MIDDLE SAXON COMB MANUFACTURE IN *LUNDENWIC* AND POST-MEDIEVAL COVENT GARDEN: EXCAVATIONS AT 15–16 BEDFORD STREET AND 27 JAMES STREET, WESTMINSTER

Alexis Haslam, Ian Riddler and Nicola Trzaska-Nartowski

With contributions by Lucy Allott, Philip L Armitage, Märit Gaimster, Chris Jarrett, Lynne Keys, Imogen Poole, Kevin Rielly, John Shepherd and Berni Sudds

Edited and revised by Bruce Watson

SUMMARY

Bedford Street

Located within the Middle Saxon (c.AD 650–850) trading centre of Lundenwic, *the excavations at 15–16 Bedford Street revealed six Saxon cess and rubbish pits dating from the late 7th to the mid-8th century. The material recovered from these pits included a considerable quantity of worked animal bone associated with the production of single-sided composite combs. Evidence for comb making had previously been recorded at a number of sites throughout* Lundenwic, *although in the majority of cases the combs recovered were found to have been manufactured from deer antler. The Bedford Street pits provided evidence for the use of cattle bone in mid-8th-century comb production nearby.*

Following the abandonment of Lundenwic *in the late 9th century, the area reverted to agricultural land. The next phase of activity concerned a number of 17th-century gravel extraction pits which were probably dug to supply material for the construction of Covent Garden and Bedford Street in the 1630s. During this period a property fronting onto Bedford Court was constructed and a number of brick-lined cesspits were dug in the associated backyards. The rich finds and faunal assemblage recovered from one of the cesspits dating to c.1690–1710 is indicative of a clearance group from a nearby inn or tavern. During the late 17th century Bedford Court was redeveloped and a number of new properties were constructed along with associated features including cesspits and drains. These properties were finally demolished in the late 19th century following the erection of 14–16 Bedford Street and further redevelopment within Bedford Court.*

James Street

Excavations at 27 James Street in the centre of the Middle Saxon settlement of Lundenwic *produced evidence of archaeological activity ranging from the mid-7th century up until the 19th century. The earliest phase of activity was represented by an inhumation burial and a series of post- and stakeholes. During this period the area encompassing James Street is believed to have been occupied by a burial zone located on open land on the fringes of the early settlement.*

Throughout the mid- to late 7th century the site was utilised as a midden before a number of refuse

pits were excavated and a structure represented by a series of stakeholes was erected. These features suggest that Lundenwic *was expanding, but by the late 7th century the stakehole structure had been removed and the site had once again reverted to use as a midden. A metalled gravel surface interpreted as a road sealed the midden material and correlates with a previously conjectured gridded street system. This road went out of use between the mid-8th and early 9th centuries, as the road surface itself was buried beneath a series of dumped deposits. Large quantities of slag recovered from these dumps suggest that smithing activity was taking place within the immediate vicinity, whilst recovered antler waste provided evidence of comb production. Sealing the dumps was a homogeneous soil horizon which has been identified on numerous excavations within the Saxon settlement and is often described as 'dark earth'. This horizon is synonymous with the abandonment of* Lundenwic *during the 9th century.*

Archaeological activity dating to the post-medieval period comprised a late 17th- to early 18th-century well located in the rear courtyard of the building and several drains and masonry structures relating to building alterations undertaken between the early 19th and early 20th centuries.

Contents

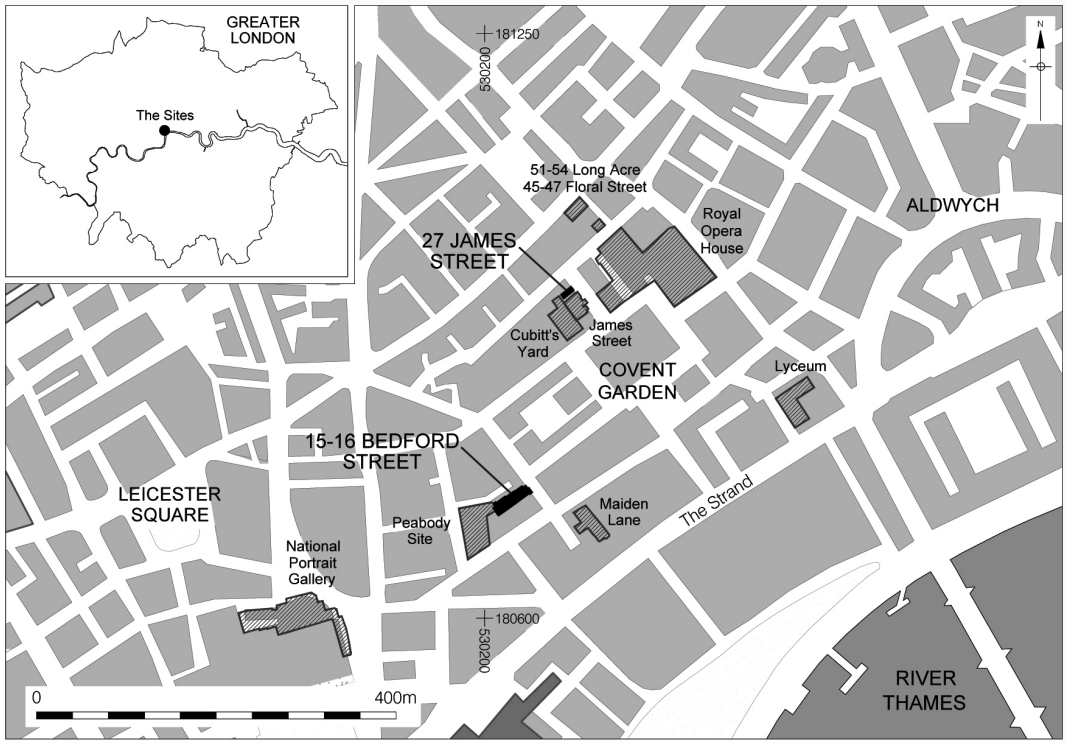

Fig 1. Site location plan, showing other sites mentioned in the text

INTRODUCTION

Bedford Street

An archaeological excavation was undertaken by Pre-Construct Archaeology Limited (PCA) in the basement area of 15–16 Bedford Street, City of Westminster, between January and May 2005 (Leary 2005) (Figs 1–2). These works took place in advance of the redevelopment of the site. The ground works involved the complete remodelling of the internal layout of the building and included the lowering of the basement ground level, the underpinning of the party and retaining walls, and the introduction of both new services and a lift pit (Fig 3). The excavation followed an initial watching-brief, which monitored the geotechnical work on site between July and September 2004 (Leary 2004).

Centred at NGR TQ 3025 8075 (site code: BDO 04), the site was bounded by Bedford

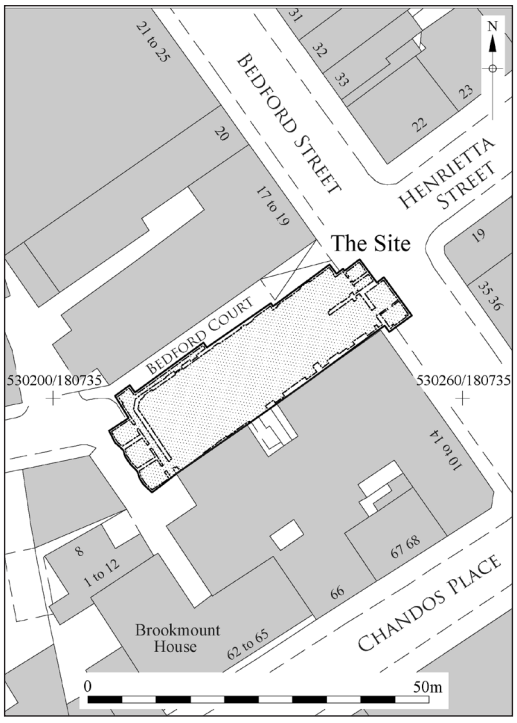

Fig 2. Detailed site location plan for Bedford Street

Fig 3. Working view showing a block of truncated archaeological deposits in the basement at Bedford Street, which has been cut back on three sides by modern intrusions

Court to both the north and west, by Bedford Street to the east, and by retail outlets to the south. Both the archaeological watching-brief and the excavation were supervised by Jim Leary.

James Street

An archaeological excavation was undertaken by PCA at 27 James Street, London WC2, City of Westminster (Fig 1), between June and August 2009; the fieldwork was supervised by Alexis Haslam. These works were conducted in advance of a proposed redevelopment and involved a total of three separate areas of archaeological investigation. Area 1 was located in the cellar of the building which, as part of the site redevelopment, was being both lowered and extended. Areas 2 and 3 were situated within the courtyard to the rear of the property, a significant portion of which had previously been truncated by a basement constructed to provide an extension to the pre-existing cellar (Fig 4). The undisturbed area of the courtyard in the north-west corner did, however, retain an isolated island of undisturbed stratigraphy (Fig 5). Measuring *c.*3m by 3.5m, this island was reduced as Area 2. Area 3 consisted of the archaeological remains located beneath the concrete slab of the previous cellar extension.

The site was centred at NGR TQ 3029 8097 (site code: JMC 09), and was bounded to the north by 26 James Street, to the south by 28 James Street, to the west by 9–10 Floral Street, and to the east by James Street itself.

All text unless stated otherwise is by Alexis Haslam. Complete lists of the post-Roman pottery codes cited, including details and date ranges, are available from the London Archaeological Archive and Research Centre (LAARC) and are also posted on: www.museumoflondon.org.uk/.../post92mol_post_roman_fab_form.pdf (accessed 2010).

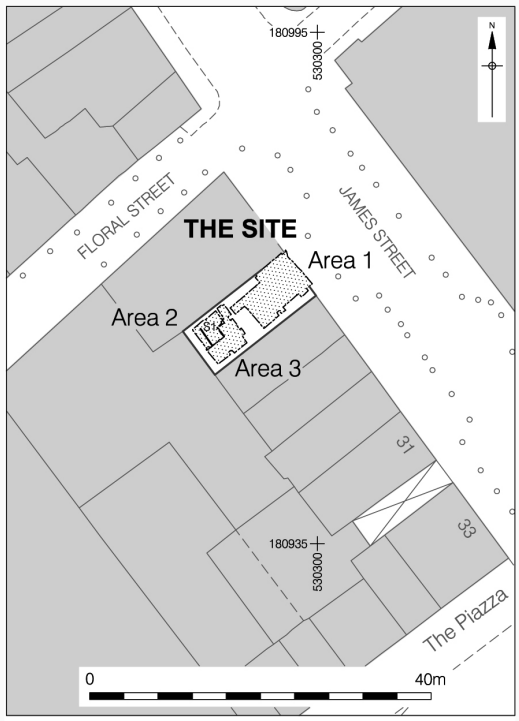

Fig 4. James Street site layout showing the location of Areas 1–3 and Section 1 (Fig 26)

GEOLOGY AND TOPOGRAPHY
(Phase 1 on both sites)

The underlying solid geology of the Covent Garden area comprises Eocene London Clay. Sealing the London Clay are the Middle Pleistocene Terrace Gravels, which have been variously described as belonging to either the Lynch Hill (Gibbard 1994) or the slightly later Hackney Gravel terrace formation (British Geological Survey sheet 256). Drift deposits forming part of the Langley Silts Complex (more commonly referred to as 'brickearth') overlie the Terrace Gravels. The thickness of this brickearth varies locally from 3.1m as recorded at the Royal Opera House (Malcolm *et al* 2003, 13) to 0.47m as recorded at Maiden Lane (Leary *et al* 2004, 3) (Fig 1).

Situated on the northern terrace of the River Thames, the topography of the Covent Garden area comprises a gentle slope descending in a southerly direction from a high point located along Long Acre (Malcolm *et al* 2003, fig 11). Level heights recorded on top of the brickearth during recent archaeological excavations in the

Fig 5. Area 2 of James Street under excavation, view looking west

vicinity of the site reflect this slope, with a highest level of 20.19m OD recorded at James Street and lowest levels of 14.83m and 13.15m OD respectively recorded at Maiden Lane and the National Portrait Gallery (Leary *et al* 2004, 3).

Due to the impact of post-medieval cellars at the Bedford Street site the natural brickearth had been completely removed from the area examined. So the natural geology recorded consisted of the Terrace Gravels, which were recorded at between 15.17m and 16.23m OD. Equivalent deposits were recorded during the Royal Opera House investigations to the north-east of Bedford Street at between 15.4m and 18.6m OD (Malcolm *et al* 2003, 13).

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Bedford Street and James Street are located within modern day Covent Garden, which has been interpreted as the focal point of the Saxon settlement of *Lundenwic*, that was established during the early 7th century AD as a trading settlement and a river port or *emporium*. Situated approximately 1km upstream of Roman *Londinium* and encompassing an area of 55–60 hectares, the boundaries of *Lundenwic* have so far been defined as extending north from the River Thames to Shorts Gardens and as far east as Aldwych (Malcolm *et al* 2003, 1). The western boundary of the settlement is located between Leicester Square and Charing Cross Road, extending in a southerly direction beneath the National Portrait Gallery and Trafalgar Square (Whytehead *et al* 1989, 68) (Fig 1).

Lundenwic like many of its contemporary trading settlements was located on the borders of kingdoms, which were often defined by natural features such as navigable rivers. During the 7th century this stretch of the Thames served as the boundary between the kingdoms of the East Saxons and Wessex. The almost complete absence of Middle Saxon finds (*c.*AD 650–850) from the walled Roman city of *Londinium* implies that it was virtually deserted during this period, apart from the documented existence of a cathedral (Vince 1990, 54, figs 4 and 8).

The first post-Roman reference to the 'port' of London concerns a charter issued in favour of Chertsey Abbey by Frithuwald, sub-king of Wulfhere in AD 672–4, and mentions that a plot of land 'of ten hides is by the port of London, where ships come to land' (Dyson 1980, 84). By the mid-7th century a number of buildings had been established on the site of the Royal Opera House along with a 5m-wide metalled road surface linking the Strand with Oxford Street (Malcolm *et al* 2003, 28). Throughout the late 7th to early 8th centuries the population of *Lundenwic* continued to grow, and the introduction of a further metalled road surface at James Street running parallel with the Royal Opera House road indicated that a gridded street pattern had been established by this point in time (Leary *et al* 2004, 8). The introduction of further buildings at the Royal Opera House indicated the development of property plots, whilst craft activities included tanning, weaving and bone and antler working. Evidence of the latter has been discovered at these two sites, the Royal Opera House and at the Lyceum (Fig 1). The impression is that by the early 8th century *Lundenwic* was a highly developed urban and mercantile centre. The presence of a jewellery workshop at the Royal Opera House indicates economic growth and trade in luxury goods (Malcolm *et al* 2003, 102), whilst the presence of imported pottery and Rhenish lava quernstones provides evidence of long distance exchange. Throughout the 8th century *Lundenwic* continued to develop, with contemporary buildings being recorded at the Royal Opera House, Maiden Lane and James Street.

Between the late 8th and mid-9th centuries *Lundenwic* appears to have gone into decline and documentary sources make no reference to a port, ships, or merchants during this period (Malcolm *et al* 2003, 109). Fewer buildings were erected on the site of the Royal Opera House (Malcolm *et al* 2003, 109) and the *Historia Regnum* records that in AD 764 the settlement was 'devastated by fire' (Whitelock 1955, 249). Although some structural elements relating to the 9th century were recorded at James Street and the Lyceum, by this time the site at 21–24 Maiden Lane had reverted to open land and was being utilised for the disposal of rubbish (Leary *et al* 2004, 144–5). The *Anglo Saxon Chronicle* states that a Viking raid was carried out on

the settlement in AD 842, and that a further raid took place in AD 851 (Swanton 1996, 64). Substantial ditches have been recorded at both the Royal Opera House (Malcolm *et al* 2003, 118–20) and at 21–22 Maiden Lane (Cowie *et al* 1988, 79), which suggests that by the late 9th century *Lundenwic* was encircled by defences. During this period the focus of occupation appears to have reverted to the more readily defensible Roman city of *Londinium*, which was reoccupied and refortified by Alfred in around AD 886 and renamed *Lundenburh* (Leary *et al* 2004, 5). Following the establishment of *Lundenburh*, *Lundenwic* was abandoned (Malcolm *et al* 2003, 130).

During the medieval period, the area around Covent Garden was utilised as farmland, which was principally worked by the monks of Westminster Abbey to whom the land had been granted (Malcolm *et al* 2003, 135). In 1552 Edward VI gave this land to John Russell, the first Earl of Bedford, who proceeded to enclose and subdivide the fields into smaller plots (Malcolm *et al* 2003, 137). Major developments in the area took place during the early 17th century with the construction of the Covent Garden piazza, which was demarcated and erected between 1631 and 1637. Inigo Jones was commissioned to develop the site by Francis Russell, the fourth Earl of Bedford, and he drafted proposals for an Italian style piazza surrounded by arcaded terraces. Unable to pay for such a grandiose development, Lord Russell built a scaled down version (Malcolm *et al* 2003, 137).

Bedford Street itself formed part of the Covent Garden development and was originally laid out in the 1630s, taking its name from the Bedford estate. Leases commenced on the street from 1631, suggesting that a number of properties had already been constructed by this date. Following the Great Fire of London in 1666 a number of the houses were converted into shops as a direct result of the destruction of residences within the City. To the immediate west of the site, Bedford Court, previously used as a stable and coach yard, was redeveloped by the fifth Earl of Bedford in 1688 and was soon occupied by a number of shops. The buildings occupying 15–16 Bedford Street were demolished in 1862–3 and were replaced with new properties associated with the present façade. The lease on 16 Bedford Street began in December 1863, while the lease on No. 15 began in December 1865 (Sheppard 1970, 253–63).

As part of Lord Russell's Covent Garden development plan, an outer rectangle comprising Hart Street (Floral Street from 1895), Maiden Lane, Charles Street and Bow Street was constructed around the internal piazza. Linking the inner and outer rectangles were James Street, King Street, Henrietta Street and Great Russell Street, all of which were lined by terraced houses (Sheppard 1970, 25–34). By 1638 James Street was fully occupied; No. 27 was used as a church parsonage until the 1820s (Sheppard 1970, 178–80).

SYNTHESIS OF THE EXCAVATIONS AND SPECIALIST REPORTS

BEDFORD STREET SAXON SEQUENCE

Middle Saxon (AD 670–750), Phase 2

The earliest evidence of archaeological activity on the site consisted of six cess and rubbish pits, all dug into the natural gravel. Heavily impacted upon by post-medieval pitting, these features displayed considerable evidence of truncation, extending up to a maximum of 2.5m from north to south, 1.5m from east to west, and 0.83m in depth. Recorded as either sub-circular or sub-oval in plan the pits were observed at between 15.90m and 16.16m OD and were backfilled with silts, sands and clayey deposits ranging in colour from dark grey to dark brown. Four pits ([231], [236], [284] and [309]), which date to the second quarter of the 8th century, are defined as Phase 2b features (see Sudds this report) (Fig 6). Despite the site's central location within *Lundenwic*, a combination of the depth of the basement and earlier post-medieval activity explains why there was a low density of surviving Saxon features.

Pottery recovered from the various pits included chaff-tempered ware, Ipswich-type ware and continental imports such as Badorf-type ware, indicating that deposition took place between the late 7th and mid-8th centuries (see Sudds below). Significant quantities of animal bone were also retrieved, with this material suggestive of a diet comp-

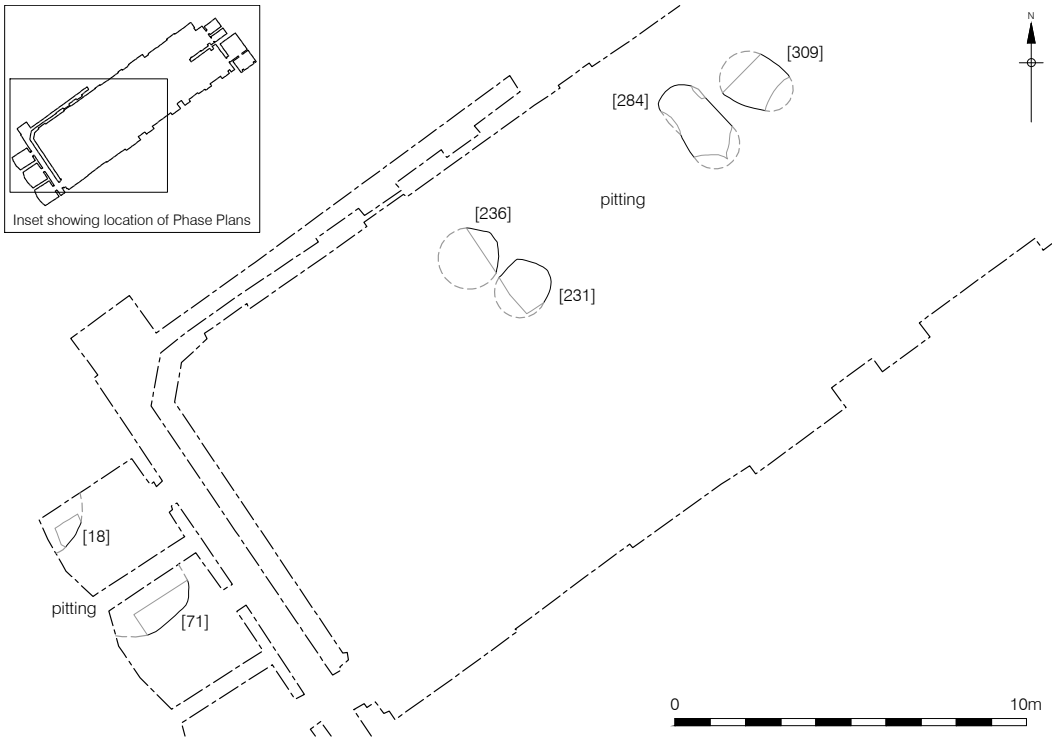

Fig 6. Middle Saxon pits at Bedford Street (Phase 2 a & b) showing their excavated and conjectured extents;

rising primarily beef, pork and mutton (see Armitage below).

Of particular significance was pit [231] located in the central area of the excavation. Large amounts of cattle metapodial bones were recovered from the two fills of this pit. In many instances the proximal and distal ends of these bones had been sawn off, with 'bone blanks' subsequently being produced from the remaining metapodial shafts. A number of these 'blanks' were retrieved from [231] and have been interpreted as 'prefabricates' discarded during the manufacture of bone combs nearby (see below). Two further 'bone blanks' were also recovered from pit [236] to the north of [231] suggesting that these features were contemporary. Pottery recovered from pit [231] provided a deposition date between AD 730 and 750. Another craft activity carried out on site was the production of textiles as evidenced by the retrieval of loomweights, spindle whorls and a pin-beater (see Sudds below).

Situated to the east of [231] and [236] were a further two pits, [309] and [284] (Fig 6). Located at the bottom of pit [309] were the decomposed remains of a wooden base or lining, whilst remoulded brickearth had also been used to line the edges of this feature. The organic nature of the basal fill suggested that [309] had been utilised as a cesspit. Several sherds of pottery belonging to the same vessel were recovered from three of the separate pit fills; this indicated that [309] had been rapidly backfilled, possibly during a single event. Further finds recovered from this pit included iron nails and a knife (see Gaimster below), whilst the ceramic evidence suggested a deposition date between AD 670 and 750.

Pit [284], located to the west of [309], had also been lined with reworked natural brickearth. It contained fragments of pottery belonging to an imported vessel. Sherds of the same pot were also recovered from pit [309], indicating that these two features were

contemporary in date and were backfilled at the same time. Both elder and gooseberry were recovered from environmental samples taken from the primary fill of [284], the presence of which is indicative of waste ground within the immediate vicinity of the site. More evidence of possible waste ground was revealed by the recovery of elder and strawberry/cinquefoil from the primary fill of pit [231].

The next phase of archaeological activity at Bedford Street, which dates to the 17th century is described below, p. 181.

WORKED SAXON ANTLER, BONE AND HORN FROM BEDFORD STREET

Ian Riddler and Nicola Trzaska-Nartowski

Introduction

Just over 400 fragments of worked bone and antler waste were recovered from the fills of 14 features of Saxon and later date (Fig 7). Most of the material is worked bone and in that respect its character is quite different from previous deposits discovered in *Lundenwic*, which consist largely of small quantities of antler (Riddler 2004c; 2004d). It is one of the largest assemblages of worked bone and antler yet recovered from the settlement, almost equalling the overall total of waste recovered from the Royal Opera House (Blackmore 2003a, 302), and it demonstrates how combs and other items were manufactured during the first half of the 8th century. The selection of materials, the stages of manufacture, the quantity of objects produced and the technology involved can all be deduced from the surviving fragments of waste. Set alongside contemporary deposits from *Hamwic* and Dorestad, the nature of the craft can be established at a time when the choice of materials and the range of objects were undergoing significant change.

