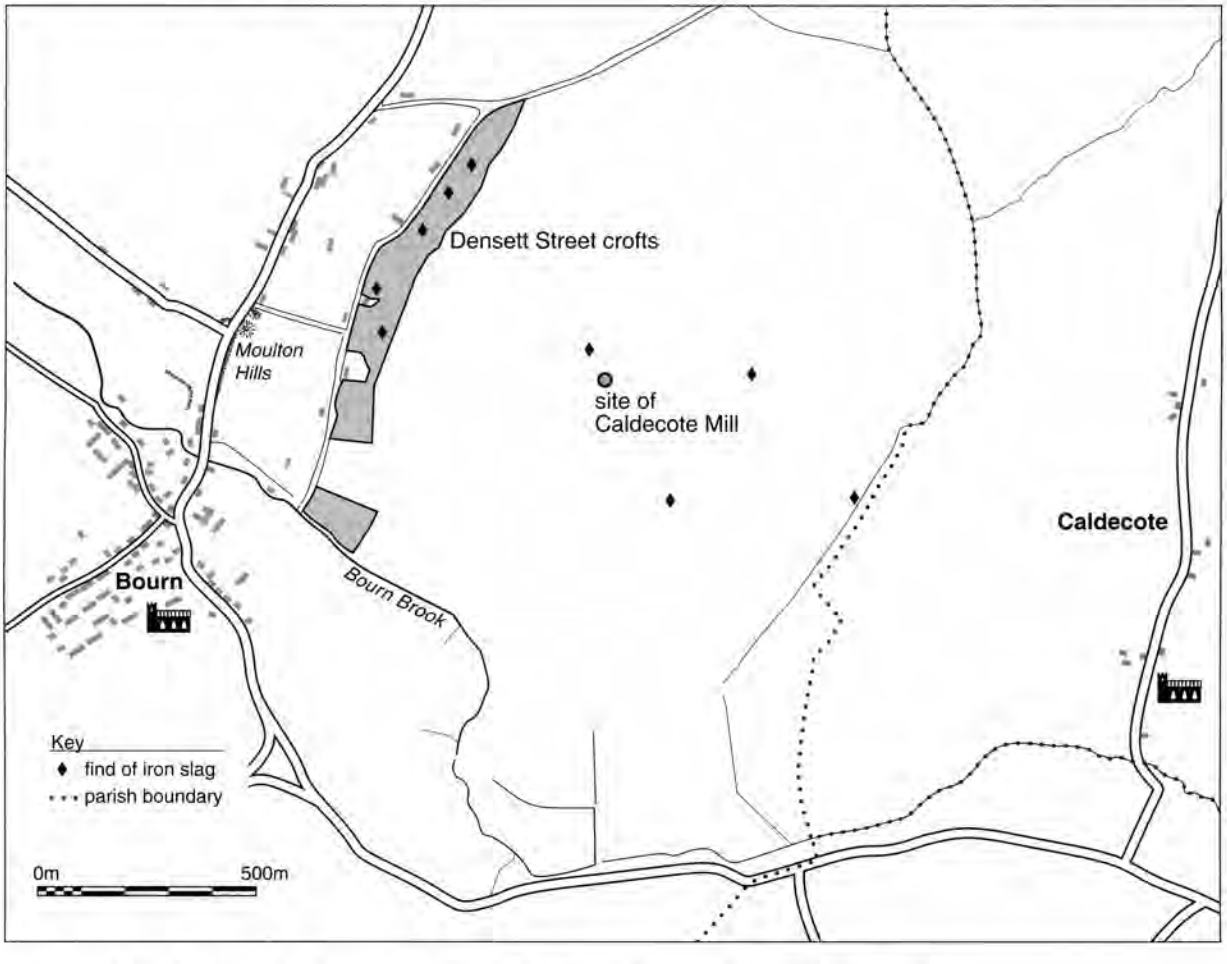

Figure 4. *Finds of iron slag shown in relation to the Densett Street crofts and Moulton Hills.*

name. The field names *Brunne Wolde*, *Long Wolde*, and *Caldecote Wolde*, indicate that the clay plateau between Bourn and Caldecote was once wooded (Christ's College, Cambridge, muniments: Bourn manor court rolls 1350–1399). This is significant, because of the three materials required to smelt iron in primitive furnaces – ore, clay, and charcoal – only charcoal is likely to have been in short supply locally during the high Middle Ages. Boulder clay is the main drift deposit in the area, and fragments of burnt clay found in slag scatters show the same range of inclusions (mainly chalk and flint) as the boulder clay itself, which appears to have been used without much modification to build furnaces. Ore of good quality was obtainable locally. But a shortage of fuel may have limited medieval iron production in these villages. In 1279, only about 450 acres of woodland were recorded in the Hundred Rolls for the area within about four miles of Bourn (*Rotuli Hundredorum* ii: Stow Hundred).

Walker's finds reinterpreted

This fieldwork has established that iron was produced in Bourn and neighbouring villages during the high Middle Ages. What connection, if any, did Moulton Hills have with this local industry? There is some (but not much) direct evidence of iron working in the museum assemblage of Walker's finds. There are small pieces of iron ore, slag lumps, bits of furnace lining, and smiths' sharpening stones; in all about 20 pieces that can be recognised as smiths' debris, not counting the nails that appear in nearly every context. The paucity of this evidence is not surprising. To anyone familiar with the waste products of primitive forges, the materials are unmistakable; but Walker was not looking for industrial residues. Small pieces of slag can be mistaken for lava millstone which, since it has once been molten, has cavities and gas bubbles like iron slag. If Walker had come across large flows of tap slag, he would no doubt have distinguished them from stone; but slag was valuable as hardcore in the Middle Ages, especially in a stone-poor region like the Bourn valley, where even church walls were built out of stones laboriously gathered in the fields; and one would expect to find slag recycled as road metal or hard core. The medieval roads to Caxton, Densett, Bourn and Cambridge cut through Moulton Hills.

Figure 5. *Finds from Walker's excavation, including iron nails from Tumulus 1. Plate reproduced from Walker's report published in* PCAS *15: 166–177.*

The presence of smithing debris among Walker's finds indicates that there was a forge in Moulton Hills, but that does not necessarily mean that the mounds were built for that purpose. Any discussion of the origin of the earthworks, must take account of their size and construction, the large quantities of burnt material and of lava millstone contained in them, and the two distinct periods of occupation of the site.

At first sight profiles of Moulton Hills suggest spoilheaps resulting from the extraction of iron ore; there are, however, no accessible ore deposits on the site. Charles Turner made a geological survey of the area in 2004: he took core samples from the bed of Bourn Brook and from locations leading up to the plateau on which the mounds stand, and proved boulder clay over the whole field.

Since those who built Moulton Hills were not extracting ore, the form of the mounds themselves is significant: they were built for a specific purpose, and the form may indicate their function. Walker's discovery of an inner mound and ditch in 'Tumulus 2' gives a clear idea of the sequence of construction (Fig. 3). The original mound was built up to a height of two metres or more with clay dug out of the surrounding ditch (before consolidation of the clay, the height would have been greater than at present). This mound, 31 feet in diameter, was the site of industrial activity, which continued long enough, or at sufficient intensity, to fill the ditch with burnt matter. At some later time a further 200 tons of clay was dug out of the present ditch, which is more than twice the diameter of the earlier one, and the clay was used to build a mound at least 3m high (allowing for consolidation) and 22m across. Digging and piling up 200 tons of boulder clay would represent at least 100 man-days of labour. I stress the labour involved in the enlargement of the mound, because it appears to demonstrate that the builders saw considerable economic advantages in building the mounds up to their present height ('Tumulus 1' is the same height as 'Tumulus 2', and a bit wider). The enlargement of 'Tumulus 2' effectively created a bank 68m long and 5m high from the bottom of the ditch.