Few assemblages of worked bone have been published from any post-Roman sites in England. There are a number of brief

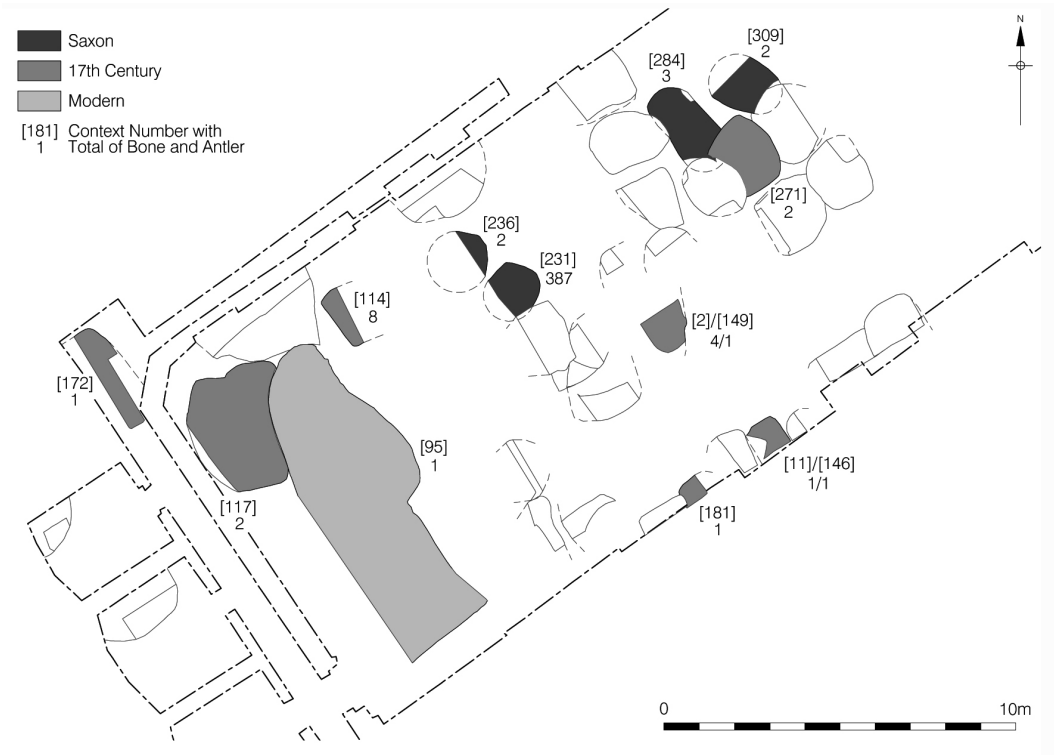

Fig 7. The distribution of features at Bedford Street from which Saxon bone and antler waste was recovered

reports on assemblages from *Hamwic* and the full publication of that material is well in progress (Driver 1984; Morton 1992, 150–2; Riddler 1992; 2001a; Riddler & Andrews 1997; Bourdillon 2003). Further afield, Ulbricht's work on assemblages from two medieval sites in Schleswig has established a methodology for analysing bone and antler waste (Ulbricht 1984). In addition, an assemblage of a little over 300 fragments of worked bone waste came from 8th-century levels at Münster (Winkelmann 1977, 112–15). Given the significance of the material, the opportunity has been taken here to examine the waste and objects in some detail and to compare them with contemporary assemblages, as well as setting them in the context of faunal analyses from *Lundenwic*.

The choice of material

417 antler and bone offcuts, weighing just over 7.5kg, were recovered from 14 separate pits (Table 1). 387 fragments came from two contexts within a single pit and the remainder were dispersed into nearby features (Fig 7). Most of the offcuts have been sawn and/or split from cattle bone but there are also small quantities of antler, as well as sawn sheep and horse bone and one fragment of whale bone. The horn core of a goat came from the main deposit of worked material, alongside two further small fragments of sawn core.

368 fragments, forming 88.3% of the assemblage, consist of worked cattle bone. The majority of that material stems from cattle metapodia, either as offcuts of the proximal and distal ends (203 pieces) or as segments of midshafts (101 pieces) (Fig

Table 1. Worked antler, bone and horn from Bedford Street

Feature	Context	Antler	Cattle	Sheep	Horse	Horn Core	Prefabricates:				Total:
							Bone	Bone or Antler	Antler	Whale	
2	1	1									1
11	10	1									1
95	96	1									1
114	112		8								8
117	131		2								2
146	145	1									1
149	148	2	2								4
172	171	1									1
181	180								1		1
231	229	4	323	2	4	3	16	4		1	357
231	230		28				2				30
236	235		1				1				2
271	269		2								2
284	280		2								2
284	282	1									1
309	304							1			1
309	305	1									1
	U/S						1				1
		13	368	2	4	3	20	5	1	1	417

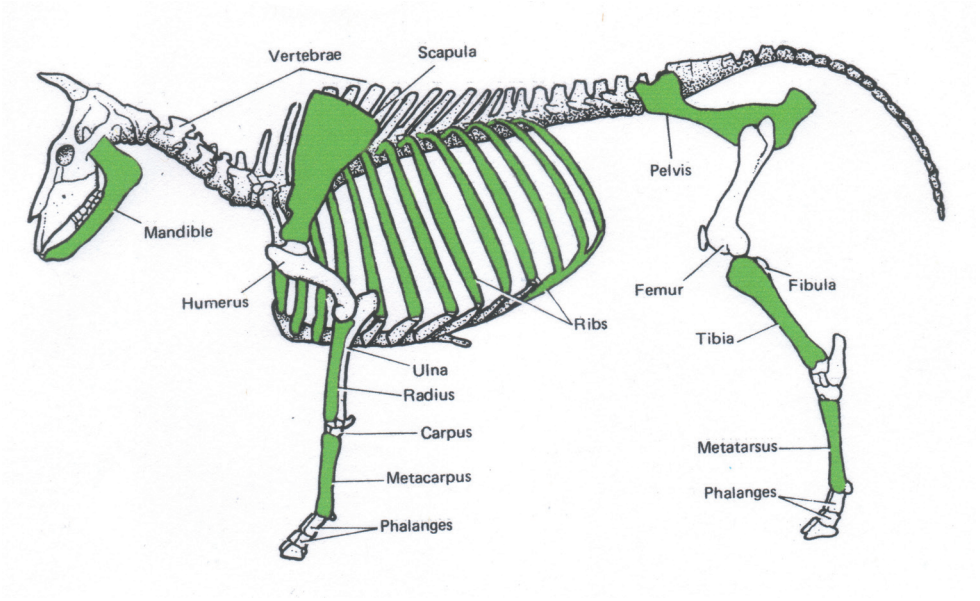

Fig 8. Cattle skeletal elements used in bone working at Bedford Street

Table 2. Worked cattle bone from Bedford Street

Feature	Context	Metapodia	Midshafts	Radius	Tibia	Scapula	Mandible	Rib	Innominate	Context Totals:
114	112	3	5							8
117	131		2							2
149	148	1	1							2
231	229	185	81	11	10	11	6	14	5	323
231	230	12	10	1		2		3		28
236	235							1		1
271	269		2							2
284	280	2								2
		203	101	12	10	13	6	18	5	368

8; Table 2). In this respect, this assemblage follows the conventional pattern for the early medieval period. Six contemporary deposits from *Hamwic* are summarised in Table 4, plus Figs 9–10. Cattle metapodia and accompanying midshafts form between 58.9% and 96.9% of the total of worked bone in these assemblages, the lower figures reflecting an increased presence of worked horse bone. Cattle metapodia also represented 87.36% of the worked bone assemblage at the later site of the 'Schild' at Schleswig (Ulbricht 1984, 13 and table 4). At Münster, in contrast, the assemblage consisted entirely of worked horse bone (Winkelmann 1977, 115). Cattle metapodia were generally the preferred bones for working and they dominate assemblages from the late Roman period onwards. Skeletal elements with a round section were favoured during the

Roman period for lathe turning, as at Augst for example (Deschler-Erb 1998, 71–2), but from the 4th century onwards the emphasis of production lay with composite combs, for which flat surfaces were required. Moreover, the metapodia provide the poorest quality cattle meat, as defined by West (1989, 153) and they had few other uses beyond bone working.

Beyond the metapodia, the range of worked cattle bone extends to radius, tibia, scapula, mandible, innominate bones and segments of rib (Table 2; Fig 8). With the exception of one fragment of rib, all of these worked pieces came from the main bone working deposit. Offcuts of radius and tibia occur in equal numbers and consist mostly of the proximal or distal ends, sawn cleanly from the midshaft. They occur in small numbers within comparable *Hamwic* assemblages (Bourdillon 2003, table 12) with large quantities present at Chapel Road East and smaller assemblages elsewhere in the settlement (Fig 10).

The 13 offcuts of scapula include two glenoidal ends and 11 fragments of blade. The general impression gained from this waste is that flat sections of blade were required and were obtained from at least two cattle scapulae. The mandible offcuts are mostly sawn sections of the ramus or front part of the jaw, with just one segment of the back or ventral part. Sawn offcuts of mandible and scapula are quite rare at *Hamwic* and a little more than 100 of each skeletal element have been found there, with the majority coming once again from the worked bone assemblages at Chapel Road East (Bourdillon 2003, table 7). Similar offcuts have also been found in Dorestad (Clason 1978, afb 1). Sawn innominate bones are scarcer still and have yet to be recorded from *Hamwic*. As with the scapulae and mandibles, the offcuts suggest that broad surfaces of flat and relatively thin bone were required.

The 18 fragments of rib bone have mostly been sawn or cut laterally by knife at one end, and fractured at the other. In some cases the rib has been split along its length and roughly trimmed to a rectangular shape. Rib bone was used either for casket mounts or for the mounts of gaming boards, although occasionally it formed the raw material for the connecting plates of composite combs. It occurs within most bone-working assemblages of the Saxon period, though rarely in great numbers. Almost 800 fragments came from an assemblage at Plessenstraße in Schleswig, which is an unusually large amount for the period (Ulbricht 1984, table 4).

In general, the assemblage provides a wide range of cattle skeletal elements for a deposit of 8th-century date (Fig 9). Few of the *Hamwic* assemblages extend far beyond the metapodia, in conjunction with small quantities of radius, tibia and rib, but a contrast can be drawn between the northern assemblages (sites 24, 26, 31 and 32) and the material from Chapel Road East (site 14) in the south-eastern part of the settlement, where a wider range of bones was utilised for working. The broadening of the range of worked skeletal elements to include the scapula and mandible is a feature both of that site and of some areas of Dorestad (Riddler 2001a, 65; Clason 1978; 1980, 246). The relative totals of worked cattle bone compared with other species, and the skeletal elements of cattle chosen for working, link the Bedford Street assemblage to the waste material from Chapel Road East, rather than to other assemblages within *Hamwic* (Figs 9–10). Assemblages from the northern part of *Hamwic* have a more restricted range of species and skeletal elements.

The worked bones of other animals are poorly represented and in this respect the Bedford Street assemblage differs from that at Chapel Road East (Fig 9; Table 4). The four offcuts of horse include one piece sawn from the distal metacarpus and three midshaft fragments of the same bone type, which may have come from the same bone. A sawn offcut of the proximal tibia of a sheep or goat is accompanied by one fragment of sheep-sized rib, and a sawn goat horn core was found alongside two further fragments of core not attributable to species. Amidst the debris from comb manufacturing lay one fragment of whale bone (Fig 16, top left). All of this worked bone material came from the main deposit of waste. In contrast, the 13 fragments of red deer antler were distributed across nine separate features, occurring alongside worked bone in two of those features (Table 1).

The antler waste includes three burrs, one of which is skull-attached, whilst the other

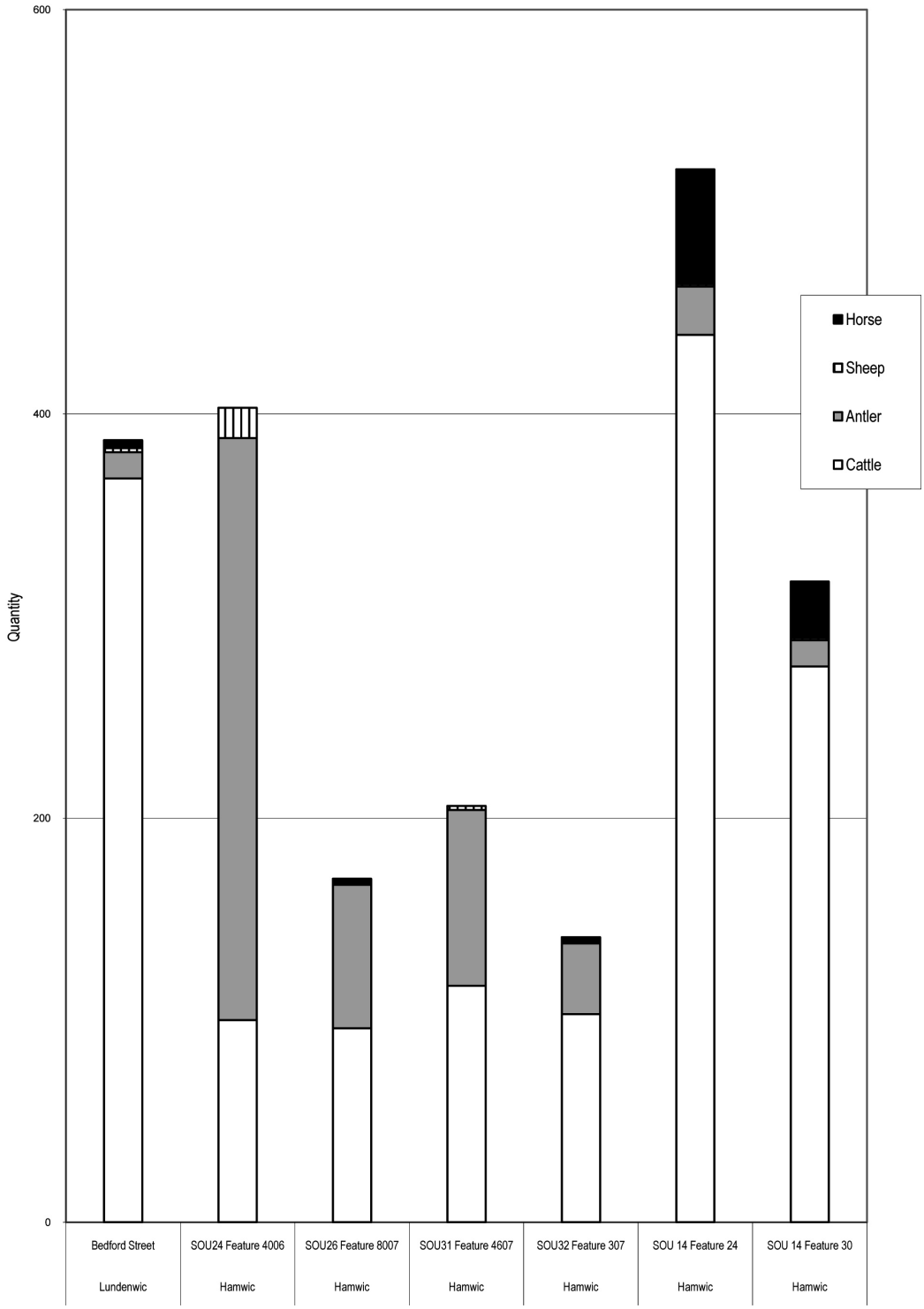

Fig 9. Worked bone and antler waste from selected assemblages at Lundenwic and Hamwic

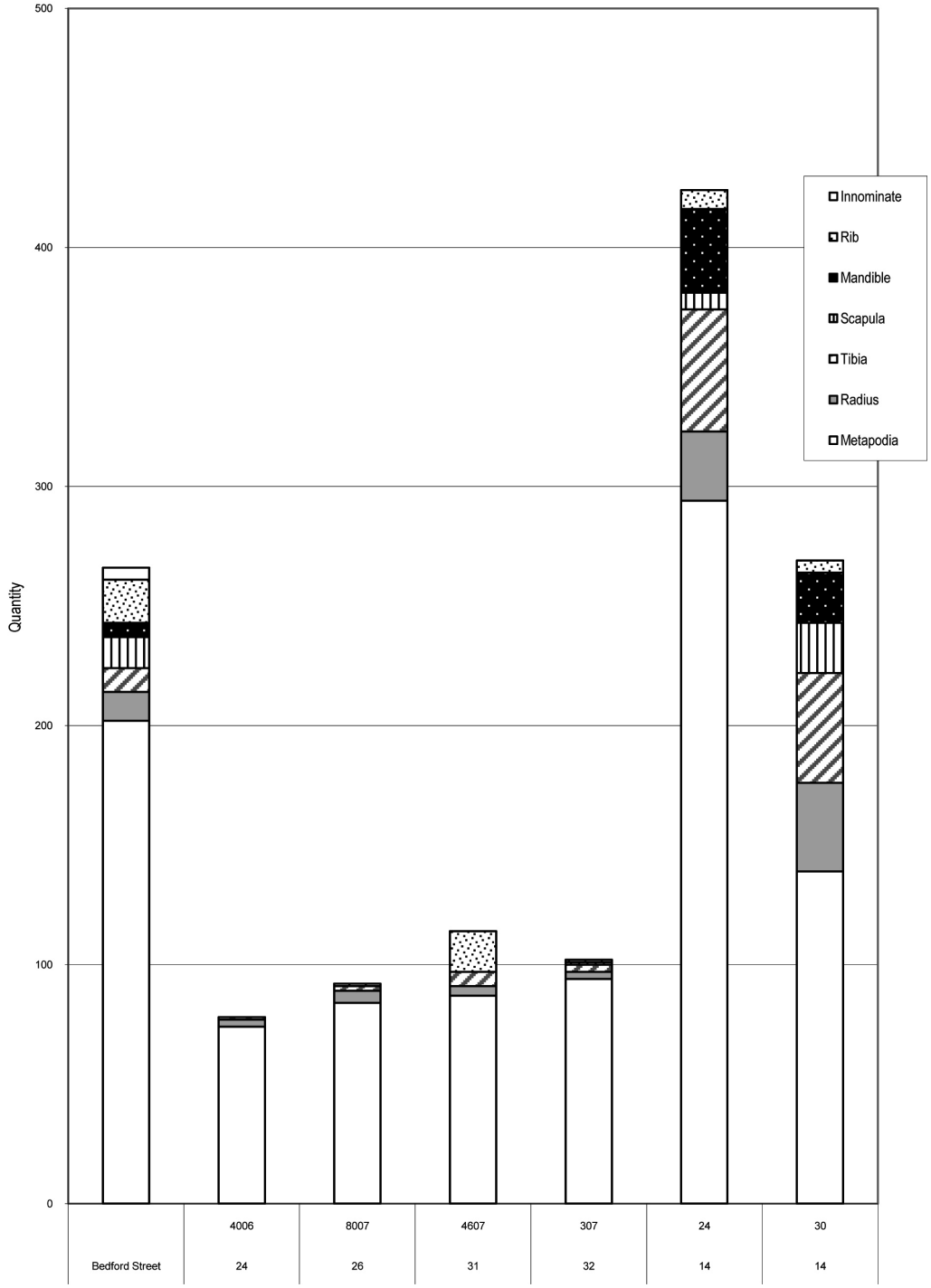

Fig 10. The range of worked cattle bones from selected assemblages at Lundenwic and Hamwic

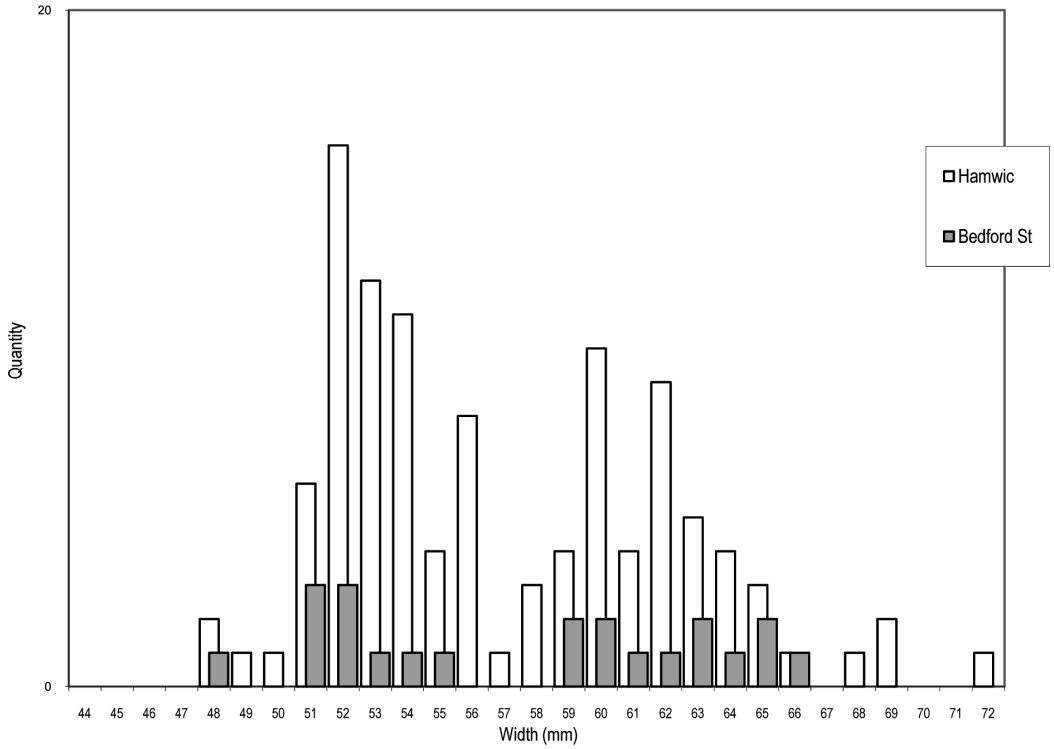

Fig 11. Greatest lateral width for worked cattle distal metacarpus from Bedford Street

two are naturally-shed. One of the naturally shed burrs stems from a mature animal and the other lacks any trace of a brow tine and was shed by a young deer. Amalgamating the antler waste from five sites to provide an overall *Lundenwic* total, there are 21 naturally shed burrs and 14 that have been cut from the skull (Blackmore 1988a, 138; 2003a, tables 67 and 68; Malcolm *et al* 2003, 171; Riddler 2004c, 57, table 20; Armitage

Table 3. Worked antler from Bedford Street

Feature	Context	NS Burrs	SA Burrs	Burrs Total	Tines	Beam or Tine	Beam/ Tine	Context Total	Feature Total	Weight	Weight per Fragment
	1				1			1	1	7.4	7.4
11	10		1	1				1	1	77.2	77.2
	96				1			1	1	35.4	35.4
146	145					1		1	1	8.5	8.5
149	148						2	2	2	78.3	39.2
172	171					1		1	1	6.1	6.1
231	229	1		1	1	1	1	4	1	13.6	3.4
284	282	1		1				1	1	71.3	71.3
309	305				1			1	1	15.1	15.1
				3	4	3	3	13			

2004a, 34). 60% of this sample of burrs were naturally shed, a ratio that accords reasonably well with figures from contemporary sites (Riddler 2004c, table 21).

Material selection

In his analysis of the worked bone and antler from Chapel Road East, Driver examined the selection of material by species, skeletal element, age and sex (Driver 1984). For the Bedford Street assemblage it has already been established above that cattle were the preferred species and that metapodia were the preferred bones for working. There are also offcuts of horse and sheep. Driver noted that the overall presence of worked horse bone at Chapel Road East was 7.9%, against 2% or less from *Hamwic* faunal assemblages, and he suggested that the worked figure provided a more realistic view of the presence of horse in the settlement (Driver 1984, 399–400; Bourdillon 2003, 54–5). No other *Hamwic* site has provided anything like that level of representation of worked horse bone, however (Table 4), and it forms less than 1% of the assemblage from Bedford Street, equating with its presence in the faunal record for *Lundenwic* (West 1988, table 21; 1989, table 19; Rackham & Snelling 2004, table 27; Rielly 2003, table 72).