A bank of clay is a convenient place to build a furnace, and furnaces built into banks follow a design familiar in the archaeological record (eg Tylecote 1986, Fig. 100): an arch at the bottom of the outer wall allows the fire to be set, a draught to blow through the furnace, slag to be tapped, and the bloom to be taken out. The mass of clay on three sides would act as insulation, leaving only the outer wall of the furnace to be protected against loss of heat. Two of the 'cooking places' that Walker found cut into the sides of the mounds at ground level could well have been furnaces, to judge by the heaps of ashes produced, and there is plenty of room in the unexcavated sections of the perimeter ditch for other furnaces. (A gradiometer survey of the site made by Peter Morris in 2004 revealed a large magnetic anomaly on the south side of 'Tumulus 1' in an area untouched by Walker's trench-

es. This could be another furnace.) The 5m from the trench bottom to the top of the mound may have been important in creating a natural draught, thus reducing or eliminating the laborious work of blowing bellows: if so, then the hilltop site, open to prevailing south-west winds, was no doubt chosen deliberately.

If the smiths in Moulton Hills were able to use the full height of the mounds to build their furnaces into, then the shafts would rise 3m through the reconstructed mound in 'Tumulus 2'. It is possible that the induced draught could have gained further momentum from the additional height of 2m of ditch below. At any rate, the hilltop site, a bank 5m high, and 80 cubic metres of burnt matter, are strong indications of a furnace technology employing natural draught. The length of the bank at 68m would provide ample space for the various processes of making iron – roasting ore, smelting, refining blooms and smithing artefacts – all of which require sustained high temperatures.

Rhineland lava millstone

The hypothesis that Moulton Hills were built specifically for iron working accounts for many of the facts that Walker recorded, including the shape of the mounds as reconstructed in their present form. Does it also explain the presence in all parts of the earthworks of large quantities of lava millstone? It is not only the quantity of millstone that must be accounted for but also its ubiquity. Either the material was brought to the site during the whole period of occupation, and was incorporated into the banks and mounds in each phase of construction, or it must have lain scattered on the surface before any of the work of digging and building was begun. Walker assumed that the Rhineland lava millstone was imported during the Roman period, but lava querns are some of the commonest finds on medieval house sites in the area, and there is evidence that the material was brought to the site during the high Middle Ages. I have examined all the specimens of millstone preserved among Walker's finds, and they are indistinguishable in the way they are cut, from the many fragments picked up from the Densett crofts, and from the site of a medieval windmill half a mile east of Moulton Hills. Some of the pieces in the museum assemblage and from Densett are fragments of querns with narrow, closely spaced channels and a small central hole; others are much thicker, with widely spaced deep channels, and these are clearly bits of actual millstones. It would appear that both household querns and fragments of millstone were taken to Moulton Hills to be reused.

There is an obvious use for a heat-resisting stone in the building of furnaces. Lava withstands heat very well, and small pieces built into the clay walls of a furnace would strongly reinforce the structure. Two of the millstone samples in the museum assemblage show signs of burning, and several of the Densett fragments are either fire-blackened or slagged. The very large quantities and the pervasiveness of the material though every part of the earthworks can be explained by the need to reinforce friable clay walls under intense heat. Clay furnaces are short-lived structures requiring frequent rebuilding. Walker's finds of lava millstone 'in almost every spadeful of earth' suggests that the mounds were reconstructed more than once – and the location of heaps of ash at the centre of both mounds at ground level shows that where there is now a thickness of eight feet of boulder clay, there were once fireplaces in the open. The deceptive simplicity of circular mounds surrounded by concentric ditches conceals a complex sequence of earth moving. We are fortunate to have one such sequence recorded in Walker's section through 'Tumulus 2'. If it were not for the inner ditch full of burnt matter, and the patch of ashes on top of the inner mound, there would be nothing to distinguish one mass of remade boulder clay from another.