The two offcuts of sheep consist of a sawn proximal tibia and a segment of sheep-sized rib bone. Worked sheep bone occurs in small numbers across most of the middle and late period sites at *Hamwic* (Table 4; Fig 10). The choice of bone is restricted, as here, to the metapodia and the tibia, bones that were used as the handles of handled combs. A finished comb made from a sheep metapodial came from excavations at Downing Street (Green 1963, fig 5). Both finished and unfinished examples are known from *Hamwic* (Holdsworth 1976, fig 21.4). Within the assemblages from *Hamwic* listed in Table 4, worked sheep bones form a minor element, with the majority coming from a pit on Site 24 whose waste could be linked directly with handled comb manufacture.

Selection by age can be examined in broad terms by comparing the fused and unfused examples of the cattle distal metapodia. The particular style of bone working used in the assemblage entailed splitting some of the metapodia along their length, before sawing away the two ends of the bone. This means that some bones have provided two worked distal offcuts, rather than one, but the practice occurred both with fused and unfused metapodia. With that in mind, counts of distal offcuts have been used here for the metacarpus and the metatarsus. Across the entire assemblage, seventeen of the metacarpus offcuts (73.4%) were fused and seven of the metatarsus (81.6%), which suggests that mature, fused bone was generally preferred for working. At the Royal Opera House the percentage of fused bones of unworked metapodia and tibiae lay between 46.7% and 65.4%, although it rose

Table 4. Comparable Hamwic assemblages of worked antler and bone

Site	Feature	Antler	Cattle	Mid-shafts	Horse	Sheep	Post-Cranial Deer	Pre-fabricates	Total:	% of Cattle Metapodia	% Antler	Antler	Worked Bone
24	4006	288	100	78		15	1	65	547	91.8%	59.8%	288	194
26	8007	71	96	95	2	1		14	279	98.5%	26.8%	71	194
31	4607	87	117	117		2		58	381	99.2%	26.9%	87	236
32	307	35	103	11	3				152	97.4%	23.0%	35	117
14	24	24	439	74	57	1	1		596	89.7%	4.0%	24	572
14	30	13	275	87	28	1	1		405	92.3%	3.2%	13	392
	Bedford Street	13	267	101	4	2		27	414	98.4%	3.4%	13	374
		531	1,397	563	94	22	3	164				531	

to 75% with some of the smaller groups of Period 5 (Rielly 2003, 321, tables 85 and 89). At the Peabody site, between 40% and 50% of the unworked distal metapodia were fused (West 1989, fig 49).

The preference for larger and more mature bone may also be seen by considering the widths of the distal metacarpals and comparing these with the larger worked sample from the *Hamwic* assemblages (Fig 9) and the results obtained by West (1989, 160–1) for unworked cattle metapodia from the Peabody site. The fused examples from Bedford Street form two groups of a similar size, which may equate with male and female examples. At the Peabody site, in contrast, males formed only 23.5% of the faunal assemblage, females 53% and castrates (which cannot be readily identified from width measurements alone with worked samples) made up 23.5% (West 1989, table 25). Similar ratios had been obtained previously for *Hamwic* (Bourdillon & Coy 1980, 106). This confirms the impression that larger metapodia from older cattle were preferred for working, whenever they were available.

Cattle metapodia are abundant and antler is poorly represented, although three burrs are present. Antler extends to just over 3% of the overall assemblage, a figure comparable with the Chapel Road East assemblages (Table 4). This may seem surprising, when MacGregor has stressed that antler was generally the preferred material for comb making (MacGregor 1985, 25–9). Its relative absence from this site relates directly to the range of objects being produced, which was centred on combs made of bone, as noted below. The increase in combs made of bone rather than antler occurs across a number of sites in the late 7th to mid-8th century, both in England and on the Continent, and represents a distinct change from earlier practices. Antler combs were still being produced at this time, even on this site, and there is a shift of emphasis in material selection, rather than a complete abandonment of previous practice.

The working processes

The various stages in the manufacture of combs can be followed within the waste material. The initial dismemberment of the cattle metapodia involved the removal of the proximal and distal ends (Fig 10). These were sawn cleanly in a single direction from the posterior face to the anterior in almost all cases (Table 5).

Offcuts from the distal end of the metapodia were sawn to lengths of 25–75mm and proximal offcuts 15–35mm, leaving sections of midshaft generally of 75–90mm in length (Fig 13a). The bones had already been prepared before the ends were sawn away. Almost all of the offcuts of the proximal metacarpus had been trimmed by knife on their posterior face before they were sawn (Fig 14), indicating a clear interest in obtaining flat and smoothed surfaces from that side of the bone. 70% of the proximal metatarsal offcuts had also been treated in this way.

Two methods of initial dismemberment can be seen (Fig 13a and b). With the first method the proximal and distal ends were sawn laterally from the bone, whilst with the second method some of the metapodia were split along their length before the epiphyses were sawn away. In the latter case the intention seems to have been to remove both sides of the metacarpus to leave two segments of the posterior face, probably for

Table 5. Direction of sawing of cattle metapodia from Bedford Street

	Metacarpus		Metatarsus		Total:
Sawing:	**Proximal**	**Distal**	**Proximal**	**Distal**	
Posterior to Anterior	41	35	30	9	115
Posterior to Anterior diagonally	7	13	2	12	34
Posterior to Anterior or Anterior to Posterior	3	16	8	10	37
Anterior to Posterior					0
Lateral to Medial or Medial to Lateral		1	1	1	3
Indeterminate	6	2	2	4	14

Fig 12. Sawn cattle metapodia from Bedford Street. Width of metapodial spread 256mm

use as tooth segments in comb manufacture. Equally, the central part of the bone could be used as the raw material in the manufacture of double-pointed pin-beaters, one of which came from the main bone-working deposit (Fig 13a; Fig 18d). This method of dismemberment can be seen with just over 50% of the distal ends of the metacarpals

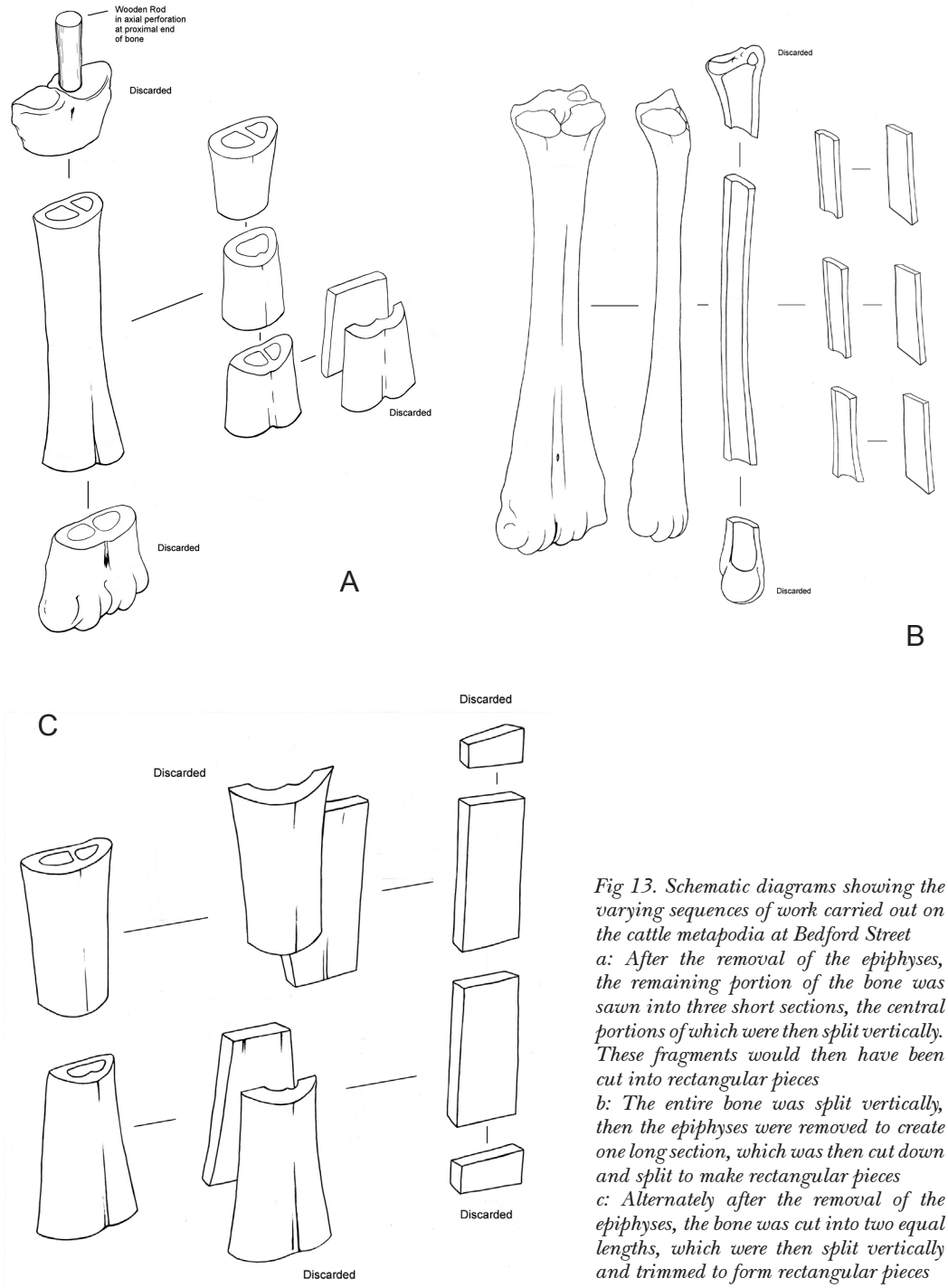

Fig 13. Schematic diagrams showing the varying sequences of work carried out on the cattle metapodia at Bedford Street
a: After the removal of the epiphyses, the remaining portion of the bone was sawn into three short sections, the central portions of which were then split vertically. These fragments would then have been cut into rectangular pieces
b: The entire bone was split vertically, then the epiphyses were removed to create one long section, which was then cut down and split to make rectangular pieces
c: Alternately after the removal of the epiphyses, the bone was cut into two equal lengths, which were then split vertically and trimmed to form rectangular pieces

and metatarsals, but with lesser numbers for the equivalent proximal offcuts, extending to 35.7% for the metatarsus but only 17.9% for the metacarpus. It is possible, therefore, that the proximal metacarpus was often removed by sawing before the remainder of the bone was split along its length, effectively using a combination of the two methods. With the

Fig 14. Proximal metacarpus offcuts, trimmed on the posterior face and sawn laterally, from Bedford Street. Width of metapodial spread 168mm

metatarsus, however, around half of the bones were split in half before the epiphyses were removed from both ends (Fig 13b). The same interest in obtaining flat bone to form tooth segments lies behind the splitting of the metarsus along its length. The splitting provided two long sections of relatively flat bone, from which the ends could be removed and the remainder trimmed to shape. A number of offcuts were discarded after the sides had been sawn laterally into several segments and split to remove excess material (Fig 13c).

In situations where the bone has not been split along its length, midshaft offcuts from the metacarpus have been sawn to two distinct sizes of segment. With its ends removed, the bone was sawn laterally either into two or more commonly three segments (Fig 13a and c). The anterior face of the bone was then removed, leaving discarded offcuts of 32–40mm in length, or over 50mm if the midshaft had been sawn into just two segments (Fig 13c; Fig 15). The flat, posterior face formed the basic material for bone tooth segments, whilst the curved anterior face was discarded at this stage. Each bone could provide either two or three tooth segments, depending on its size and the length of segment required. Several offcuts sawn from the metacarpus have been partially pared and smoothed on one side, and fully smoothed on the other.

Nineteen of the metapodia, including eight metacarpals and eleven metatarsals, have been perforated. In all but one case, the perforation has been made axially through the proximal articulation, usually in a central position. A distal metatarsus offcut from pit [114], however, has been perforated laterally just above the condyles. A proximal metatarsus from feature [231] has been perforated twice through the same surface. The perforations are circular, oval or square in shape and vary from 7 to 14mm

Fig 15. Offcuts from the anterior face of the metacarpus, towards the distal end, from Bedford Street

in diameter. Armitage noted the presence of another perforation, piercing the proximal end of a metatarsus, from excavations at the National Portrait Gallery (Armitage 2004b, 107). The purpose of the perforations is unclear but the most likely explanation is that a wooden rod was passed through the proximal articulation and that it formed a useful grip when sawing or splitting the bone (Fig 13a). The technique was used only when the bone was cleanly sawn, and not when it was split before it was sawn: 17 of the 19 perforated metapodia have been sawn laterally but have not been split axially.

From the waste to the final product

The trimming of rectangular sections of bone provided a series of unfinished tooth segments for combs (Fig 16). 27 fragments of bone, antler and whale bone are described here under the collective term of prefabricates. Most are made of bone and represent complete or fragmentary tooth segment blanks (Table 6). There are also several pieces of manufacturing waste, sawn away during the trimming of the tooth segment blanks to size (Fig 13c). One unfinished bone segment shows how this process was carried out. The segment has been riveted on one edge and it comes from a comb that had clearly been assembled, with marks indicating the original positions of the connecting plates (Fig 17a). One side of the segment has been tapered but it is damaged at the end and this probably occurred when the comb teeth were being cut. The opposite side projected above the line of the connecting plates and would have been sawn away after the teeth had been cut, a stage that was never reached.

A tooth segment blank from feature [181]

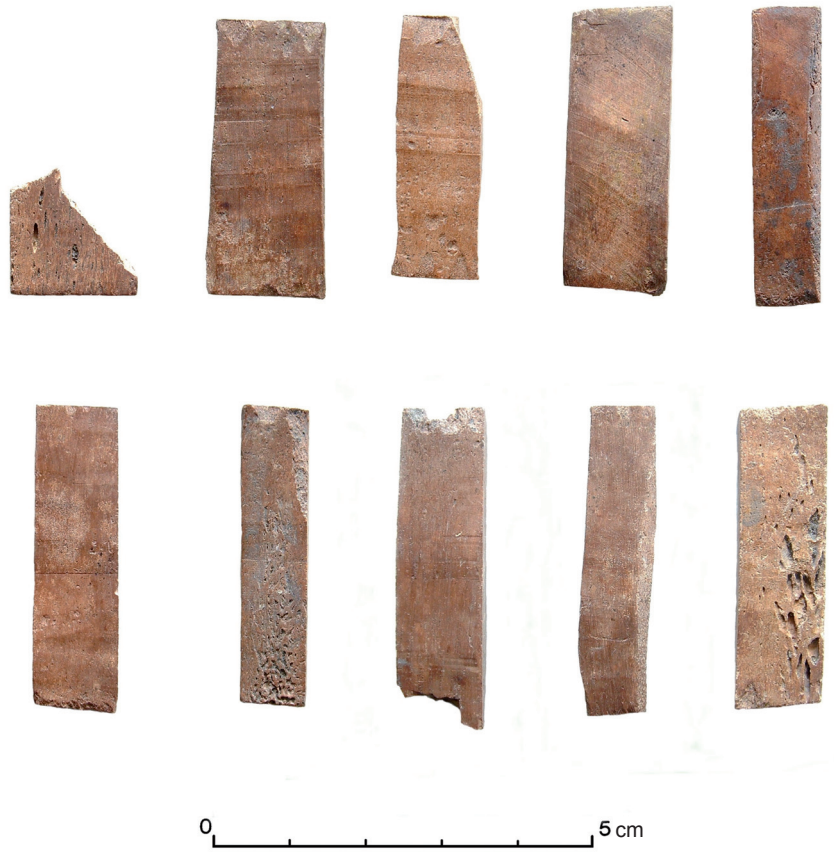

Fig 16. Unfinished bone comb tooth segments from Bedford Street; the top left one is whale bone from [231], the remainder are bone

is the only example to be made of antler; the assemblage from feature [231] also includes a fragmentary piece of whale bone (Fig 16, top left). Small quantities of whale bone have been recovered from previous excavations in *Lundenwic* and larger quantities are known from *Hamwic*, particularly from the earliest phase of occupation there (Sidell 2000, 188–9; Malcolm *et al* 2003, 87; Bendrey 2005, 65; Riddler & Trzaska-Nartowski forthcoming a). Little is known about its use at this time and quantities of waste material are seldom matched by finished objects. The evidence from both *Hamwic* and Brandon indicates that whale vertebrae were trimmed for use as chopping boards, whilst sections of rib and jaw were utilised in comb manufacture (Riddler 1998; Riddler & Trzaska-Nartowski forthcoming a).

The remaining tooth segment blanks are made of bone. Whilst most combs of the period were made entirely of antler, two types of bone comb were current during the 8th century. The most common type was the handled comb, produced from the early 8th century onwards in both bone and antler (Riddler 1990a; 1990b; 1997). The second type was a form of single-sided composite comb that included connecting plates made from animal ribs, with bone or antler tooth segments. Examples of the latter type have come from Abbots Worthy, *Hamwic*, Hessens, Ipswich, Wharram Percy and York, and it was current during the late 7th and early 8th centuries (Riddler 2001a, 66). An unfinished connecting plate from a comb of this type was recovered from feature [231]. It has been roughly shaped and

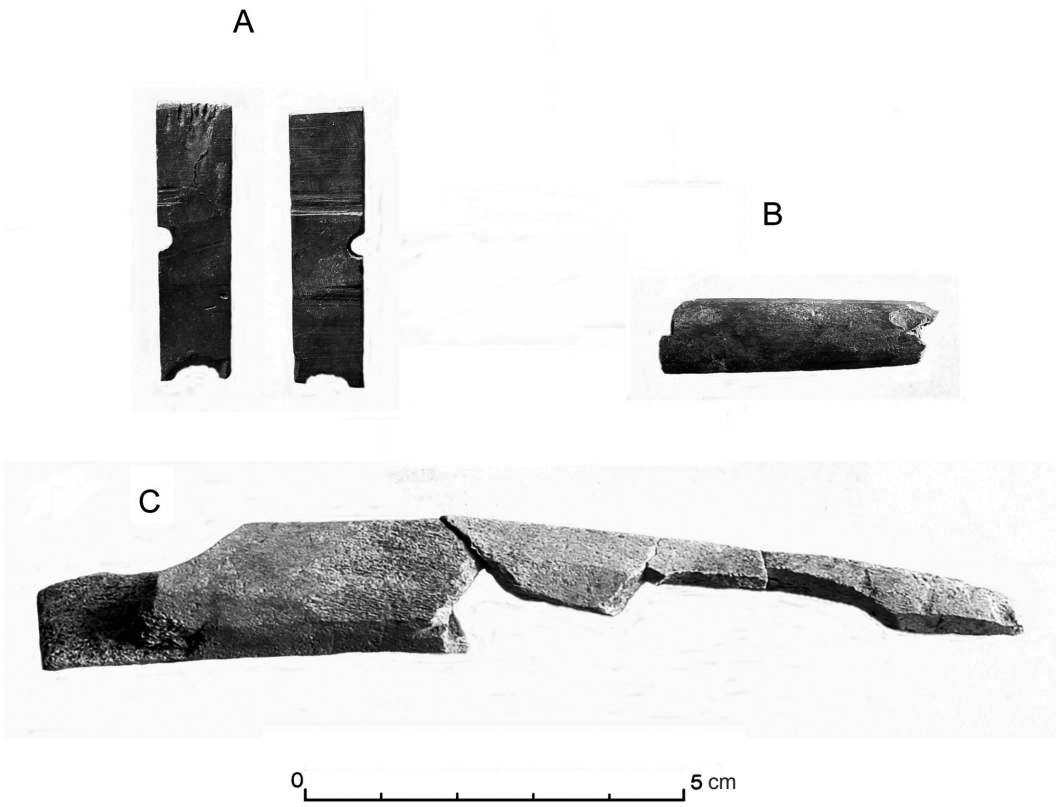

Fig 17. Unfinished comb components from Bedford Street: (a) riveted tooth segment [231]; (b) bone connecting plate from [231]; (c) antler handled comb [231]

includes a single rivet hole towards one end, indicating that the connecting plates had been placed together to be shaped as a pair before the comb was assembled. A second fragment of an unfinished connecting plate from the same deposit is also made of bone

Table 6. Comb prefabricates from Bedford Street

Feature	Context	Tooth Segment Blanks:				Comb Manufacturing Waste:	
		Bone	Bone or Antler	Antler	Whale Bone	Bone or Antler	Context Total:
181	180			1			1
231	229	16	2		1	2	21
231	230	2					2
236	235	1					1
309	304					1	1
U/S		1					1
		20	2	1	1	3	27

and probably stems from a handled comb (Fig 17b). A third fragment from the same context is an unfinished handled comb, made of antler rather than bone (Fig 17c). One of the connecting plates survives, as well as most of the handle. It has been cut from an antler tine and a groove has been sawn along its centre to accommodate the tooth segments; the sides have been roughly facetted to shape. It fractured at this stage, however, and was discarded.

The technology of bone and antler working

Both bone and antler often have traces of the tools used to work them. Most of the bone and antler has been cleanly sawn in a single direction, with the exception of the larger antler burrs, both of which have been sawn from several directions and partially snapped away at the centre. Five saw marks cut into the antler are 1.0–1.2mm in width with a sixth example of 0.8mm possibly stemming from a saw with a narrower blade. The saw blades used on antler from Exeter Street were noticeably thicker, providing grooves of 1.4 and 3.1mm (Riddler 2004c, 57). The worked bone was sawn with blades of the same width as the antler, ranging from 0.8 to 1.1mm, whilst thinner blades of 0.5–0.6mm were used to trim the tooth segments and cut the teeth of the two finished combs found on site. The toolkit of the comb maker included at least two saws, the thicker blade being used in the initial dismemberment and a thinner blade in the cutting of comb teeth. A fragment of a saw blade came from a Middle Saxon context at James Street (Leary *et al* 2004, 100).

The proximal ends of the metapodia were smoothed on the posterior face and this would have been achieved either with a knife or a draw knife. A draw knife would also have been used to smooth the surface of antler and possibly to pare the bone tooth segments to shape, although a knife could also have been used for this purpose. The perforations of the metapodia were achieved with the aid of a knife; there is no indication of the use of a drill for them, although a drill was used to create the rivet holes on the connecting plates of the composite combs, and to provide the central perforation of the antler spindle whorl (Fig 18e).

The finished product

In examining the worked bone waste and the various stages of manufacture, the emphasis has lain with single-sided composite bone combs, either as handled combs or with connecting plates of animal rib. Both types of comb were being produced in the earlier part of the 8th century. No finished combs of either type were recovered from the site but this is not surprising. The finished products from the site do not necessarily relate to the episode of production that provided the waste materials. It is rare to find any direct and obvious correlation between waste deposits and finished combs on the same site. At Chapel Road East, for example, scarcely any finished objects were found and Morton noted that 'the artisans would not willingly have kept their products out of circulation or precipitately abandoned their stock' (Morton 1992, 152).

A small number of finished objects of antler or bone were recovered from the pit fills, including a fragmentary pin, two combs, a pin-beater and a spindle whorl. Only one of these objects, the pin-beater, came from the main bone-working deposit. The head and point of the pin are both missing and only the shaft now survives (Fig 18a). It can nonetheless be placed in the group of small Middle Saxon pins that belong to the period *c.*AD 650–750 (Riddler *et al* forthcoming b). They include a fragmentary pin from the Royal Opera House, as well as a complete example from Exeter Street (Blackmore 2003a, 310, fig 174.B132; Riddler 2004c, 53, fig 38.1).