Romano-British and medieval occupation of the site

The fact that Walker found lava millstone in the inner mound in 'Tumulus 2', as well as in every other part of the earthworks, shows that the inner mound is contemporary with the rest: that is, medieval. All Romano-British material in the mounds is residual, thrown up out of ditches into the mounds. The range of Romano-British finds suggests a domestic rather than a ceremonial site (Fox 1923 p195): there are roof tiles in the assemblage, together with fine and coarse pottery wares, and small metal objects. It appears that the medieval smiths cut though a Romano-British settlement when they dug their ditches.

Two coins found by Walker near the top of 'Tumulus 2' give an indication of the date of the last reconstruction of the mound: they are a silver penny of Edward II and a silver halfpenny of Edward III. The earthworks may therefore have taken their present form in the first half of the 14th century.

A gradiometer survey of the field in which the mounds stand by Peter Morris in 2004, shows a pattern of ridge and furrow running up to the ditches of Moulton Hills to the south and east; but since roads cut into the earthwork to the north and west, nothing can be deduced of the relative ages of ridge and furrow and the mounds themselves. The furlong in which the mounds stand was known as *Oldehylls* in the 15th century, which suggests that the earthworks were by then disused. The earliest recorded use of the name is in a court roll of Bourn manor, 7 July 1431 (Christ's College Cambridge muniments).

Moulton Hills and iron technology

The technology of clay iron furnaces is not fully understood, and is the subject of debate and on-going experiment. Our knowledge of clay furnaces is limited by the fact that no excavated example has survived to its full height. A Romano-British furnace built into a bank at Ashwicken (characterised by Tylecote as 'the iron-working site par excellence') survived to a height of 1.4m (1986, Fig.100). Well-preserved Early Iron Age furnaces were recently excavated in Germany (Gassmann 2002). But all medieval clay furnaces so far excavated are truncated, and their technology remains a matter of theoretical reconstruction.

Moulton Hills occupies a hilltop site open to pre-

vailing winds, and may have employed natural draught to blow its furnaces. The nearest parallel examples of medieval furnaces that appear to have used natural draught were excavated at Stanley Grange, Derbyshire (Challis 2002). There, all the furnaces were aligned with mouths facing into the prevailing westerly wind, but against the southward grain of the slope:

> This strongly suggests the use of wind-power to assist in providing the draught, with the wind entering the furnace mouth after passage over hot charcoal lying within the slag-tapping bays. This quite radical interpretation fits the evidence observed during the excavation...
>
> Such furnaces would probably have needed to be taller than their forced draught counterparts, the added height serving to increase the draught (Challis 2002).

Challis' reconstruction drawings show a shaft height of more than two metres. If the hypothesis put forward here is correct, and Moulton Hills proves to be a medieval iron-working site, then the height of the mounds is likely to be significant, both as a pointer to how the furnaces worked, and as a factor in their preservation. Furnaces built into the sides of the mounds may survive with good superstructures.

Moulton Hills as a smithing site

Another way in which Moulton Hills may prove significant is in the data it could yield on rural smiths. It is clear from the museum assemblage of Walker's finds, that there was at least one smithy on the site: nails were found in every context, and the wear-traces on sharpening stones indicate that metal objects other than sickles were produced there. If smithing hearths survive in good condition in the mounds they could throw light on a dark corner of medieval life. Very few rural smithies have been excavated. Grenville Astill commented in 1997 'Of the eleven excavated smithies in England, only four were located in villages, and all are dated to the later fourteenth or fifteenth centuries.' (Astill and Langdon 1997).

There appear to be industrial 'streets' in Caxton, Bourn and Caldecote where scatters of iron slag are found along medieval road frontages of several hundred metres in each village. Is there a connection between Moulton Hills and the industrial settlement along Densett street? The similarity of finds in the Densett house sites, and in Walker's assemblage from Moulton Hills, make that an attractive possibility.