Fragments of two combs were recovered residually from separate features of post-medieval date. Both are double-sided composite combs made of antler. The middle section of one comb survives, including six tooth segments and parts of two connecting plates. The central part of the comb is undecorated whilst the ends include lattice designs formed of widely spaced, paired diagonal lines (Fig 18b). There are seven teeth per centimetre and they are of the same length and thickness on both sides of the comb. All of the teeth show signs of wear, although it is not extensive. A comb from James Street is decorated with a widely spaced lattice pattern extending across both

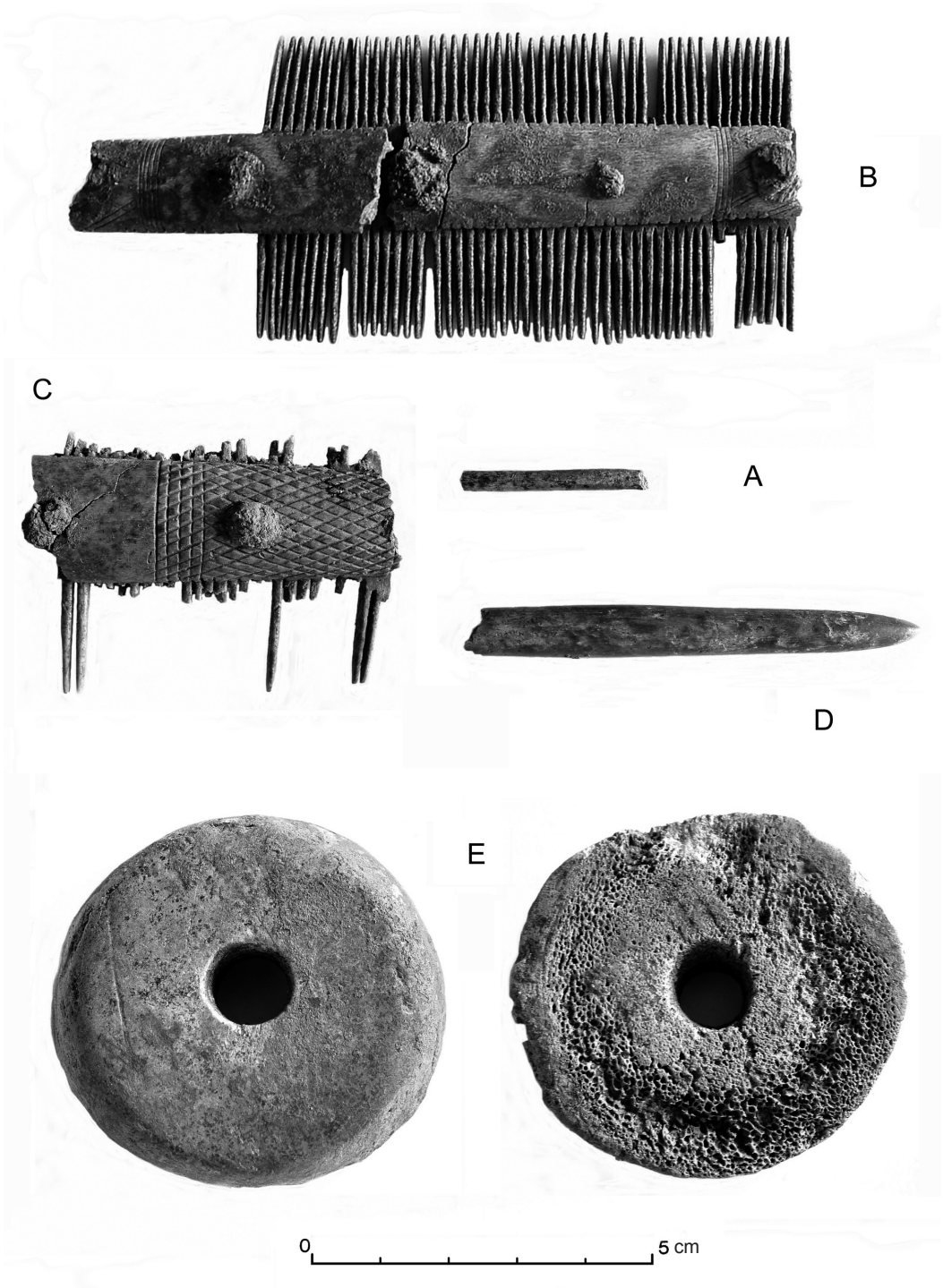

Fig 18. Finished antler and bone objects from Bedford Street: (a) central portion of bone? pin shaft [235]; (b) antler comb [residual]; (c) antler comb [residual]; (d) incomplete pin-beater [231]; (e) antler spindle whorl, views of top (left) and base, weight 45.6g [133]

connecting plates, whilst a fragment from Maiden Lane includes panels of a similar design (Riddler 2004b, 24, fig 22.1; Laidlaw 2004, fig 49.3). It is a common decorative device of the period, also seen on combs from Barton Court Farm, Canterbury (Christ Church College), Maidenhead, and *Sandtun* (Riddler 2001b, 229, fig 41.12). This pattern is normally confined to the ends of the comb and is repeated on both sides. Combs with this specific pattern have been found in contexts of late 7th- to mid-8th-century date.

The second comb fragment is also a double-sided composite and it is decorated with a dense lattice pattern bounded by five vertical lines (Fig 18c). The middle part of the comb appears to have been undecorated. This was a larger comb with broad connecting plates and long teeth. There were five per centimetre on one side and six per centimetre on the other, and the surviving teeth show traces of wear. A dense mesh lattice design can also be seen on a comb from Exeter Street (Riddler 2004c, 53, fig 38.2), as well as on Middle Saxon double-sided composites (most of which are unpublished) from Barking Abbey, Canterbury (Marlowe Theatre), and Flixborough (Blockley *et al* 1995, fig 511.1168). The earliest examples of double-sided composite combs with this type of decoration go back to the 7th century and can be seen at West Stow, for example (West 1985, figs 33.9, 252.3), whilst denser meshes, as seen here, occur on combs in the first half of the 8th century.

The textile manufacturing implements are limited to a pin-beater and a spindle whorl. Around half of the pin-beater survives, including one of its tapered ends (Fig 18d). It was originally double-pointed and is a common object type of the period, found also at Maiden Lane, Shorts Gardens, the Royal Opera House and Hare Court (Blackmore 1988a, 137, fig 38.8; 2003a, 305–6; Gaimster & Riddler 2005, 59, fig 69.2). It came from pit [231], dating to *c.*AD 730–750. An increase in the quantity of textile manufacturing implements was noted during Period 5 (*c.*AD 730–770) at the Royal Opera House (Malcolm *et al* 2003, 169–70).

The spindle whorl is oval in shape and has been cut from an antler burr, with slight traces of the coronet still visible (Fig 18e). It has two flat surfaces, allowing it to be ascribed to Walton Rogers type A2 (Walton Rogers 2007, 24, fig 2.18). The upper surface includes cortile tissue but the spindle whorl is complete and finished. There has been some confusion in the past concerning the material and function of bone and antler spindle whorls (Blackmore 2003a, 305; Walton Rogers 2007, 25), but most of those from *Lundenwic* can be assessed for their function, material and weight. All of the illustrated examples from the Royal Opera House are made of antler, as is the spindle whorl from Maiden Lane (Malcolm *et al* 2003, figs 42, 63, 90, 98, 172; Laidlaw 2004, 84). The Bedford Street whorl is the heaviest and the largest yet to have been recorded from *Lundenwic* (Fig 19), although it is only a little heavier than some of the whorls from the Royal Opera House. The range of weight within the *Lundenwic* series lies between 14 and 46g, which can be compared with 14–60g at Mucking, 10–20g at Flixborough, 19.5–57.5g at Ipswich (antler spindle whorls), 8–31.5g at Ipswich (bone spindle whorls), and 10–55g at Coppergate in York (Walton Rogers 2007, 26; Riddler *et al* forthcoming b). Several spindle whorls from Birka weighed less than 5g, with the remainder extending up to 44g (Andersson 2003, fig 30). The Flixborough whorls stand out amongst this sample for their diminutive size and weight. The Bedford Street spindle whorl lies within the heavier group from *Lundenwic*, with weights in excess of 39g; the lighter group ranges from 14–26g. Interestingly, two similar groups can also be identified for the weights of the antler spindle whorls from Ipswich (Fig 19).

Quantifying production

Table 7 indicates that the numbers of proximal and distal offcuts of each bone vary slightly, the assemblage providing a little over 60 metacarpals and 40 metatarsals. It is difficult to provide precise numbers when significant quantities of the offcuts have been split axially, providing two offcuts for each articular surface, since some of these may form pairs and stem from the same bone. During the analysis an attempt was made to pair all of these offcuts together and that has reduced the figures to those seen in Table 7.

A rough estimate of the number of combs produced at Bedford Street can be obtained

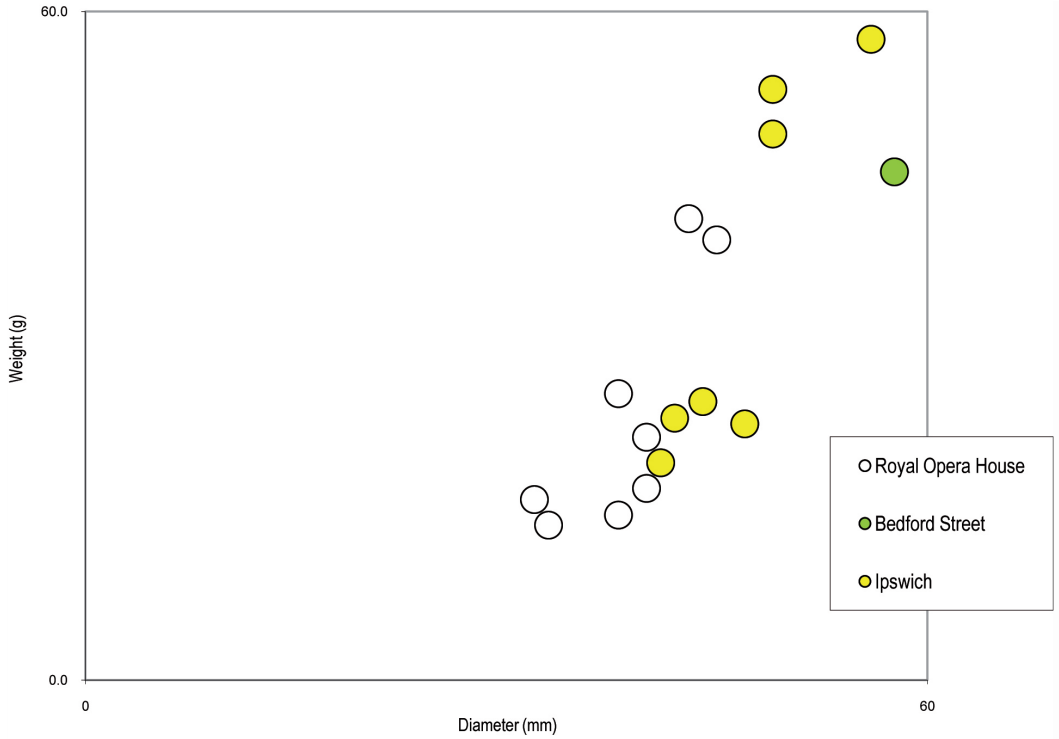

Fig 19. Scatter graph showing the Lundenwic and Ipswich antler spindle whorls: weight against diameter, compared with the Bedford Street example

from considering the various components of the waste. Handled combs invariably utilised the metatarsus as the handle and there are 43 cattle metatarsals, alongside eight tibiae, nine radii and a horse metacarpus. Thus 43 handled combs may have been produced from this raw material. In addition, a sheep tibia would also have been used as the handle for a handled comb and the 18 segments of cattle-sized rib could have provided connecting plates for single-sided composite combs. A rough estimate of the production of 55–60 combs from this raw material can be suggested. The small quantity of antler should also be added to this estimate. It includes three unworked burrs, as well as a spindle whorl cut from a fourth burr. Around 3–4 combs could be produced from a single antler, and approximately ten combs may have been made from this material. In total therefore, around 65–70 combs could have been produced from the raw material uncovered in the excavations. Various authors have replicated composite combs of antler and bone and it is estimated that they take two to three days to manufacture (Ambrosiani 1981, 118; Pietzsch 1979; Galloway & Newcomer 1981, 74; Lobisser 1997, 80–1). The figure would decrease within an organised comb making workshop, but at the same time additional preparatory work for bone and horn has to be taken into consideration. Both materials require a fair amount of preparation before they are suitable for working. The bone needs

Table 7. Cattle metapodia from Bedford Street

Feature	Context	Metacarpus		Metatarsus	
		Proximal	Distal	Proximal	Distal
114	112		2		1
149	148			1	
231	229	49	62	40	33
231	230	5	3	2	2
284	280	2			
		56	67	43	36

be separated from the skin and sinew, and cleaned before use, whilst horn has to be separated from the core, which can be a long process. Preparatory soaking of the bone and antler may also have taken place before they were worked. Taking these factors into account, it can be suggested that an established comb workshop would probably have produced each comb in two days on average and the waste assemblage analysed here would therefore have occupied a single comb maker for a period of approximately 130–140 days, or roughly four to five months.

Only the stags of red deer develop antlers. These grow during the period from March to September each year and are cast in the spring, between March and May (Clutton-Brock 1984, 13). A small collection of antler may therefore have become available during the spring, to add to supplies of domestic animal bone obtained from butchers. It is possible to envisage a comb maker beginning work in the early spring, initially perhaps with domestic bone, supplemented a little later with antler. The same craftsman also worked with horn, to judge from the three sawn offcuts of horn core, one of which stems from a goat. The presence of horn working in *Lundenwic* has been noted previously in relation to horn cores from the Royal Opera House and the National Portrait Gallery (Malcolm *et al* 2003, 184; Riddler 2004f, 146). Sawn cores are generally found in close association with worked bone and antler, as at Bedford Street, and they confirm that the same craftsman was working with a variety of raw materials, producing combs and other implements.

As noted above, the sawn offcuts of cattle scapulae, mandibles and innominate bones represent the debris from the manufacture of objects other than combs. The range of finished objects from Bedford Street is fairly restricted, although it extends to pins, pin-beaters and spindle whorls; a wider range can be seen at the Royal Opera House, with textile manufacturing implements prominent alongside combs, pins, spatulae, keys, handles and even a sword guard (Blackmore 2003a). Horn was the principal material used at this time for the handles of knives and slightly later deposits at Elisenhof have produced horn spoons (Westphalen 1999, 112–13). By adding in this range of implements, produced in various materials, the duration of the workshop can be extended across a significant proportion of the year, even if only a little over 400 waste fragments remain from this activity. The scale of production is therefore larger than the quantity of offcuts might initially suggest.

Most of the finished products were removed from the site, leaving a few fragments of combs that fractured during their manufacture, as well as a pin-beater, within the main waste assemblage. Several objects were dispersed across the site but all of these appear to have been used and they cannot be directly related to the workshop, although they were contemporary with it.

Dating

The main deposit of worked bone came from a pit of Phase 2b, assigned to *c.*AD 730–750. This dating accords well with the suggested products of the comb maker. No handled combs can be securely dated to the 7th century and their production appears to begin in the early years of the 8th century (Riddler *et al* forthcoming b). There is a fragment of a handled comb from West Stow (West 1985, fig 253.15) but Ipswich ware is also present at the site and that would suggest, alongside other indications, that the site continued into the early 8th century. Handled combs were being produced at all of the early production and trading centres by *c.*AD 720. Combs with connecting plates made from animal rib have also been found in most of those centres, including *Hamwic*, Ipswich and York, and there are several waste deposits from their manufacture (Riddler *et al* forthcoming b). At *Hamwic*, those deposits are limited to the earliest phase of bone working there, of late 7th- to early 8th-century date (Riddler & Trzaska-Nartowski forthcoming a). The finished objects of bone and antler from the site provide similar dating evidence, focused on the first part of the 8th century, and this echoes the dating provided by the ceramics.

Itinerant, sedentary and seasonal working

The assemblage predominantly consists of worked bone, reflecting the production of handled combs and other single-sided composite combs of bone, as well as a limited

range of other implements. Antler and horn were worked alongside bone, although little of the antler comes from the main waste deposit and it may not all stem from the same workshop or production episode. Similar 8th-century bone-working deposits have been found at Dorestad, *Hamwic* and Ipswich. As yet, there is little evidence for bone working at either Dorestad or Ipswich, although small quantities of offcuts have come from both settlements and a Middle Saxon workshop produced bone handled combs at the Buttermarket in Ipswich (Riddler *et al* forthcoming b). Comparisons with *Hamwic* are more revealing. The worked bone waste from Chapel Road East, in particular, forms a close parallel for the Bedford Street assemblage. At Chapel Road East the waste material was found in 14 features, two of which are summarised in Table 4 (Morton 1992, fig 59).

The presence of a few fragments of sawn horn core is important in terms of understanding the mechanisms of the craft at this time. In reviewing combs from Birka, Ambrosiani suggested that the distribution of certain forms indicated that comb makers of the 9th to 10th centuries were itinerant (Ambrosiani 1981, 38–40; 1982). Elsewhere, it has been suggested that comb making was a seasonal craft (Ulbricht 1978, 120–2, 138). The Bedford Street assemblage is important for the way in which it shows that various materials were being utilised in the same workshop. MacGregor has reviewed the processes involved in horn working and has rightly stressed the sedentary nature of that craft (MacGregor 1985, 66–7; 1991, 364; 1992, 165). It is difficult to reconcile that evidence with itinerant comb making and it is much more likely that the craft was sedentary, and possibly of a seasonal nature. This is also the image provided by excavations at the Royal Opera House, where antler working took place in one building and its successor in Period 4, and moved to a building across the road in Period 5 (Malcolm *et al* 2003, 35–6, 72–80, tables 67–8). At Chapel Road East bone and antler working began in one structure and subsequently moved to the adjacent building (Morton 1992, 150–1).

The Bedford Street assemblage is the largest worked bone assemblage yet recovered from *Lundenwic*, but it is not unique in the settlement. Armitage noted the presence of three sawn metapodial offcuts at the National Portrait Gallery (Armitage 2004b, 107). Building 3 at the Royal Opera House included 25 distal metapodial bones, pressed into the floor to serve as a kerb for a hearth (Malcolm *et al* 2003, 23–4, fig 16). This building was subsequently used as an antler workshop and a smithy. At *Hamwic*, Ipswich and *Lundenwic* the working of bone, alongside antler and horn, is a feature of the 8th century. At *Hamwic* the practice continued into the mid-9th century, the latest assemblages from the settlement being amongst the largest (Riddler 2001a, 63; Bourdillon 2003, 50). Elsewhere, the use of bone may already have been in decline as the supply of antler became more abundant and better organised. The Bedford Street assemblage therefore reflects a particular moment in the development of the craft, when bone was used as the raw material for objects made previously in antler; and when the use of bone may itself have led to lasting changes in object forms.

SAXON POTTERY FROM BEDFORD STREET

Berni Sudds

A total of 179 sherds of Middle Saxon pottery was recovered from Bedford Street representing 129 separate vessels (4,114g) (Table 8). The fabrics recorded, including the material recovered residually, are listed in Table 9. By provenance the range and relative quantities identified are typical of other *Lundenwic* assemblages, dominated by local chaff-tempered wares, followed by non-local and regional material, foremost amongst which is Ipswich-type ware, with a small but significant group of continental imports comprising the remainder of the group (Blackmore 1988b; 1989; 2001; 2003b; Jarrett 2004a; 2004b; 2004c; 2004d). Unfortunately, over three-quarters of the Middle Saxon assemblage was either un-stratified or residual (Table 8). The Saxon pottery was classified and dated according to the framework established by Blackmore (1988b; 1989; 2003b). The assemblage was catalogued using the Museum of London pottery fabric codes (see **Introduction** for details).

Table 8. Total sherd count and MNV (minimum number of vessels) of the Saxon and later pottery from Bedford Street

Phase	Total sherd count	Total MNV	Residual Saxon pottery
2: Middle Saxon	41	19	-
3: 17th century	152	123	117 (91 vessels)
4: 18th century	126	54	2 (2 vessels)
5: 19th century	18	14	-
6: 20th century	19	15	2 (2 vessels)
Unstratified	18	16	17 (15 vessels)

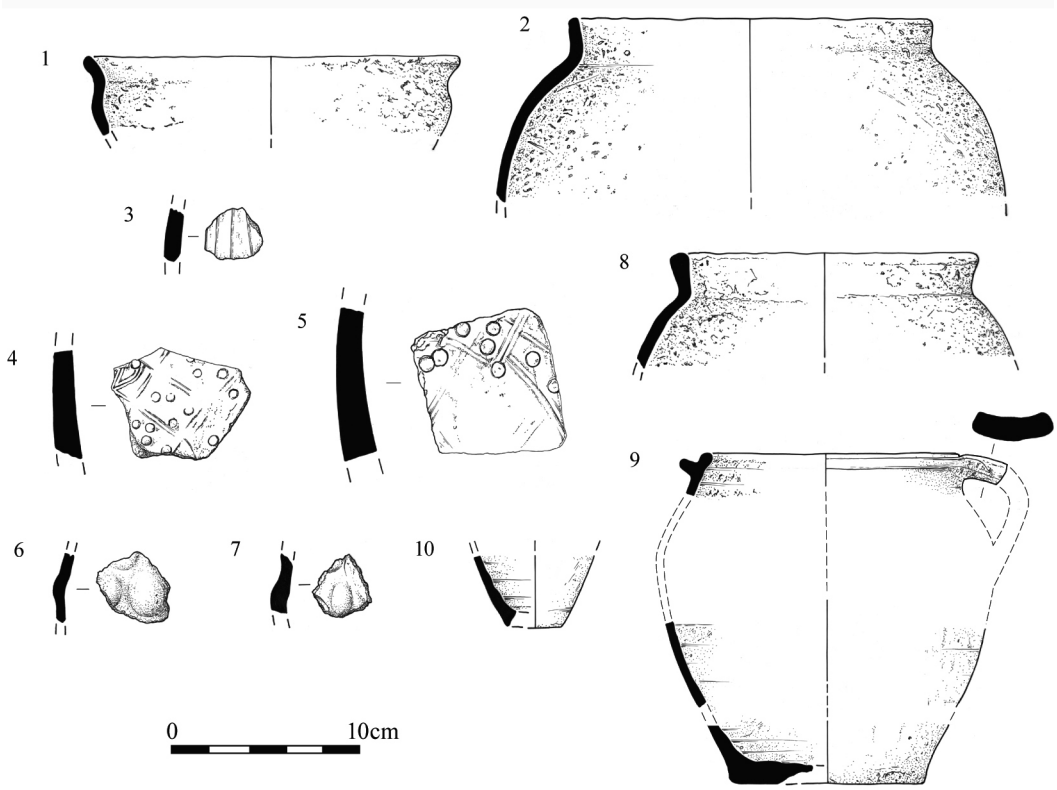

Fig 20. Saxon pottery (the contexts are only listed for the stratified material): (1) Chaff-tempered possible shouldered bowl; (2) Chaff-tempered large rounded jar from Saxon pit fill [305]; (3) Chaff-tempered body sherd; (4) Ring-stamped and incised line decorated Ipswich ware sherd from Saxon pit fill [229]; (5) Ring-stamped and incised line decorated Ipswich ware sherd; (6 & 7) Sand-tempered ware sherds with bossed decoration; (8) Chalk-tempered ware jar rim; (9) North French blackware burnished strap-handled pitcher with flanged rim; (10) North French greyware (fine, hard and thin-walled fabric) burnished base of a closed vessel

Table 9. Saxon pottery fabrics, including number of sherds and minimum number of vessels (MNV) from Bedford and James Streets

Fabric code	Common name	Date range	Bedford St No. of sherds	Bedford St MNV	James St No. of sherds	James St MNV
BADOB	Badorf/ Walberberg-type	670-850	17	2	1	1
CHAF	Chaff-tempered	400-750	4	2	2	2
CHFG	As CHAF with crushed tile grog	400-750	4	1		
CHFS	As CHAF with quartz sand	400-750	5	5	1	1
CHSF	As CHAF with fine sand & organic matter	400-750	72	55	6	6
CHSFL	As CHAF with flint	400-750			1	1
IPSC	Ipswich coarse ware	730-850	11	11	8	7
IPSF	Ipswich fine ware	730-850	29	23	11	9
IPSM	Ipswich intermediate ware	730-850	7	7	3	3
MAYE	Mayen-type	770-850			1	1
MISC	Misc unsourced	600-850	4	1		
MSCH	Mixed sand, flint & chalk tempered	600-850	1	1		
MSFGA	Mixed sand, flint & shell tempered	750-850	1	1		
MSHLA	Shelly limestone & organic temper	600-850			1	1
MSS	Shell-tempered	770-850			2	1
MSSC	*Ditto* (with sand & organic temper)	770-850			1	1
MSSE	*Ditto* (reduced)	770-850			2	2
MSSF	*Ditto* (finely tempered)	770-850	1	1		
NFBWA	North French blackware	600-850	8	4		
NFBWB	North French blackware (reduced & sandy)	750-850	1	1		
NFBWC	Tating-type	750-850	1	1		
NFEBB	North French/ East Belgium greyware	600-800	3	3		
NFGWA	North French sand tempered greyware	600-800	1	1		

Fabric code	Common name	Date range	Bedford St No. of sherds	Bedford St MNV	James St No. of sherds	James St MNV
NFGWC	North French greyware (fine, hard & thin walled)	600-800	1	1		
NFGWD	North French greyware (micaceous sand tempered	600-800			1	1
SLGSD	Surrey-type	650-850	1	1		
SSANB	Sand-tempered (grey-black)	600-850	3	3	1	1
SSAND	Sand-tempered (burnished)	600-850	3	3		
SSANH	Abundant medium quartz sand with organic matter (relate to SLGSA/)	600-850			1	1
XXIMP	Misc / unsourced import	600-850			1	1

Local Saxon wares

Chaff-tempered wares (CHAF; CHFG; CHFS; CHSF)

A minimum of 63 (1,458g) chaff-tempered vessels were identified in the assemblage but in contrast to many of the other published *Lundenwic* sites, namely Jubilee Hall and Maiden Lane (Blackmore 1988b, 84), the Peabody site and the National Gallery (Blackmore 1989, 73), and The Royal Opera House (Blackmore 2003b, 229–31), the CHAF variant, containing only organic temper, is not the most commonly represented type. Indeed, only two CHAF vessels were recovered, the chaff-tempered variant containing fine sand, CHSF, instead being the most frequently occurring type, represented by 55 vessels. The CHSF variant was also observed to be more prevalent at James Street (Jarrett 2004a, 14) and on more recent excavations at Maiden Lane, adjacent to those conducted in 1988, both CHSF and CHFS occurred more frequently than CHAF (Jarrett 2004b, 78).

The chaff-tempered wares are thought to have been locally produced between the 5th and mid-8th centuries, although they occur most frequently in *Lundenwic* during the 7th and early 8th centuries (Blackmore 2003b, 230). As elsewhere the range of forms evident in this fabric is fairly limited, represented by jars and two sherds from a possible shouldered bowl (Fig 20, 1). Few body profiles could be identified but rims are simple and either upright or slightly everted. The occurrence of four sherds from the same large rounded jar (Fig 20, 2) in a chaff-tempered fabric containing abundant crushed Roman tile (CHFG) is particularly noteworthy as although identified on a few of the other sites in *Lundenwic*, the fabric is usually only represented by one or two sherds (Blackmore 1988b, 84; 1989, 74; 2003b, 231–2). The vessel has a simple upright rim and is reduced grey with a dark grey smoothed surface speckled with predominantly orange/red grog. The vessel was derived from fill [305] of pit [309], dated by associated ceramics to *c.*AD 670–750.

As observed elsewhere in *Lundenwic* decoration on the chaff-tempered wares is rare (Blackmore 1988b, 85; 1989, 74–5), probably due to the predominantly 7th- to early 8th-century dating of the fabric, post-dating the main *floruit* of decoration on early Saxon pottery witnessed in the south and east of Britain from the 5th to early 7th centuries. The majority of vessels are either smoothed or burnished; although these methods of surface finishing may be seen as decoration,

particularly the burnishing, their application may simply have been functional (Blackmore 1989, 74–5). One small CHSF body sherd, however, is externally burnished and decorated with incised vertical lines over a possible boss (Fig 20, 3). Unfortunately, the sherd was recovered as a residual find from a 17th-century feature, but its decoration is indicative of a 6th-century date (discussed later). Both internal burnt residue and external sooting have been identified on the chaff-tempered vessels, suggesting that some are likely to have been used for cooking or heating organic substances. The number of vessels with residue is proportionally low, however, as observed at the Lyceum Theatre (Jarrett 2004c, 49), possibly indicating that vessels in this fabric were also used for other functions including storage.

A small number of the chaff-tempered sherds also appear to have been exposed to very high temperatures, demonstrating bubbled surfaces or iron-oxide-like slag concretions. The possibility has been considered that this could be indicative of some form of industrial activity, but unfortunately all of these examples were either residual or unstratified.

Non-local and regional Saxon wares

Ipswich-type ware (IPSF; IPSM; IPSC)

Ipswich-type ware represents the second most prevalent fabric on site after chaff-tempered wares with a minimum of 41 (1,969g) vessels identified. The three variants of fine (IPSF), medium sandy (IPSM), and coarse sandy (IPSC) were identified, as seen across *Lundenwic*. The fine fabric represents the most prevalent variant on site, although there appears to be no evident significance or pattern to relative proportions in terms of chronology. Ipswich-type ware was probably produced from the early 8th to mid-9th century at kilns in Ipswich and represents the first post-Roman pottery to be produced on an industrial scale and manufactured partially on a wheel or turntable (Hurst 1959; 1976; Blinkhorn 1989; Blackmore 2003b, 234). It is possible that copies of Ipswich-type ware forms were manufactured in the London area (Blackmore 2001, 27; 2003b, 234). Indeed, a chalk-tempered (MSCH) jar rim recovered from the site and discussed below appears to represent just such a copy, although this fabric probably originated not from London but from a chalk region of the South-East, perhaps the North Downs or Chilterns (Blackmore 1988b, 88).

As elsewhere the most common form represented is the jar or cooking pot (Blackmore 1988b; 1989; 2003b; Jarrett 2004a; 2004b; 2004c; 2004d). Where evident these have everted, bevelled rims and often have pronounced horizontal grooving to the shoulder, both characteristic of the industry. A rarer form is represented by the shoulder of a possible bottle in the coarse variant of the ware, oxidised and finished with streaky horizontal burnishing. Bottles are not common to the industry in general and occur infrequently in *Lundenwic*. Examples have, however, been identified at the Peabody site and the Royal Opera House (Blackmore 1989, 79; 2003b, 235).

Just under half of the sherds displayed some form of surface finishing, most commonly smoothing but also wiping. A small number of vessels were also burnished or stamp-decorated, the former group including the possible bottle. The two stamped vessels were ring-stamped, albeit with a different sized stamp, but both were also incised with pairs of diagonal lines (Fig 20, 4 & 5). There appears to be no direct parallel for this combination of decoration in the published record for *Lundenwic*. A ring-and-dot-stamped example with paired diagonal incised lines forming pendant or standing triangles has been identified at the Peabody site (Blackmore 1989, fig 30.39) and a simple ring-stamped vessel at Maiden Lane (Blackmore 1988b, fig 26.41–2), but neither closely match the two examples from Bedford Street. The simple ring stamp has not been paralleled or usefully dated (Blackmore 1988b, 86), although stamped decoration is generally taken to be a 7th- to 8th-century phenomenon (Blackmore 1989, 80). As observed elsewhere the stamped decoration occurs on vessels in the fine fabric variant (Blackmore 2003b, 235; Jarrett 2004a, 15).

The residues and sooting identified on Ipswich-type wares elsewhere in *Lundenwic* would suggest the vessels may have been used for a number of functions including boiling water, food preparation, storage and

also perhaps in the preparation of vegetable dyes (Blackmore 1988b, 86–7; 1989, 80; Jarrett 2004d, 92). Most of the sherds from Bedford Street demonstrate internal residue, although some burnt residue and general sooting is also evident, indicative perhaps of both food storage and preparation.

Quartz- and sand-tempered wares (SSANB; SSAND; SSANH)

A total of seven sand-tempered wares were recovered from the site including the medium sand-tempered variant (SSANB), the fine sand-tempered ware (SSAND) and a single possible sherd of the medium quartz-sand-tempered ware with organic matter (SSANH). Most of the sand-tempered wares remain as yet unsourced, although a Hampshire provenance is possible for the medium sand-tempered SSANB. No rims forms were recovered and only one sherd demonstrated burnt residue pointing towards function. Where evident surfaces were smoothed or burnished, although more unusually two of the SSANB sherds demonstrate bossed decoration (Figs 20, 6–7).

Although never very numerous and in use in 7th-century *Lundenwic*, sand-tempered wares were generally more prevalent after the mid-8th century (Blackmore 2003b, 235). Bossed decoration, however, is a decorative technique commonly associated with the early Saxon period, namely the 5th and 6th centuries, although this type of decoration has been recorded on Middle Saxon pottery dating to the mid-8th to mid- or late 9th century from eastern Kent (Macpherson-Grant 2001, 212, 221–3). Here it is considered to represent a regional adaptation to contemporary influences, probably continental imports, and is distinct from the early Saxon bossed tradition. The sherds from Bedford Street are small and it is not possible to determine the broader arrangement of the design, but the technique and appearance of the bosses is similar to those excavated at *Sandtun* (Macpherson-Grant 2001, figs 32, 33, 35). Unfortunately these vessels were recovered from post-medieval contexts, but it is likely that they were contemporary with the rest of the Middle Saxon assemblage, although it is possible that they represent residual early Saxon finds.

Lower Greensand ware (SLGSD)

A single sherd of the Lower Greensand ironstone sand-tempered fabric group was identified in the assemblage, represented by the fine sandy variant SLGSD formerly included under SLGSC (Blackmore 1988b, 87). This group of fabrics probably originates from Surrey.

Mixed gritted ware (MSFGA)

The single mixed sand, flint, grit and shell-tempered ware represents a rare and relatively late find in *Lundenwic* perhaps dating from the mid-8th century. Indeed, the fabric is either likely to be contemporary with or post-date the introduction of Ipswich-type ware (Blackmore 2003b, 236). The sherd is small, but was probably derived from the body of a jar with smoothed surfaces. Unfortunately this sherd was found in a 17th-century deposit ([222]).

Chalk-tempered ware (MSCH)

The rim of a single mixed sand, flint and chalk-tempered ware jar was identified in the assemblage. The fabric has no fixed provenance, although it is likely to originate from one of the chalk regions of South-East Britain, possibly the North Downs or the Chilterns (Blackmore 1988b, 88). Interestingly, the vessel appears to be a copy of an Ipswich-type ware rim (Fig 20, 8). Possible London copies of Ipswich-type ware are known (see above) and other localised copies of Ipswich-type ware forms have been observed in other regions, namely Cambridgeshire (Anderson 2003). This reflects not only the widespread distribution of Ipswich-type ware but the influence it had on local contemporary pottery production.

Shell-tempered ware (MSSF)

A single shell-tempered vessel was recovered probably belonging to the abundant finely tempered variant MSSF. A Kentish source is thought most likely for the majority of the shell-tempered wares in *Lundenwic* and they are significant for dating, appearing from the late 8th century (Blackmore 2003b, 237–8).

Continental imports

As identified elsewhere in *Lundenwic*, the imported wares are all wheel-made and represent table wares for the serving of liquids (Blackmore 1988b, 89).

Northern French/Eastern Belgium reduced wares (NFBWA; NFBWB; NFBWC; NFGWA; NFGWC; NFEBB)

The reduced greywares and blackwares from Northern France and Eastern Belgium represent the most frequently identified imports at Bedford Street, represented by 11 vessels (15 sherds). Six of these are North French blackware, including four with a pinkish-brown body (NFBWA), one with a sandy reduced fabric (NFBWB), and one with a very fine bluish-white body (NFBWC). The first group includes a burnished strap-handled pitcher with a flanged rim (Fig 20, 9), similar to those illustrated from the Royal Opera House (Blackmore 2003b, fig 47.34, fig 73.58, fig 85.61). The sandy reduced NFBWB variant is represented by a flat base and the fine bluish-white NFBWC by a single burnished base sherd from a closed vessel (Fig 20, 10). The latter demonstrates traces of glue from the possible attachment of a tinfoil strip in the Tating-type ware tradition (Blackmore 1989, 85–7). Tating-type ware is the name given to black-burnished ware with applied tinfoil decoration; products of this nature appear to have been made in more than one location including Northern France, the Meuse valley and the Rhineland (Blackmore 2001, 30).

Two North French greyware vessels were recovered: one ridged strap-handle in the moderate sand-tempered variant NFGWA, probably from a jug, and a body sherd of the very hard thin walled NFGWC variant. Both of these vessels are burnished. Finally, three sherds of a hard greyware from Northern France or possibly Eastern Belgium (NFEBB) were also identified, represented by a strap-type handle from a jug and two body sherds, possibly from the same vessel. The latter is partially oxidised with burnished vertical lines and may represent a North French red burnished ware (NFRWA).

These fabrics occur from earliest phases of activity at the Royal Opera House, but it is more difficult to determine when they went out of use (Blackmore 2003, 239). The greywares from Northern France and/or Eastern Belgium (NFGWA; NFGWC; NFEBB) are dated from *c.*AD 600–800. The blackwares (NFBWA; NFBWB), with the exception of Tating-type ware, are also dated from *c.*AD 600 but although most probably pre-date AD 750, could crop up as late as the mid-9th century. The so called Tating-type ware (NFBWC), however, is dated later, *c.*AD 750–850 (Blackmore 2001, 30; 2008a, 170). At Bedford Street only two of the vessels (NFEBB; NFGWC) were recovered from late 8th-century contexts.

Rhenish buff ware (BADOB)

Two hard fine sandy cream/buff coloured vessels (BADOB) were identified in the assemblage that probably originate from Badorf or Walerberg in the Rhineland. The majority of the 17 body and base sherds recovered derive from the same vessel, although distributed between the fills of two pits ([284] and [309]). The vessel is large but fairly thin walled with a sagging base. Decoration, including the applied strips of the '*Reliefbandamphorae*', usually occurs on the upper body of the Rhenish buff wares. As only lower body and base sherds were identified, the form of the vessel from Bedford Street remains uncertain. This is unfortunate as form provides some chronology within this long-lived industry. A study by Tischler, however, has revealed that a change from flat to sagging or lenticular bases can be observed during the late 8th century (Hodges 1981, 84). This would suggest that the vessel from Bedford Street is likely to date to the later 8th or early 9th century. Given the size of the vessel, an amphora or jar form seems most likely.

Distribution and chronology

Unfortunately the majority of the material was recovered residually from features dated to the 17th century (Phase 3). However, a small assemblage of stratified Saxon pottery was recovered from three of the Phase 2b pits ([231]; [284]; [309]) (Fig 6), and included fabrics dating from *c.*AD 400–850, although the combination of types would indicate

the earliest feature dates from the second quarter of the 8th century. The basal fill of pit [231] ([230]) contained a single sherd of Ipswich-type ware dating *c.*AD 730–850, but the presence of chaff-tempered sherds in the upper fill ([229]), in addition to more Ipswich-type ware, may suggest deposition occurred before *c.*AD 750. A provisional date during the second quarter of the 8th century (*c.*AD 730–750) is therefore suggested. The Ipswich-type ware from fill [229] is decorated randomly with a ring-stamp and incised lines (Fig 20, 4).

The recovery of sherds of the same imported vessel scattered between the fills of both pit [284] and pit [309] indicates a degree of contemporaneity between these features. Indeed, fragments of the same Badorf-type ware (BADOB) vessel were recovered from three of the fills of pit [309], indicating backfill occurred in quick succession. The chaff-tempered wares (CHAF) from both pits conventionally pre-date AD 750 but the sagging based Badorf vessel suggests deposition is unlikely to have taken place before the late 8th century. This could imply that the chaff-tempered vessels are residual, were old when deposited, or have a longer lifespan than previously supposed. The condition of the sherds is good, suggesting the vessels may have been long-lived or perhaps more likely, and with mounting evidence in support, that the fabric continued to be made, albeit in decreased quantities, post-AD 750 (L Blackmore, C Jarrett & A Vince pers comm). A date after *c.*AD 800 is unlikely, due to the presence of two North French and/or Eastern Belgium greywares. The chaff-tempered material includes a rounded jar with distinct grog temper (Fig 20, 2), thought to be crushed Roman tile (CHFG). The latter is very uncommon in the *Lundenwic* settlement with only a few other sherds having been identified (Blackmore 1988b; 1989; 2003b).

Discussion

The small stratified Saxon assemblage from Bedford Street appears to date to the 8th century. The majority of the unstratified fabrics are dated early within the Middle Saxon period, however, comprising predominantly chaff-tempered ware, largely pre-dating *c.*AD 750. Other fabrics likely to pre-date the mid-8th century include a small number of North French blackwares and those dating to the end of the 8th century include other reduced wares from Northern France or Eastern Belgium. Fabrics with a date range extending to the mid-9th century are represented by Badorf/Walberberg-type ware, Ipswich-type ware and the sand, Lower greensand ironstone sand, mixed grit, chalk and shell-tempered wares (SSAN, SLGSD, MSFG, MSCH, MSSF). Aside from the mixed gritted sherd (MSFGA), the Tating-type ware (NFBWC), the two possible late 8th- or early 9th-century bossed sand-tempered vessels and the single shell-tempered sherd (MSSF), it is interesting to note that characteristically late fabrics or styles of decoration occur fairly infrequently.

The range of forms identified is fairly typical, predominantly comprised of locally and regionally produced jars with a smaller quantity of imported table wares, including pitchers and jugs. Interestingly, there appears to be a chalk-tempered ware (MSCH) copy of an Ipswich-type ware jar form. The residue and sooting on the local and regional jars is suggestive of both food storage and preparation, or at least the heating of organic substances.

A small number of the chaff-tempered jars and the single chalk-tempered jar have evidently been exposed to very high temperatures; the examples are burnt or the surface of the vessel has bubbled up or has slag concretions. It is possible this may indicate that some form of craft or industrial activity was taking place. Indeed, the resistance to thermal shock of a chaff-tempered body, and thus the suitability of this fabric for use at high temperatures, in contrast to other fabrics is perhaps no coincidence (Brown 1974, 18).

LOOMWEIGHTS FROM BEDFORD STREET

Berni Sudds

A total of 17 fragments of loomweights, weighing 3,306g, was recovered from nine separate contexts (Table 11). This material represents 14 semi-complete individual weights typologically of Saxon date. The

majority were residual finds from the backfill of 17th-century features, but a single example was recovered from a Middle Saxon pit ([231]) (Fig 6). The weights would have been used to keep the warp threads of an upright loom taut, as evidenced where found *in situ* (Malcolm *et al* 2003, 85). They represent a fairly common find in *Lundenwic* and provide evidence for weaving on site (Goffin 2003a).

On the basis of profile three broad form categories have been proposed for Saxon loomweights that, to some extent, reflect their date and method of manufacture (Hurst 1959, 23–4; Riddler 2004a, 19–20). Those of Early Saxon (*c.*AD 410–650) date are described as annular, examples dated to the Middle Saxon (*c.*AD 650–850) period are generally categorised as intermediate, and finally those dating from the 8th century onward are bun-shaped (Wheeler 1935, 154–5; Hurst 1959, 23; Walton Rogers 2007, 30). Of the 14 weights, the majority are of the intermediate type, only one annular and two bun-shaped examples were identified.

Ongoing analysis has resulted in a reassessment of the original fabric groupings proposed for the Middle Saxon loomweights recovered from *Lundenwic* (Blackmore 1988c, 111). Four main groups have now been identified, all manufactured from brickearth local to the settlement, but differentiated by the admixture of various inclusions (Goffin 2003a, 216; Keily 2013). As on most other sites in *Lundenwic* the examples from Bedford Street are in original Fabrics 1a and 1b (Blackmore 1988c, table 13; Riddler 2004a, 20). The division between these two sub-groups has become difficult to determine and rather arbitrary, therefore these two have recently been amalgamated under Fabric 1a (Keily 2013).

SMALL FINDS OF METAL AND STONE FROM BEDFORD STREET

Märit Gaimster

The stone and metal objects from Bedford Street (Table 11) included a range of tools and household related items with good parallels in finds from other sites within *Lundenwic* and other contemporary settlements (Malcolm *et al* 2003; Leary *et al* 2004). The two nail shanks recovered reflect the rare usage of nails in an essentially

*Table 10. Distribution and quantification of loomweight fragments from Bedford Street. (Key: Diameter = estimated range calculated from wall and hole diameter (mm). Height = actual maximum value (mm). * = cross-joining fragments from the same weight)*

Context	SF No.	Form	Fabric	Number	Weight (g)	Diameter	Height	Cord mark
131		Non-diagnostic	1a	1	22	-	-	
145		Intermediate	1a	1	170	120 - 136	48	
226	17	Bun-shaped	1b	1	190	100 - 111	53	
229	23	Bun-shaped	1a	1	362	103 - 128	52	
253	41	Intermediate	1a	1	76	106 (min)	40	
257*	45	Intermediate	1a	1	308	98 - 117	59	
258*		Intermediate	1a	1	188	98 - 117	59	
258	46	Intermediate	1a	1	160	94 - 121	42	
265	49	Intermediate	1a	2	342	115 - 127	55	
269	42	Intermediate	1b	1	578	117 - 129	64	Yes
269	50	Annular	1a	2	298	111 - 120	40	
273	44	Intermediate	1b	1	192	135 (max)	45	Yes
310	52	Non-diagnostic	1a	1	130	-	-	
310	55	Intermediate	1a	1	184	138 (max)	54	
310	56	Intermediate	1b	1	106	112 (max)	39	

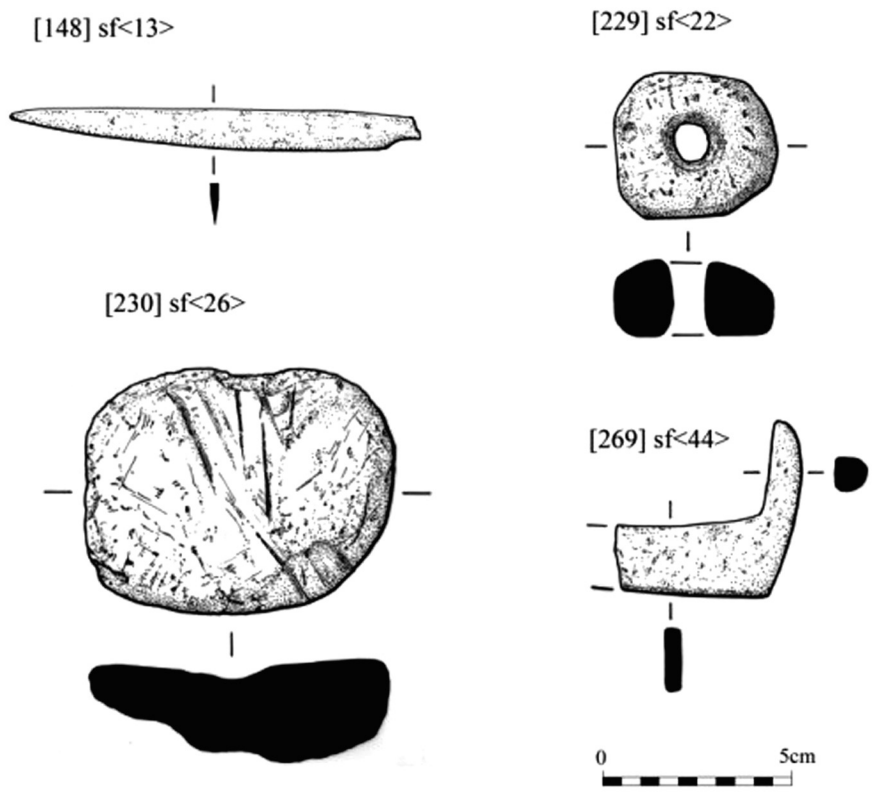

Fig 21. Saxon small finds from Bedford Street (listed by accession number): <13> incomplete iron knife blade [residual]; <22> chalk spindle whorl [229]; <26> small carved chalk block [230]; <44> iron hinge pivot [residual]

timber-based building tradition (Leahy 2003, 23–4). Structural fittings relating to buildings may be reflected in an incomplete iron hinge pivot < 44>, which would have been used to hang a door or shutters (Fig 21). The hinge pivot was retrieved together with residual Middle Saxon pottery from a Phase 3 context.

A chalk spindle whorl <22> complements the antler example discussed earlier (Fig 18e). Chalk is a fairly common raw material for these tools, reflected also in spindle whorls from other sites within *Lundenwic* (Blackmore 1988c, 114, fig 29.8–9; Williams 1989, 110, fig 37.132). While these correlate well with common types identified for the Middle Saxon period (Walton Rogers 2007, 23–6, fig 2.18), showing one or two flat faces, the Bedford Street whorl is bun-shaped in the manner of Anglo-Saxon loomweights. However, similar spindle whorls are known from the Early Saxon settlement at West Stow in Suffolk (West 1985, 139, fig 150.8). The Bedford Street example has been reshaped on three sides, almost into a square (Fig 21 <22>); it may have been adapted or reused for other purposes. A small chalk block with carving marks across the centre was retrieved from the same pit (Fig 20 <26>).