Conclusion

In this paper I have advanced the hypothesis that Moulton Hills are medieval earthworks constructed for the purpose of smelting iron. This would account for the form and dimensions of the mounds, the ubiquity of lava millstone in all features in the earthworks, and the specific location of industrial quantities of burnt matter discovered during the 1909 excavation.

Moulton Hills is a scheduled ancient monument. It is currently wrongly dated, and incorrectly described. A small excavation could reopen Walker's trenches without further damage to the monument, and settle questions of origin and function using modern methods of sampling and analysis. If it is a medieval bloomery, then its unusual form, and largely undamaged condition, promise rare insights into medieval technology.

Endnotes

1. Walker's chronology has misled later commentators. Fox (1923) summarised his finds (p. 195): 'The finds indicate cremation burials of II A.D. by Romanized Britons. Roman remains have been found at Bourn Hall near by.' In 'Barrow No. 2' 'the outer barrow was post-Roman, of unknown date'. Fox suggested that the Roman remains below ground level in Barrow No.1 were 'probably occupational', which can hardly be reconciled with Walker's report. Hurst (1956) identified the shallow bowl illustrated by Walker as 'a typical shallow St. Neots bowl, though it has unfortunately been mislaid; it would appear to be Pre-Conquest'. Since Hurst was unable to see the bowl, and relied on Walker's description, the 'Pre-Conquest' date remains doubtful. RCHM (1968) also summarised Walker's finds, but dissented from his conclusions (p.27): 'it would appear that these mounds were constructed from material containing Roman debris, known to occur in an adjoining garden to the N., and that they overlie early medieval hearths. The mounds, the purpose of which is unexplained, are probably later than the Norman Conquest'. The only evidence for an early medieval date for the 'hearths' is the bowl dated by Hurst (see above) as 'Pre-Conquest'. Liversidge (1977) remained unconvinced of the date of the whole earthwork: 'From Walker's account and the fragments surviving in the Museum of Archaeology and Ethnology it seems that these two barrows were erected either to cover cremations of presumably late 2nd-century date, probably burnt in situ, or are post-Roman mounds incorporating a scatter of earlier debris.' The chronological confusion of Walker's report is reflected in all these later commentaries.
2. Fox (*op. cit.* p. 195) notes: 'There is no record of Barrow No III in the paper. Mr Walker, in response to my enquiry writes (Nov 21, 1921): 'No, I did not open the third tumulus. It was exactly like the other two and fragments of Roman pottery turned out in the small hole I made in it.'

Bibliography

Astill, G and Langdon, J (eds) 1997 *Medieval farming and technology* Leiden

Challis, K 2002 Medieval iron smelting in Derbyshire *Historical Metallurgy* 31 (1): 33–42

Christ's College Cambridge muniments: Barnwell Priory's manor in Bourn: court rolls and bailiffs' accounts, 1314–1399.

Fox, C 1923 *The archaeology of the Cambridge region.* Cambridge, CUP

Gassmann, G 2002 New discoveries and excavations of 6th – 2nd century BC furnaces in SW Germany. *Historical Metallurgy* 36 (2) 71–76

Hurst, JG 1956 Saxo-Norman pottery in East Anglia. *PCAS* 49: 38–56

RCHM 1968 *The County of Cambridge* vol. 1: *West Cambridgeshire*. London, HMSO
Liversidge, J 1977 Roman burials in the Cambridge area. *PCAS* 67: 11–38
Rotuli Hundredorum vol.ii: Stow Hundred. London, Records Commission 1812–18
Tylecote, RF 1986 *The prehistory of metallurgy in the British Isles*. London, Institute of Metals
Walker, FG 1911 Excavations in the tumuli at Bourn, Cambridgeshire, 1909. *PCAS* 15: 166–177