Evidence of cereal milling was provided by the discovery of a residual (Phase 3) incomplete Rhenish lava rotary quernstone <40>. The quern fragment consists of the central part of the upper stone; the hole, or hopper, has a flange. Lava stone appears to have been a favoured material for domestic querns throughout the Anglo-Saxon period, and there is evidence that it was traded as quern blanks to be finished into working querns in local workshops (Goffin 2003b, 205).

Table 11. Catalogue of Middle Saxon small finds from Bedford Street

Context [148] sf <13> (Fig 21)
?complete blade of whittle-tang knife; probably Type C1; L 110mm
Phase 3, Lightwell

Context [229] sf <22> (Fig 21)
complete chalk spindle whorl; originally bun-shaped but reshaped almost into square with three flat sides; diam. *c.*45mm
Phase 2, Area E

Context [230] sf <26> (Fig 21)
oval chalk block with a depression and carving marks across the centre; L 80mm W 65mm
Phase 2, Area E

Context [253] sf <40>
lava quern; centre part of upper stone; central hole diam 28mm
Phase 3, Area F

Context [269] sf <44> (Fig 21)
iron hinge pivot; sub-rectangular shank (incomplete) W 25mm; circular-section pivot
Phase 3, Area F

Context [302] sf <54>
iron nail; incomplete; rectangular section tapering; L 40mm W 6mm
Phase 2, Area F

Context [302] sf <57>
iron nail; incomplete; rectangular section tapering; L 90mm W 8mm
Phase 2, Area F

Context [303] sf <58>
iron knife; incomplete; flat tapering tang with part of blade extant; L 80mm
Phase 2, Area F

Two incomplete iron knives were also among the finds associated with the Middle Saxon phase. One of these <13>, residual with Saxon pottery in Phase 3, can be identified as a Type C knife, characterised by a back form that is horizontal with the edge before curving down towards the tip (Fig 21 <13>). This type of knife is known from at least the 7th century and is a common form on Middle Saxon sites (Rogers 1993, 1275; *cf* Blackmore 2003c, 256–7).

ANIMAL AND FISH BONES FROM BEDFORD STREET

Philip L Armitage

The fills of five Saxon pits yielded a total of 3,575 animal bone elements/fragments (hand-collected and sieved samples combined). Employing standard zooarchaeological methodological procedures, 2,372 (66.4% of the total) are identified to taxon/species and part of skeleton, and 1,203 (33.6%) fragments remain unidentified. For the purposes of reporting and discussing the results of the study carried out into the animal bone assemblages, these are arranged below in three parts:

PART 1: MAMMAL AND BIRD BONES

Introduction

The fills of the five Saxon pits [18], [231], [236], [284] and [309] yielded a total of 3,128 mammal bone elements/fragments. Of these 2,091 (66.8%) are identified to taxon/species (Tables 12–13), representing seven species: horse *Equus caballus* (domestic); cattle *Bos* (domestic); sheep *Ovis* (domestic); goat *Capra* (domestic); pig *Sus* (domestic); cat *Felis* (domestic); red deer *Cervus elaphus*. Anatomical (body part) distributions for the major species (cattle, sheep and pig) from each of the pits are summarised in Tables 14–16.

From the same pits came a small quantity of bird bones; in total 33 specimens, of which 32 (97%) are identified to taxon/species (Table 12), representing four species: greylag/domestic goose *Anser anser* (domestic); domestic fowl *Gallus gallus* (domestic); tufted duck *Aythya fuligula*; *cf.* white-tailed eagle *Haliaeetus albicilla*. Anatomical body part distributions for the two major species represented (goose and domestic fowl) are summarised in Table 17.

Table 12. Mammal and bird bone assemblages recovered from the Phase 2 Saxon pits at Bedford Street, the hand-collected and all material recovered from the sieved samples is included, but the bone-working waste is excluded

Pit No.	18	231	236	284	309	Totals
Taxon/Species						
Mammals:						
horse		1				1
cattle	3	241	2	358	224	828
sheep	1	144	4	105	177	431
goat		2		1		3
pig	1	64	3	142	166	376
cat					1	1
unident mammal frags		283	14	366	374	1037
Birds:						
goose			1	6	5	12
domestic fowl		6	1	3	8	18
cf. white tailed sea eagle		1				1
tufted duck		1				1
unident bird				1		1
TOTALS	5	743	25	982	955	2710

Table 13. Species represented in the sawn bone-working waste recovered from the Phase 2 Saxon pits at Bedford Street

Pit No.	18	231	236	284	309	Totals
red deer		6		2	1	9
horse		1				1
cattle		370	2	1	3	376
sheep		2				2
goat		1				1
TOTALS	0	380	2	3	4	389

plus the following cattle bone elements from Pit 231 probably associated with the bone-working waste:
41 unfused/detached condyles from metapodials
13 os centrotarsales & 8 other tarsal bones

Table 14. Anatomical distribution of the cattle bones recovered from the Phase 2 Saxon pits at Bedford Street (excluding the bone-working waste)

Element/Pit	18	231	236	284	309	Totals
horn core		2		3	2	7
skull		3		17	8	28
premaxilla				2	1	3
maxilla		1		5	1	7
mandible		15		27	9	51
incisor		1		1	4	6
upper cheektooth		8		11	1	20
lower cheektooth		4		2	2	8
canine						
hyoid		1		1		2
vertebra		9		6	4	19
cervical		2		9	8	19
thoracic		5		27	15	47
lumbar		3		12	13	28
sacrum					2	2
caudal		2		1		3
rib		80	2	107	76	265
sternum					1	1
clavicle						
scapula		7		12	8	27
humerus		4		9	3	16
radius		9		8	5	22
ulna	1	2		4	6	13
carpal						
metacarpus		4		11	4	19
innominate		5		14	9	28
femur		6		4	2	12
tibia	1	5		3	4	13
fibula						
patella		1			1	2
calcaneum		2		7	3	12
astragalus		1		2	2	5
os centrotarsale	1				1	2
tarsal				1	1	2
metatarsus		4		6	3	13
metapodial		7			2	9
phalanx I		11		5	6	22
phalanx II		7		2	3	12
phalanx III		5		2	1	8
sesamoid						
long bone shaft frag.		25		37	13	75
TOTALS	3	241	2	358	224	828

Table 15. Anatomical distribution of the sheep bones recovered from the Phase 2 Saxon pits at Bedford Street (excluding the bone-working waste)

Element/Pit	18	231	236	284	309	Totals
horn core		1		1	1	3
skull		1				1
premaxilla		2		1	1	4
maxilla					3	3
mandible		2	1	4	12	19
incisor		2	1		1	4
upper cheektooth		3				3
lower cheektooth		3				3
canine						
hyoid						
vertebra		1		1	1	3
cervical		6		1	1	8
thoracic				11	6	17
lumbar		3		1	3	7
sacrum		1			1	2
caudal						
rib		43		63	90	196
sternum					1	1
clavicle						
scapula		6		3	8	17
humerus		5		2		7
radius		10		1	4	15
ulna					2	2
carpal						
metacarpus	1	2		2	3	8
innominate		6		3	10	19
femur		6		2	5	13
tibia		7		3	7	17
fibula						
patella						
calcaneum		3			1	4
astragalus						
os centrotarsale						
tarsal				1		1
metatarsus		4			12	16
metapodial		5	1		1	7
phalanx I		2		1	3	6
phalanx II			1			1
phalanx III						
sesamoid						
long bone shaft frag.		20		4		24
TOTALS	1	144	4	105	177	431

Table 16. Anatomical distribution of the pig bones recovered from the Phase 2 Saxon pits at Bedford Street (excluding the bone-working waste)

Element/Pit	18	231	236	284	309	Totals
skull		7		13	13	33
premaxilla		1		5	1	7
maxilla		1	1	7	8	17
mandible		2		11	15	28
incisor				2	2	4
upper cheektooth				2		2
lower cheektooth				4		4
canine		1		3	1	5
hyoid						
vertebra		14			2	16
cervical				5	5	10
thoracic		1		8	6	15
lumbar					2	2
sacrum						
caudal						
rib		2		10	31	43
sternum				1		1
clavicle						
scapula		2		6	7	15
humerus		1		6	13	20
radius				4	1	5
ulna		1		6	2	9
carpal						
metacarpus		7		8	6	21
innominate		4		6	7	17
femur		5		6	8	19
tibia	1	1	1	5	6	14
fibula				2		2
patella						
calcaneum		1		1	2	4
astragalus						
tarsal					1	1
metatarsus		1		9	6	16
metapodial		7	1	7	13	28
phalanx I		4		1	4	9
phalanx II		1		1	2	4
phalanx III				1	1	2
sesamoid						
long bone shaft frags.				2	1	3
TOTALS	1	64	3	142	166	376

Table 17. Anatomical distribution of the goose and domestic fowl bones recovered from the Phase 2 Saxon pits at Bedford Street (excluding the bone-working waste)

Element/Species	goose	fowl
mandible	1	
coracoid		2
scapula	1	
humerus	1	3
radius	1	1
carpometacarpus		1
tibiotarsus	1	6
fibula		1
tarsometatarsus	1	2
long bone shaft	2	2
vertebra	3	
rib	1	
Totals	12	18

All elements are from adults except for 1 immature domestic fowl tibiotarsus

Patterns of refuse deposition and condition of the bone

Pit [18] contained only a very small amount of household food refuse. The more extensive fills of pits [231], [236], [284] and [309] comprised household food refuse intermixed with craft/industrial waste, with a marked concentration of the latter category in pit [231]. Virtually all of this waste material was thrown into the pits very soon after being discarded, as evidenced by the overall good state of preservation, exceptionally low incidence of bones exhibiting signs of subaerial weathering/erosion/biological degradation, and limited evidence of dog scavenging. The incidence of burnt bone is also remarkably low. In conclusion, it appears the pits served as the 'primary burial contexts' for many of the bones — similar to the situation identified by Rackham (2004, 68) at the Lyceum site.

Descriptions of the animals

Cattle

Withers heights in eight cattle are calculated from the lengths of their metapodial bones (6 metacarpal and 2 metatarsal bones), after the method of Fock (1966) as referenced in von den Driesch and Boessneck 1974, 325–48; with the stature of the smallest animal calculated at 107.3cm and the largest at 117.1cm. Although the mean stature for these eight Bedford Street cattle (113.8cm) appears to fall below those values calculated for other central *Lundenwic* sites (such as the Peabody site where the mean was 117.9cm with a size range extending up to 137.0cm (West 1989, 160)) the Saxon pits at Bedford Street did yield several other cattle bones (including a calcaneum from pit [309] GL (Greatest length) 140.4mm GB (Greatest breadth) 50.5mm and a distal metacarpus from pit [284] Bd (Greatest breadth at the distal end) 72.2mm) from very much larger beasts that indicate the presence of animals (probably bulls and oxen) very similar in stature and build to the improved cattle of the preceding Romano-British period — thus providing further evidence that the Saxons were maintaining the improvements in livestock husbandry initiated by the Roman farmers (Armitage 1982a, 51).

In five innominate bones sex can be determined as follows (using the criteria of Grigson 1982): one male and four females. Eight jawbones are aged according to their patterns of dental eruption and wear (Table 18, 1). Further information on the age at death in the Bedford Street cattle is provided by epiphyseal fusion in their long bones (Table 19, 1). Reviewing this evidence suggests that whilst some of the meat consumed came from animals in their prime as meat-producers (aged 2 to 3.5 years) and from a few young calves, much of it derived from more mature to older cattle (aged over 5 to 8 years) probably representing culled milking cows and plough oxen. The presence at the site of at least one breeding (milking?) cow is indicated by a neonatal metatarsus from fill [299] of pit [284].

It should be noted that the kill-off-pattern for the cattle from pit [231] is confounded by the presence of large quantities of fused and unfused sawn metapodials (and associated detached unfused distal condyles) identified as waste from bone-working activity and which may not necessarily be representative of meat consumed at the site — but instead comprise imported raw material in the form of detached feet bones from cattle slaughtered and consumed elsewhere in *Lundenwic* (see discussion below).

Table 18. Ageing of the mandibles of the main domesticates recovered from the Phase 2 Saxon pits at Bedford Street

7.1: Cattle (age categories referenced in Bond & O'Connor 1999, 346)

N	J	I	SA1	SA2	A1	A2	A3	E
			1	1			6	

Key to categories: N = neonatal, J = juvenile, I = immature, SA = sub adult, A = adult, E = elderly

7.2: Sheep (age categories after Payne 1973)

A	B	C	D	E	F	G	H	I
		2	4	1	2	3		

Key to categories: A = 0 - 2 months, B = 2 - 6 months, C = 6 - 12 months, D = 1 - 2 years, E = 2 - 3 years, F = 3 - 4 years, G = 4 - 6 years, H = 6 - 8 years, I = 8 - 10 years

7.3: Pig (age categories referenced in Bond & O'Connor 1999, 351)

N	J	I1	I2	SA1	SA2	A1	A2	A3
				6	4	1	5	

Key to categories: N = neonatal, J = juvenile, I = immature, SA = sub adult, A = adult

Table 19. Ageing of the post-cranial bone elements (epiphyseal fusion) of the main domesticates recovered from the Phase 2 Saxon pits at Bedford Street

19.1: Cattle

	fused	**fusing**	**unfused**	**Approx. age of fusion**
Element/ epiphysis				
scapula	7			
innominate	9			
Totals	16			10 months
humerus distal	9			
radius proximal	5			
1st phalanges proximal	13	1	6	
Totals	27	1	6	1. 5 years
metacarpal distal	8		2	
tibia distal	2	1	4	
metatarsus distal	6		1	
Totals	16	1	7	2 to 2.5 years
calcaneum	3		9	
femur proximal	3		4	
Totals	6	0	13	3.5 years
humerus proximal	1		2	
radius distal	5		5	
ulna proximal	1		2	
femur distal	2			
tibia proximal	1		3	
Totals	10	0	12	3.5 to 4 years

plus 1 ulna of a young calf and 1 metatarsus of a neonate calf

Bone-working waste (cattle elements) from pit [231]

	fused	**fusing**	**unfused**
metapodials (detached dist. condyles)			41
sawn dist. metacarpals	43		15
sawn dist. metatarsals	29		3
Totals	72	0	59

19.2: Sheep

		fused	fusing	unfused	Approx. age of fusion
Element/ epiphysis					
scapula		10			
innominate		11			
humerus distal		4	2		
radius proximal		6		2	
	Totals	31	2	2	6 to 10 months
1st phalanges proximal	Totals	4		1	12 months
metacarpal distal		2		3	
tibia distal		6		3	
metatarsal distal		3		3	
	Totals	11	0	9	1.5 to 2 years
femur proximal		2		3	
calcaneum				3	
	Totals	2	0	6	2.5 to 3 years
humerus proximal				1	
radius distal			1	3	
ulna proximal				1	
femur distal		2		5	
tibia proximal		2		2	
	Totals	4	1	12	3 to 3.5 years
	plus 1 neonatal lamb metatarsus				

19.3: Pig

	fused	fusing	unfused	Approx. age of fusion
Element/ epiphysis				
scapula	8		1	
humerus distal	9		1	
radius proximal	2		2	
innominate	10			
Totals	29	0	4	1 year
metapodials distal	10	1	23	
1st phalanges proximal	3		1	
tibia distal	5		5	
calcaneum	1		3	
Totals	19	1	32	2 to 2.5 years
humerus proximal		2	3	
ulna proximal			3	
femur proximal	3	1	4	
tibia proximal	2		2	
radius distal			4	
femur distal			7	
Totals	5	3	23	3 to 3.5 years

plus 1 sucking piglet humerus

Sheep

Stature (withers height range 60.5–63.5cm) of the Bedford Street sheep compares with the sheep from other *Lundenwic* sites (see Armitage 2004a, 32) and the size of modern Soay sheep. The horn core of a male yearling from fill [303] of pit [309] further supports the observation that the Bedford Street sheep would have resembled in size and appearance the modern Soay.

In six innominate bones sex can be determined using the diagnostic characters documented by Armitage (1977, 75–9): all these specimens are identified as female. As referenced above, there is at least one male represented by a horn core from pit [309], sexed according to the criteria of Hatting (1975) and Armitage (as laid out in Clutton-Brock *et al* 1990).

Age at death in 12 sheep (represented by their jawbones) is determined using the patterns of eruption and attrition in the lower cheek teeth, after the method of Payne (1973) and shown in Table 18, 2. Further evidence relating to the ages of slaughter in the Bedford Street sheep is provided by epiphyseal fusion in their long bones (Table 19, 2). Considering all the available evidence, the overall kill-off pattern compares with that documented for the sheep from James Street, another central *Lundenwic* site, where the greatest proportion of the meat in the diet came from animals aged between 1 and 2.5 years (Armitage 2004a, 32). As discussed by O'Connor (2001, 59), such sheep would have reached their prime in terms of carcass quality but were killed before their potential as wool, milk or offspring producers could be fully exploited. The contribution of such prime sheep to the meat supply of *Lundenwic* therefore indicates a well established and thriving local livestock farming system that was readily able to meet the specific provisioning requirements of *Lundenwic*. Again as noted at James Street, the Bedford Street sheep exhibit a second peak of slaughtering after four years of age, probably indicating the culling of worn-out wethers (*ie* castrates) that had previously been kept primarily for their wool — as well as the culling of old barren/worn-out ewes previously kept for their wool and milk products and as producers of offspring for flock replacement, rather than as meat producers. At the other extreme in the age range represented, the one neonatal lamb metatarsus found indicates the presence of at least one breeding ewe at the site. If this was the situation, then perhaps this particular ewe was being kept specifically for her milk.

Pigs

Shoulder heights are calculated in six Bedford Street pigs from the lengths of their long bones (3 metacarpus, 1 tibia and 2 metatarsus) using the factors of Teichert as referenced in von Becker (1980). The values obtained (min 68.6cm, max 77.7cm, mean 74.9cm) compare with the size ranges of pigs from the other *Lundenwic* sites documented by West (1989, 162) and Armitage (2004a, 31).

Gender in four of the pigs may be determined from the morphologies of their lower and upper canines (tusks) using the criteria of Mayer and Brisbin (1988): one female and two males are recognised by their lower canines from pit [284] and a single male by its upper canine from pit [231].

From the data presented in Table 18, 3, there appears to have been a concentration in the slaughter of the pigs at dental ages SA1 and A2, which equate to 'just over one year' and 'just over two years' respectively. This kill-off pattern is largely borne out by the epiphyseal fusion in their long bones (Table 19, 3) showing pigs killed at 1 to 2.5 years, but also indicating a second peak in slaughtering at 2.5 to 3.5 years. Only a very few mature pigs are represented among the Bedford Street bone assemblages suggesting the breeding herds supplying meat to the site's inhabitants were located elsewhere (probably on the periphery of the settlement as in the case of the sheep flocks). However, the one humerus of a very young/sucking piglet found suggests at least one breeding sow had been present at the site.

Goats

Four elements, all horn cores, were positively identified as goat: three specimens came from the fill of pit [231] and one from pit [284]. Basal circumference measurements taken on two of these Bedford Street horn cores fall within the size range (120–250mm)

of the specimens from *Hamwic* documented by Bourdillon and Coy (1980, 111) believed to be from male/castrate animals.

Horse

There are only two bone elements of horse from the site, both from fill [229] of pit [231]: 1 sawn distal end of a metacarpus; 1 detached unfused distal epiphysis from another metacarpus.

Cat

A single fibula from fill [303] of pit [309] is the only evidence for the presence of cat at the site.

Birds

Four species are represented, with bones of geese and domestic fowl predominating. The two domestic fowl tarsometatarsi were both identified as female by the absence of spurs (criteria of West 1982): specimens from [282] fill of pit [284] and [305] fill of pit [309]. Measurements (in mm) taken on these and other intact *Gallus gallus* bone elements from the site reveal all the birds represented fall within the size ranges of domestic fowl examined by the author from other *Lundenwic* sites (Armitage 2004a; 2004b) as well as those from *Hamwic* documented by Bourdillon and Coy (1980). Tufted duck was represented by a single tarsometatarsus from [229] fill of pit [231]. From the same context came a large humerus shaft fragment that is possibly from a white-tailed eagle.

Interpretation and discussion

It is probable that all the meat consumed at the Bedford Street site had been brought from farmsteads established on the periphery of *Lundenwic*. Although there are neonatal bones of cattle, sheep and pig represented among the food debris recovered from the pit fills at Bedford Street, these are too few in number to indicate anything more than limited husbandry activity at the site. In general terms, the Bedford Street inhabitants were 'food-consumers' rather than 'food-producers'.

As with other central *Lundenwic* sites, beef formed the staple meat consumed, and like their immediate neighbours at the Peabody site (West 1989) pork was second in importance in the diet followed by mutton (Table 20). The flesh of domestic fowl and geese supplemented the diet, but in lesser quantities than the meat from the major domestic (farm) animals. There is no evidence for the exploitation of wild game species (deer, wild boar and hare), which must have been abundant in the forests close by the settlement. All the red deer bone elements present derive from antler working (see below) and do not indicate the consumption of venison. Apart from the isolated tufted duck bone, there is no evidence for the inclusion in the diet of any wildfowl, which would have been readily available from the marshlands and riverbanks nearby. There is, however, evidence (see below) for the consumption of freshwater/estuarine/marine fish.

Table 20. Percentage frequencies of the principal meat-yielding species by bone weight from Bedford Street, excluding bone-working waste

	cattle	**sheep/goat**	**pig**
Bedford Street	71%	11%	18%
Peabody site	74%	10%	16%

Viewed overall, the basic diet of the Bedford Street inhabitants — as revealed by the faunal analysis — features a heavy reliance on the major domestic (farm) livestock; this conforms to the typical profile noted by O'Connor (2001) for distinguishing '*wic*' from 'non-*wic*' sites. They seemed to have enjoyed a diet of solid sufficiency in respect of the staple meats, which included relatively high proportions of the better quality (meatier) parts of the carcass. In addition it is noteworthy that some of this meat came from younger cattle, sheep and pigs slaughtered when they had reached their prime age for carcass quality.

There is evidence indicating that antler, horn and bone working took place on or very near the site (Table 13). It would have been anticipated that the quantity of waste products of antler working would far outweigh that from the other activities, owing to its measurably superior mechanical properties (especially compared with bone) that made it the preferred raw material in

the Middle Saxon period for manufacturing such highly sought after/widely traded items as composite combs (see MacGregor & Currey 1983; MacGregor 1989).

Examples of sawn bone offcuts from pit [231] indicate a variety of domestic animal sources provided the raw materials, including horse and sheep — with even ribs and mandibles appearing to have been utilised. But by far the largest proportion (bulk) of the animal bone material used was from cattle, with a preference for metapodial bones (Table 21). This preference for metapodial bones is clearly evident from their disproportionately high numbers in pit fills [229] and [230] compared with the other skeletal elements of cattle from these same contexts, and suggests the metapodial bones had been specifically imported to the site for the purpose of bone working — and had been supplied from cattle slaughtered and dismembered elsewhere. The metapodial bones, however, may not have come directly from butchers, but via leather workers who had obtained hides from them. During the initial preparation of cattle hides for the tanning process, any feet that had been retained with the skins (a common practice in the past, see Serjeantson 1989, 137) would be removed. In this manner large quantities of cattle feet (*ie* including metacarpal and metatarsal bones) were accumulated by leather workers, which could eventually be sold on to bone workers. In the case of the Bedford Street bone assemblage there are only a relatively few cattle phalanges (Table 14), indicating perhaps that the bone worker at this site was mainly being supplied with already disarticulated and partially defleshed metacarpal and metatarsal bones, with the toes and hooves already removed.

Interestingly, the bone worker at Bedford Street apparently did not preferentially select fused over unfused metapodial bones, which occur in virtually equal frequencies in the discarded waste deposits (in the ratio of 1:1 as verified by a chi-square test, P = 5%), but there are, however, significantly more metacarpal bones represented (62% of the total) compared with the metatarsal bones (38%), indicating a preference for the former element, which has a broader shaft. From the backs of the shafts of these bones the craftsman had cut rectangular-shaped 'bone blanks' (see earlier report and Fig 13).

Table 21. Summary of the sawn animal bones resulting from bone-working activity at Bedford Street recovered from pit [231], contexts [229] and [230] are combined

CATTLE BONES:		
Metacarpal bone	101	(45 prox.ends; 55 dist.ends; 1 shaft)
Metatarsal bone	61	(33 prox.ends; 28 dist.ends)
Metapodial bone	146	(26 prox. & dist.ends; 120 shaft pieces = bone blanks)
Long-bone shaft frags	15	
Mandible	6	
Scapula	8	
Radius	11	
Rib	7	
Innominate bone	6	
Tibia	9	
Total cattle bones	370	
HORSE:		
Metacarpus	1	
GOAT:		
Horn core	1	
SHEEP:		
Rib	1	
Tibia	1	
RED DEER:		
Antler	6	

PART 2: FISH BONES

Introduction

Sieved environmental samples collected from four of the five Middle Saxon pits ([231], [236], [284] and [309]) yielded 405 fish bone elements of which 240 (59.3% of the total) were identifiable to taxa/species

and anatomy (Tables 22–23). Overall a total of 14 taxa/species were identified in the submitted samples. The 'unidentified' category of fish remains shown in Table 22 comprised branchiostegal rays, fin spines, ribs, fragmented vertebral centra and scales; all of which lacked the diagnostic features required for determining the fishes represented.

Identifications were made using modern comparative skeletal specimens (collections of the author). When determining species in the cyprinid pharyngeal bones/teeth, in addition to using comparative specimens, reference was also made to illustrations in the following published works: Wheeler 1978, 1227–9; Newdick 1979, 48–76; Libois & Hallet-Libois 1988, 4–6, figs 2–4; Wheeler & Jones 1989, 97, fig 7.6.

Measurements (in mm) were taken on selected bone elements of eel using dial calipers, following the system of Libois *et al* (1987, 4, fig 2). These data formed the basis for deriving estimates of total lengths in the eels represented (using the regression formulae of Libois *et al* 1987, 5). The estimated total length (TL) values are given in Table 24.

Analysis

Almost one third (32%) of all the identified bones from Bedford Street were from freshwater eels, comprising those from

Table 22. Summary of the various fish bone elements recovered by sieving samples from the Phase 2 Saxon pits at Bedford Street, listed by species and feature

Species/habitat	Latin name	Pit 231	Pit 236	Pit 284	Pit 309	TOTALS	% ID Total
Estuarine/ marine :							
herring	*Clupea harengus*	1	3	27	27	58	24.2%
twait shad	*Alosa fallax*	17		9		26	10.8%
plaice	*Pleuronectes platessa*	6	4	18	17	45	18.8%
flatfish indet.	*plaice/ flounder*	5	1			6	2.5%
cod	*Gadus morhua*	4				4	1.7%
whiting	*Merlangius merlangus*	1				1	0.4%
gadid indet.	*cod family*	2				2	0.8%
Migratory (marine to freshwater):							
freshwater eel	*Anguilla anguilla*	46		6	24	76	31.7%
salmonid indet.	*family salmonidae*	1				1	0.4%
Freshwater:							
roach	*Rutilus rutilus*	1				1	0.4%
chub	*Leuciscus cephalus*	1				1	0.4%
dace	*Leuciscus leuciscus*	1				1	0.4%
cyprinid indet.	*carp family*	8	5		4	17	7.1%
perch	*Perca fluviatilis*			1		1	0.4%
Total identified		94	13	61	72	240	
Unidentified:							
indet.spp.	*indeterminate species*	49	13	55	48	165	
OVERALL TOTALS		143	26	116	120	405	

Table 23. Identifiable fish bone assemblages recovered by sieving samples from the Phase 2 Saxon pits Bedford Street, listed by individual contexts

Feature	Context	Sample No.	Taxa/species	Element	NISP
Pit 231	Fill 229	<30>	freshwater eel	basioccipital	1
			freshwater eel	vertebrae	45
			cf.roach	pharyngeal tooth (fragment)	1
			cyprinid indet.	vertebrae	8
			herring	vertebra	1
			twait shad	vertebrae	17
			salmonid indet.	vertebra	1
			plaice	vertebrae	6
			flatfish indet.	vertebrae	5
			cod	vertebrae	4
			whiting	maxilla	1
			gadid indet.	vertebrae	2
Pit 231	Fill 230	<35>	chub	pharyngeal bone/teeth	1
			dace	pharyngeal bone/teeth	1
Pit 236	Fill 235	<36>	cyprinid indet.	vertebrae	5
			herring	vertebrae	3
			plaice	urohyale	1
			plaice	vertebrae	3
			flatfish indet.	vomer	1
Pit 284	Fill 280	<58>	freshwater eel	vomer	1
			freshwater eel	vertebrae	4
			perch	vertebra	1
			herring	vertebrae	24
			twait shad	vertebrae	9
			plaice	vertebrae	18
Pit 284	Fill 282	<60>	herring	vertebrae	2
Pit 284	Fill 283	<61>	herring	vertebra	1
Pit 309	Fill 302	<64>	freshwater eel	vomer	1
			freshwater eel	dentary	1
			freshwater eel	ceratohyal	1
			freshwater eel	vertebrae	13
			cyprinid indet.	vertebrae	2
			herring	vertebrae	8
Pit 309	Fill 303	<65>	freshwater eel	vertebra	1
			herring	vertebrae	8
			plaice	vertebrae	4
Pit 309	Fill 304	<66>	cyprinid indet.	vertebra	1
			herring	vertebrae	2
			plaice	quadrate	1
			plaice	vertebrae	9
Pit 309	Fill 305	<67>	freshwater eel	vertebrae	6
			freshwater eel	cleithrum	1
			cyprinid indet.	vertebra	1
			herring	vertebrae	2
			plaice	quadrate	1
			plaice	vertebra	1
Pit 309	Fill 306	<68>	freshwater eel	vertebra	1
			herring	vertebrae	7
			plaice	vertebra	1
				TOTAL	240

Table 24. The total length (TL) for the freshwater eels from Bedford Street. Estimates of TL are based on measurements of length (L) and transverse diameter (D); the measurement of selective bone elements follows the methodology of Libois et al (1987)

Context/Sieved sample	Feature	Element	Value (in mm)	TL
229<30>	Pit 231	basioccipital	4.16 (L)	32.1 cm
302<64>	Pit 309	ceratohyal	8.6 (L)	27.4 cm
305<67>	Pit 309	cleithrum	2.34 (D)	50.5 cm

very small immature individuals as well as much larger, fully grown adults, including eels of total length 50cm and above, which probably represented females. An especially large and robust vomer from [280] fill of pit [284] probably derived from a female eel approaching in size the adult maximum total length of 80–100cm (Newdick 1979, 88). Herring was the second most frequent species represented at the Bedford Street site, comprising 24.2% of the total NISP, whilst bones of flatfish were only very slightly lower in frequency (21.3%). All the identifiable bones of flatfish were of plaice, predominately very small specimens from immature fish. Twaite shad, represented by 26 bones, formed 10.8% of the total identifiable specimens, whist cyprinid bone elements made up 8.3% of the assemblage. Although three cyprinid species were positively identified from their pharyngeal bones/teeth — comprising single specimens of roach, dace and chub — the 17 cyprinid vertebrae recovered could not be directly assigned to species, but by association with the above probably also represented roach, dace and/or chub. The few cod vertebrae in the assemblage were all of small size, suggesting these representated young individuals caught by an inshore rather than a distant deep-water fishery (criteria of Wheeler 1977, 408). Whiting was represented by a single maxilla from [229] fill of pit [231], comparable in size to a modern specimen of a fish of total length 50.9cm. Perch was also represented by a single bone element, a precaudal (abdominal) vertebra from [280] fill of pit [284].

Fish in the diet of the inhabitants of *Lundenwic*

Analysis of the Bedford Street fish bone assemblage revealed a very similar species composition to other previously excavated *Lundenwic* sites, especially in regard of the importance of freshwater eel and herring, for example at Maiden Lane documented by Locker (1988, 149–50). Freshwater eel also featured as one of the major components in the diet of the inhabitants at Jubilee Hall, but here cyprinids (including roach) were apparently more important than herring (Locker 1988, 150).

Both the Maiden Lane and Jubilee Hall sites yielded evidence for the consumption of significant quantities of plaice, as did the Peabody and the National Gallery sites, which were also analysed by Locker (1989, 151). Bedford Street has provided further supporting evidence for the role of this species in the diet of the inhabitants of Middle Saxon London. It is noteworthy that like the plaice identified by Locker (1988) from Maiden Lane and Jubilee Hall, those from Bedford Street were mostly small immature fish, but presumably were nevertheless still regarded as a useful food source: size perhaps mattered little if the fish were all thrown together in the iron cooking cauldron (Anglo-Saxon 'cytel') and 'stewed in their own brew' (see Tannahill 1973, 110; Wilson 1976, 30–1).

Twaite shad is a relative of the herring but is much larger bodied. In Victorian times it was caught in great numbers in the lower/outer Thames estuary but was considered of 'little repute as food, their [flesh] being extremely full of bones and dry' (Yarrell 1836 quoted by Wheeler 1979, 66). Despite its later poor reputation as a food-fish this species apparently was eaten at several sites by the inhabitants of *Lundenwic*, as evidenced by its bones among the food deposits at the Peabody site and the National Gallery (Locker 1989, 151), Hare Court (Armitage 2005a) and the Lyceum site (Rackham 2004, 64–5), in addition to Bedford Street.

Although roach has traditionally been considered a valued food-fish, chub, another member of the cyprinid group, however has not been so regarded. According to Izaak Walton (1653, 68) this fish was 'objected against, not only for being full of small forked bones, dispersed through all his body but that he eats waterish, and that the flesh of him is not firm, but short and tasteless'. Like the twaite shad, however, this fish seems to have featured in the diet of the inhabitants of Middle Saxon London, as evidenced by its bones found at the Peabody site, National Gallery, and now the Bedford Street site.

Habitats exploited for their fish and methods of capture

Local net fisheries operating in the freshwater reaches of the tidal Thames and other rivers in the London area were probably the source of the cyprinids and perch eaten at Bedford Street. During their seasonal seaward migration (November to January) eels would have been caught in traps ('eel-bucks') or speared in the Thames adjacent to the settlement (as discussed by Locker 1988, 149). Twaite shad is also a migratory marine fish but rarely swims far upstream, staying instead within the tidal influence — and in the winter months occurs in abundance in the mouth of the Thames (Wheeler 1979, 143). The mouth/outer estuary of the Thames would also have been the habitat for large numbers of young cod, whiting, and immature plaice during the late autumn and winter months; these were probably captured in shore-line traps known as 'kiddles' (Wheeler 1979, 80). The use of 'kiddles' was an indiscriminate means of capturing fish of all ages and sizes, and possibly accounts for the presence of very small immature plaice among the Middle Saxon fish assemblages from London. In the case of cod and whiting, these fish could also have been taken on baited/hooked lines. Herring would have been abundant in the lower tidal Thames and inshore waters off the Essex and Kent coasts from late autumn to late spring (Wheeler 1979, 172).

Discussion

Initially, the first few faunal assemblages studied from *Lundenwic* suggested that by far the greatest proportion of fish eaten by the settlement's inhabitants had been caught in the freshwater reaches of the Thames, with only a relatively small quantity of marine species supplied by estuarine fisheries (Rackham 1994, 131). Since then, as more excavations of Middle Saxon London have been carried out, it is becoming clearer that the contribution to the food supply of the settlement from fish traded from the lower/outer estuary had previously been underestimated. The Bedford Street fish bone assemblage provides confirmation of this exploitation of the marine species found towards the mouth of the Thames. It is perhaps significant that such fisheries could take advantage of the late autumn/winter abundance of plaice, young cod, whiting and twaite shad, and thereby were able to supply the London settlement with fresh fish at a crucial period in the year when other foodstuffs may have been sorely depleted or unavailable.

PART 3: AMPHIBIAN AND REPTILE BONES

Pits [231], [236] and [309] yielded eight common frog *Rana temporaria* bone elements, and pit [284] contained a single jawbone fragment of grass snake *Natrix natrix*. It is likely the pits served as accidental traps for these creatures.

CHARCOAL SAMPLES FROM BEDFORD STREET

Imogen Poole

Introduction and methodology

Charcoal recovered from some of the Saxon pit fills was analysed to provide taxonomic identification and thus to obtain information pertaining to tree taxa use for fuel and woodland composition during this period. It is assumed that this charcoal was all derived from the discarded debris from domestic hearths. Samples were processed by flotation using a 300-micron mesh sieve. The dried residues were sorted 'by eye'. The flots were scanned using a low power zoom-stereo microscope and twelve samples

were recommended for a detailed charcoal assessment (Green & Vaughan-Williams 2005).

The material was prepared using standard techniques (Gale & Cutler 2000) and examined using an Olympus BX41 microscope. The charcoalified fragments were examined using epi-illumination with magnifications of up to 400x. Material was identified from three planes of section whenever necessary. Descriptions in relevant literature, such as Schweingruber (1990), were consulted as an aid to identification when required. Classification follows that of Tutin *et al* (1964–1993).

Results

The results of the charcoal analysis are summarised in Table 25. All the samples were subdivided according to their relative maturity (stem wood, wood of indeterminate age, young wood, *ie* twig or round wood). The presence of mature wood was determined from growth ring curvature, and the presence of heart wood was determined by the presence of tyloses in the vessels. All material appeared to be from relatively mature wood (stem wood) unless otherwise stated specifically as round wood, twig wood or mature/heart wood. Round wood was identified by the presence of (part of) a pith and bark, whereas small diameter (twig) wood was identified by the presence of the pith and inner wood or tight growth ring curvature of the inner wood if the pith was missing. A total of thirteen taxa were represented within the 572 fragments studied, of which 501 or 88% were securely identified (Table 25).

Only hardwoods (angiosperms) were identified among the fragments examined, including the unidentifiable fragments. No softwood/conifer (gymnosperms) were identified among the samples. Which members of the Maloideae are represented could not be determined due to the difficulty in distinguishing genera of this sub-family of the Rosaceae. None of the *Quercus* and *Prunus* fragments could be identified to species level. Close anatomical similarity between *Salix* and *Populus* prevented the separation of these two genera.

Fragment preservation in this assemblage from the Saxon pits was generally good. Closely spaced growth rings along with tyloses suggest that many of the *Quercus* fragments came from slow-grown mature material. Due to the abundance of mature and heart

Table 25. The range of taxa, plus their frequency and relative maturity present in the Saxon charcoal fragments from Bedford Street and James Street

Taxon	Common Name	Fragment count	% of total	Relative maturity of wood	Present at James Street
Acer	maples	2	0.4	stem	-
Betula sp.	birch	14	2.8	stem	X
Carpinus sp.	hornbeam	2	0.4	stem	-
Clematis	clematis	1	0.2	NA	-
Corylus avellana	common hazel	28	5.6	stem	X
Fagus sylvatica	common beech	7	1.4	stem	X
Fraxinus excelsior	common ash	2	0.4	stem	X
Ilex aquifolium	holly	2	0.4	stem	-
Ligustrum vulgare	wild privet	0	0	Not present	X
Maloideae – includes *Crataegus*, *Sorbus*, *Malus* & *Pyrus*	hawthorn, whitebeams & rowans (also known as mountain ash), apples & pears	21	4.1	stem	X
Populus/*Salix* sp.	poplar/willow	29	5.6	stem	X
Prunus sp.	blackthorn & cherry	26	5.2	stem	X
Quercus sp.	oak	360	71.8	heart, mature, & twig	X
Ulmus sp.	elm	7	1.4	stem	X

oak wood, coupled with the lack of obvious decay in these fragments, it seems likely that the material was derived from mature wood gathered possibly for immediate use, rather than from accumulated dead wood. Use of possible 'green' wood is somewhat surprising considering that most woods burn more efficiently when seasoned.

The vast majority of fragments examined derived from branch or possibly stem wood (Table 25). Small diameter wood is more likely to be totally destroyed by combustion relative to larger wood elements and is inherently more fragile as charcoal. Therefore twig wood and small diameter stem wood of shrub taxa could be consistently under-represented. The presence of bark indicates that wood was burned in an unconverted state, as round wood but only one fragment of *Quercus* round wood survived. Tyloses, indicative of heart wood, were observed in 27% of the *Quercus* fragments examined.

Discussion

The charcoal samples recovered from the Saxon pits revealed that the dominant species burnt on site was *Quercus* (72%); it is an excellent fuel wood, burning very hot and producing lasting hot embers. All the woods listed in Table 25 are known fuel woods except for *Prunus*, Maloideae, *Ilex*, *Acer*, *Ulmus* and *Clematis*. These latter woods have a relatively low calorific value and would probably not have been gathered as fuel wood *per se*. *Ulmus* along with *Acer*, *Ilex*, *Prunus* and Maloideae are all known to have been used to manufacture domestic items (Gale & Cutler 2000). Fuel wood for everyday activity is often biased in favour of locally available timber (Abbot *et al* 1997; Tabutia *et al* 2003). It is more likely that the possible *Clematis* found in pit [309] may have been introduced through its association with a fuel wood, or use as a tie or binding, rather than as a source of fuel.

BEDFORD STREET SAXON PERIOD DISCUSSION

The diagnostic ceramics recovered from six cess and rubbish pits discovered at 15–16 Bedford Street are dated to between AD 670 and 750 (see Sudds above) (Fig 6). This date range coincides with the expansion of *Lundenwic* as both an urban and mercantile centre. It has been suggested that the trade and economy of this settlement had intensified to such an extent by the 8th century that specialist craft workers were able to financially support themselves all year round (Malcolm *et al* 2003, 101).

Dating to between AD 730 and 750, two of these pits contained a considerable amount of worked bone waste, which demonstrates that the residents of the site carried out the manufacture of combs. The growth of such industries is also likely to have stimulated secondary trades, and in the case of the bone-working pits at Bedford Street, large quantities of cattle metapodial bones would have been required from either a butcher or perhaps a tanner. Butchery waste has previously been identified at various *Lundenwic* sites, showing that the required bones could have been easily acquired (Leary *et al* 2004, 42, 106; Malcolm *et al* 2003, 30).

The significant quantities of worked animal bone recovered from the study site are of particular importance, and represent the largest assemblage yet recovered from *Lundenwic*. Although some of this material was redeposited, the bone retrieved from pits [231] and [236] has been identified as waste created during the manufacture of single-sided composite combs. With prefabricates of both handled combs and combs produced with connecting plates present within the assemblage, it was clear that this material was associated with a nearby workshop. Calculations based upon the material recovered suggest that between 65 and 70 combs could have been manufactured from the discarded waste, providing between four and five months work for a single comb maker (see Riddler & Trzaska-Nartowski above).

Both bone working and the manufacture of combs are well attested within *Lundenwic*, and a number of comb manufacturing workshops were recorded during the excavations at the Royal Opera House. These workshops included Building 11, Building 6 and Building 15 (Malcolm *et al* 2003, 36, 41, 46), all of which dated to between the late 7th and early 8th centuries. However, these workshops primarily used antler in the manufacturing process. Therefore the use of bone at Bedford Street represents

an important change in practice, which has been recorded both in England and on the Continent between the late 7th and mid-8th centuries (see Riddler & Trzaska-Nartowski above).

Limited evidence for the manufacture of bone combs has been recovered from *Lundenwic*. Two bone-lined hearths were recorded in association with Building 3 during the Royal Opera House investigations. The bones used to line these mid- to late 7th-century hearths comprised both metacarpals and metatarsals from cattle metapodials (Malcolm *et al* 2003, 24), and clearly draw comparisons with those recovered from the Bedford Street pits. Although these bones may not have been sourced directly from a comb maker, they clearly represented bone-working waste, and further examples of sawn cattle metapodials have also been recorded at the National Portrait Gallery (Leary *et al* 2004, 101). The presence of spindle whorls, loomweights and a pin-beater on site shows evidence of another craft activity. These artefacts are very frequently found within *Lundenwic*, which implies that many households were spinning and weaving cloth probably for their own use (see Sudds & Gaimster above). The presence of some sheep aged over three or four years amongst the faunal material on site may indicate the culling of worn-out ewes and wethers. These mature animals would have been an important source of wool (Table 18), which implies that woollen cloth was being produced. Further evidence of textile production is provided by the discovery of a bone pin-beater used for beating down individual threads in the weft of the cloth during weaving (Fig 18d).

Although no structures or buildings were revealed during the excavations due to the degree of post-medieval disturbance and truncation, the Saxon pits clearly were associated with various proximate and contemporary activities including the disposal of bone-working debris, food waste, faecal material and hearth rake-out debris. For instance, the pits contained significant quantities of animal bones, which is suggestive of a diet comprising primarily beef, pork and mutton. The percentages of the meat yields from these three species were almost identical to those recovered from the Middle Saxon pits discovered nearby at the Peabody Trust site (Table 21). Some evidence for the consumption of fowl and geese was also present, although other than deer antler utilised for bone-working practices no wild species were recorded. Fish consumed included freshwater eel and herring (Table 24). Interestingly, the quality of the meat being consumed on site is indicative of a lifestyle above subsistence level, which as the inhabitants of the site were much more likely to have been 'food consumers' than producers, suggests that they were reasonably prosperous (see Armitage above). The presence of hearths on site can be inferred from the charcoal fragments recovered from the pits. Study of this material revealed that *Quercus* was the most abundant fuel (see Poole above). The presence of sooting on some of the pot sherds confirms that some of these vessels were used for food preparation, while some vessels show evidence of extreme heat contact suggesting that they might have been used in some unidentified industrial process (see Sudds above). The discovery of a residual Rhenish lava rotary quernstone and the presence of charred grains of wheat and barley from three of the Saxon pits attest to both the processing and consumption of cereals on site. Oyster shells were recovered from the upper fill of pit [231], which indicates another food source. While the two iron knife blades found on site would have served as general purpose tools (Fig 21). One clue to the sort of Saxon buildings which may have existed on site is the discovery of a residual iron hinge pivot, which was probably part of a door or shutter (see Gaimster above).

A number of other archaeological investigations have taken place along the length of Bedford Street, and five Middle Saxon rubbish pits were recorded at Nos 21–26 (Cowie 1988, 42). Further possible Saxon pits were also revealed during ground works at numbers 17–19 in 1983 (Cowie 1988, 42). The largest archaeological excavation within the immediate vicinity of the site took place at the Peabody Trust site on the eastern side of Bedfordbury at the junction with Chandos Place in 1987. Work here revealed a number of Middle Saxon wattle and daub structures with an associated yard surface, plus cess and rubbish pits (Whytehead *et al* 1989, 56–8) (Fig 1).

JAMES STREET SAXON SEQUENCE

Phase 2a: Saxon burial ground plus post- and stakehole structures: mid-7th century

The earliest feature encountered in Area 1 was a shallow, irregularly shaped cut which had been excavated directly into the natural brickearth (Fig 22). This feature was backfilled with a clayey silt, which contained human leg bones consisting of a left and a right tibia shaft, four fragments of femur and 14 unidentifiable shaft fragments (Langthorne 2010, 76). Due to the relatively poor state of preservation and incomplete survival of this individual neither their age nor gender could be determined. Clearly this feature was the eastern portion of a supine inhumation burial, the western fraction of which had been removed by a cellar wall. However, enough survived to confirm that the burial was aligned in a south-west to north-east direction. This inhumation is believed to be contemporary with the adult male burial discovered next door at 28–31 James Street (Dodwell 2004), which was dated to the mid-7th century by the presence of a spearhead and belt fittings (Leary *et al* 2004, 6) (Fig 22).

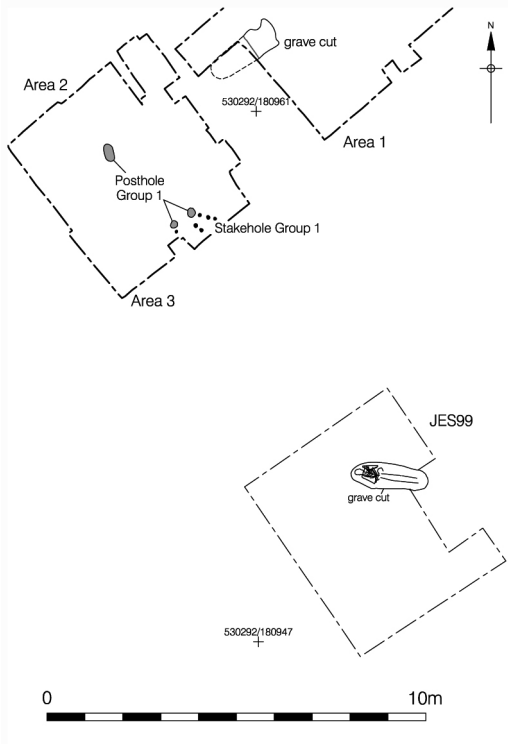

Fig 22. Phase 2a mid-7th-century activity at James Street, also showing the contemporary burial found next door (JES 99)

Further evidence of mid-7th-century activity was recorded in Areas 2 and 3. Three postholes, with diameters up to 0.37m, are interpreted as forming the south-western corner of a square or rectangular-shaped structure (posthole group 1, Fig 22). All of the postholes were cut directly into the brickearth; the timbers had all been withdrawn and then the voids backfilled with deposits of light greyish brown sandy silt.

Located immediately to the south of posthole group 1 were six stakeholes measuring up to 0.10m in diameter and 0.16m in depth (stakehole group 1, Fig 22). Arranged in two rows of three and aligned on a north-west to south-east axis, these features could not be interpreted as forming part of a specific structure. In total, the rows themselves measured 0.60m in length as seen and were spaced at a distance of 0.32m apart.

Phase 2b: Saxon midden, fence line and possible building: mid- to late 7th century

Sealing both posthole group 1 and stakehole group 1 in Areas 2 and 3 was a layer of compact, light yellowish grey, sandy silt up to 0.20m in thickness, interpreted as dumped organic rubbish or midden (not illus). Residual finds from this deposit included burnt and struck prehistoric flints, plus a single sherd of Roman pottery. The struck flints on stylistic grounds can be dated to between the Middle Bronze Age (*c.*1500–1100 BC) and the end of the Iron Age (AD 43) (Bishop 2010, 88).

Cutting into the midden layer and crossing Areas 2 and 3 was a row of ten stakeholes arranged in a north-west to south-east alignment (stakehole group 2, Figs 23–24). Spaced approximately 0.30–0.40m apart, these stakeholes were sub-circular to sub-square in shape, and extended up to 0.17m in diameter and 0.32m in depth. After the withdrawal of the timbers, the voids were backfilled with greyish brown deposits. The linear arrangement of these stakeholes suggests that they formed part of a structure such as a fence line or an animal pen. Situated immediately

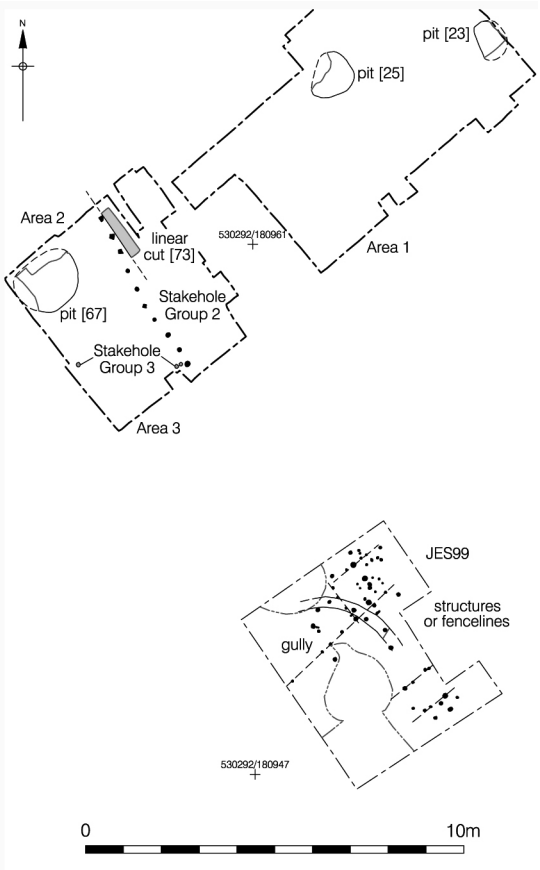

Fig 23. Phase 2b mid- to late 7th-century activity at James Street

to the east of the stakeholes, and similarly aligned, was a shallow linear cut [73], which may represent part of a beamslot, forming the western wall of a building (linear cut, Fig 23). Another three stakeholes had been driven into the midden deposits in Area 3, these were isolated individual features and could not be associated with any specific structures (stakehole group 3, Fig 23).

Three pits were recorded in association with the mid- to late 7th-century phase of occupation, with two of these features ([23] and [25]) located in Area 1 and a further pit ([67]) excavated in Area 2. All three pits had suffered a degree of truncation and none was fully exposed, with the largest example [67] extending 1.40m from north to south, 1.54m from east to west, and 0.78m in depth. Pit [23] was the deepest of the features and measured 0.98m in depth at 19.89m OD. All of these features were recorded as sub-square to sub-circular in shape with vertical sides and flat to concave bases and contained fills comprising dark grey to brown silty clays with inclusions of oyster shell, lumps of redeposited brickearth and patches of cess. Only pit [67] contained more than one fill, with a sterile primary deposit at the base of the feature.

Finds recovered from these pits included small quantities of pottery dated AD 600–750 in the cases of pits [23] and [25], consisting of sherds of chaff-tempered ware with an additional sherd of Mayen-type ware in the former and a sherd of North French greyware in the latter. Pit [67] contained a single sherd of chaff-tempered ware dated AD 400–750. A single sherd of glass was recovered from pit [23] (see glass report). Animal bone and daub were also recovered, and environmental analysis provided evidence of bread wheat and barley seeds. Wood charcoal was represented by cherry, sloe, hornbeam, hazel and oak (Allott *et al* 2010, 91–106). Fig, bramble, raspberry and elder seeds were also recovered from pit [23] together with a loomweight and stone hone, whilst a glass bead was found in the upper fill of [67]. The soft nature of the fills of [67] had resulted in considerable slumping within the subsequent Saxon deposits in Area 2, and almost all of the overlying layers were recorded as dropping towards the north-west corner of the excavation area.

Phase 2c: Saxon: late 7th century

Dumped deposits (Fig 25)

Sealing linear cut [73] and covering Area 2 was a sequence of seven dumped horizons having a total thickness of 0.37m and observed at a highest level of 20.62m OD. Consisting of green to grey-brown mixed deposits of silts, clays, sands and gravels and including one layer of redeposited brickearth and one deposit of compacted chalk, all of these horizons were found to be fairly sterile. Finds recovered from this sequence did, however, include one sherd of chaff-tempered ware dated AD 400–750, two fragments of antler-working waste, a disarticulated human tibia shaft and the femur of a neonate.

Fig 24. Stakehole group 2, Areas 2 and 3, view looking south-west at James Street

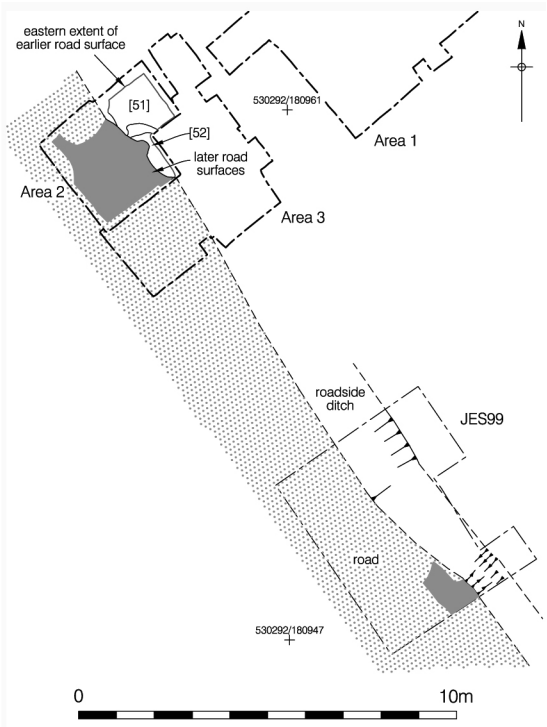

Fig 25. Phase 2c late 7th-century road surfaces found at James Street and during earlier fieldwork (JES 99). Key: light tone postulated extent of road; dark tone actual road metalling

Road surface (Fig 26)

Directly overlying the dumped horizons was a sequence of four red to brown metalled gravel surfaces which were interpreted as forming part of the north-west to south-east aligned road previously identified to the south of the study site during the excavations at 28–31 James Street (JES 99 and JST 02; Leary *et al* 2004, 8). The final two horizons in this sequence suggested that the road had been resurfaced at least twice, although the final resurfacing episode did not extend as far to the east as the earlier horizons. This evidence suggested that the road was either narrowed during the latter period of its use or that the road itself was marginally realigned. Finds recovered from the various deposits included hammerscale and a single sherd of chaff-tempered ware

dating to between AD 400 and 750. As with the underlying dumped horizons, the metalled gravel surfaces were found to be slumping into the mid- to late 7th-century pit [67].

Phase 2d: Saxon: mid-8th to early 9th century

Dumped deposits (Fig 26)

Sealing the road surface were a total of six dumped horizons having a total thickness of 0.63m and recorded at a highest level of 21.49m OD. Described as green to grey-brown deposits of silt and sand and including a layer of redeposited brickearth along with a gravel dump, inclusions within these layers comprised oyster shell, daub and patches of homogeneous 'dark earth'. Individually measuring up to a maximum of 0.34m in thickness, the presence of these dumps suggested that the road had gone out of use by the mid-8th to early 9th century, with this area now being used as a midden. Finds recovered from these deposits included five sherds of Ipswich ware, two sherds of chaff-tempered ware and single sherds of sand-tempered ware and shell-tempered ware, animal bone, eleven fragments of antler-working waste, a loomweight, a copper-alloy rivet and also a copper-alloy disc or possible coin retrieved from the redeposited brickearth layer. Of significance was the presence of iron slag throughout the sequence, suggesting the presence of a proximate smithy as the slag recovered included smith's iron stock/offcuts or waste in the form of hammered out sheet along with smithing hearth bottoms and hammerscale (Keys 2010, 78). Environmental analysis produced evidence of beans, cereal grains, bread wheat, barley and oat, whilst the wood charcoal comprised oak, hazel, privet and beech (Allott *et al* 2010, 91–106).

Phase 2e: Saxon: 9th century

Homogeneous soil — 'dark earth' (Fig 26)

Overlying the dumped horizons was a 0.50m thick, homogeneous deposit of dark grey-

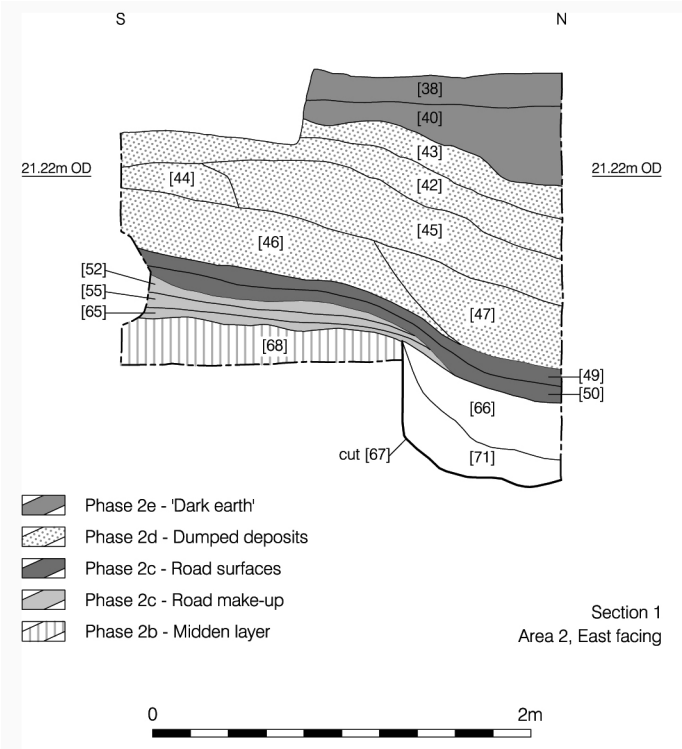

Fig 26. East-facing Section 1 through the Saxon deposits in Area 2 at James Street, this section is located on Fig 4

brown gravel, silt and sand containing oyster shell and charcoal fragments. Recorded at a highest level of 22.10m OD, this horizon was reduced in four separate spits and contained pottery dating to between AD 770 and 850, consisting largely of Ipswich ware with occasional sherds of sand-, shelly- and shelly limestone with organic-tempered wares, Badorf ware and an unsourced imported ware. Further finds recovered included animal bone, daub, Roman CBM, 16 loomweights and iron slag. Environmental analysis provided evidence of charred cereal grains and figs (see specialist reports for details).

SAXON POTTERY FROM JAMES STREET

Berni Sudds

A total of 43 sherds of Middle Saxon pottery were recovered from James Street representing 39 separate vessels. The Saxon pottery was classified and dated according to the framework set up by Lyn Blackmore based upon findings from a number of *Lundenwic* sites (Blackmore 1988b; 1989; 2003b). The assemblage was catalogued using The Museum of London's pottery type codes (see Introduction for details). The fabrics encountered are listed in Table 9 and the pottery is discussed below by provenance and form, followed by a brief consideration of distribution and chronology. The range and proportion of types represented is fairly typical for *Lundenwic* with local chaff-tempered wares and regional Ipswich-type wares occurring most frequently alongside a smaller quantity of other regional fabrics and continental imports (Blackmore 1988b; 1989; 2001; 2003b; Jarrett 2004).

Local wares

Chaff-tempered wares (CHAF; CHFS; CHSF)

The chaff-tempered wares were probably locally produced between the 5th and mid-8th centuries, but in *Lundenwic* are at their most common during the 7th and early 8th centuries (Blackmore 2003b, 230). On an increasing number of sites, including Bedford Street, Maiden Lane and at least one other site in James Street, the sandy variants (CHSF and to a lesser extent CHFS) appear to be more prevalent than the purely organic tempered CHAF fabric (Jarrett 2004a, 14; 2004b 78; see Sudds above). This is in contrast to many of the earlier published assemblages where the CHAF fabric was observed to dominate (Blackmore 1988b, 84; 1989, 73; 2003b, 229–31). It is not clear why this reversal has been identified on certain sites. Perhaps the dominance of one or other of the variants has some spatial or chronological significance.

A total of 11 vessels was recorded but few forms were identified, including jars and a single rounded bowl with a simple rim. As seen elsewhere decoration is limited (Blackmore 1988b, 85; 1989, 74–5). Over half of the vessels demonstrate some form of surface finishing, however, being wiped, smoothed or burnished, but this may simply have been functional (Blackmore 1989, 74–5).

Non-local and regional wares

Ipswich-type ware (IPSF; IPSM; IPSC)

Ipswich-type ware was the first indigenous post-Roman pottery to be produced on a semi-industrial scale and manufactured partially on a wheel or turntable (Hurst 1959; 1976; Blinkhorn 1989; Blackmore 2003b, 234). It was produced at kilns in Ipswich, probably from the early 8th to mid-9th centuries. Ipswich-type ware represents the most commonly identified fabric on site with a minimum of 19 vessels identified. The three sub-fabrics commonly observed across *Lundenwic* were recorded, comprising the fine (IPSF), medium sandy (IPSM), and coarse sandy (IPSC) variants.

Typically the most common form is the jar or cooking pot (Blackmore 1988b; 1989; 2003b; Jarrett 2004). Just one rim was identified, slightly flaring with an external bevel, and two sherds have the characteristic pronounced horizontal grooving to the shoulder. Just over a half of the sherds displayed some form of surface finishing, most commonly burnishing but also smoothing and wiping. A couple of thick-walled sherds from very large storage jars were also identified ([38]; Fig 27, 4). Four vessels contained some form of internal residue, either white or purple in colour or with a waxy composition. As

elsewhere in *Lundenwic* this would suggest that the Ipswich-type ware vessels may have been used for a number of functions including boiling water, food preparation or storage and potentially for the manufacture or storage of vegetable dyes (Blackmore 1988b, 86–7; 1989, 80; Jarrett 2004d, 92).

Quartz- and sand-tempered wares (SSAN)

Sand-tempered wares were evident in *Lundenwic* during the 7th century but appear more frequently from the mid-8th century (Blackmore 2003b, 235). They are never very common, however, and just one possible sand-tempered vessel was recovered from site with a smoothed surface finish. Most of the sand-tempered wares remain as yet unsourced.

Shelly-limestone and organic-tempered ware (MSHLA)

A single wiped body sherd containing shelly-limestone was recovered from layer [36]. This fabric was originally recorded as MSSLA (Blackmore 1989, 84) but has since been recoded as MSHLA to avoid confusion with the shell-tempered wares (Lyn Blackmore pers comm). The presence of ooliths in the limestone might suggest a source to the west of London, somewhere overlying the Jurassic belt (Blackmore 1989, 84).

Shell-tempered ware (MSS; MSSC; MSSE)

Four shell-tempered vessels were identified in the assemblage but no forms could be identified. A source in Kent, or possibly Essex, is perhaps most likely for the majority of the shell-tempered wares in *Lundenwic*, utilising the shell-bearing Woolwich Beds clay (Blackmore 2008a, 181; pers comm). The body sherds are all quite small and fairly crudely finished but their presence is important for dating, appearing from the late 8th century onwards (Blackmore 2003b, 237–8).

Continental imports

Northern French greyware (NFGWD)

One vessel from Northern France was identified in the assemblage, a laminated sherd from a burnished greyware vessel. Reduced burnished wares occur from the earliest phases of activity elsewhere in *Lundenwic*, although it is more difficult to determine when they went out of use (Blackmore 2003b, 239).

Rhenish buff ware (BADO)

A single small body sherd possibly originating from Badorf or Walberberg in the Rhineland of Germany was identified from sample <14>, layer [40]. With no form or decoration to aid with dating, a broad range from *c.*AD 670–850 is possible for this sherd, although as deposited alongside shell-tempered ware, it probably post-dates *c.*AD 770.

Mayen ware (MAYE)

A thin-walled, grooved and burnished oxidised body sherd with a fine sandy fabric containing moderate iron ore was recovered from pit fill [22]. It is possible that the sherd is from a Mayen ware vessel (Lyn Blackmore pers comm) which would be of some importance given the rarity of this type in *Lundenwic* and other Middle Saxon *wic* sites (Blackmore 2003b, 241; Hodges 1981, 19, 84). Mayen is located to the west of the Rhine near Coblenz in Germany, renowned for the mass export of quernstones, but less than five vessels are known from *Lundenwic*. This may be due to the early date of the ware, superseded by Badorf wares after the mid-8th century (Lyn Blackmore pers comm).

Unsourced

A thin-walled pimply sherd containing mica, red quartz sand, organics and white inclusions was retrieved from layer [36]. The sherd cannot be matched to any fabric within the type series but on the basis of manufacturing and firing is likely to be an import.

Distribution and chronology

The Saxon pottery was largely recovered from dump or levelling layers, redeposited brickearth and dark earth deposits. A smaller number of sherds were deposited within the fill of three pits. The earliest deposits (Phases 2b and 2c) contain the North French greyware but also the possible Mayen ware and chaff-tempered wares suggesting a date

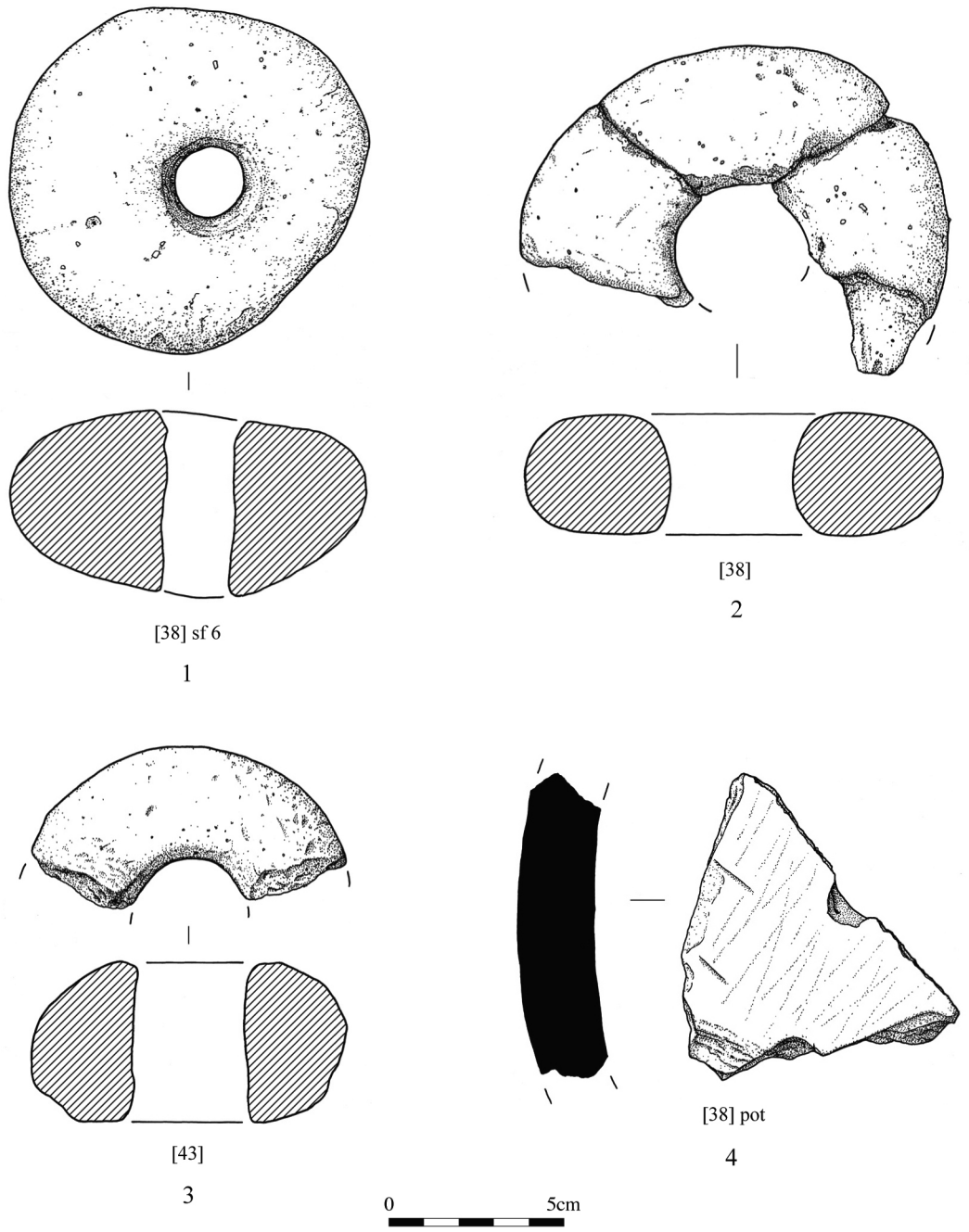

Fig 27. Saxon pottery and loomweights from James Street: (1) bun-shaped loomweight [38] <6>; (2) fragmentary bun-shaped loomweight [38]; (3) fragmentary bun-shaped loomweight [43]; (4) body sherd of Ipswich ware storage jar [38]

pre-*c.*AD 750, or possibly just after (see Sudds above). The occurrence of Ipswich-type ware and shell-tempered wares in Phase 2d deposits indicates deposition post *c.*AD 730 and 770 respectively. Phase 2e deposits also produced these diagnostically later wares and in greater number. In this respect the ceramic chronology is typical of the sequence

seen elsewhere in James Street, and more broadly in *Lundenwic*, first dominated by chaff-tempered wares, followed by Ipswich-type wares, and finally shell-tempered wares (Jarrett 2004a, 18; Lyn Blackmore pers comm).

SAXON GLASS FROM JAMES STREET

Chris Jarrett

A single, small fragment of Saxon glass was recovered from fill [22] of pit [23], <sf 26> (Phase 2b). The glass survives as a simple rim, 112mm in diameter (rim thickness 2.5mm, wall thickness 1mm), folded forwards with no cavity and made in a pale greenish blue glass (with fine bubbles). There are two marvered transparent red trails surviving: one on the rim and the other just below it. The possible form is either a bowl, dated from the end of the 7th century to the third quarter of the 8th century, or a palm cup, dated to the 7th–9th centuries (Stiff 2003, 245–6). Excavations in *Lundenwic*, such as The Peabody site, National Gallery, Jubilee Hall, Maiden Lane and the Royal Opera House, have recovered other glass vessels with either yellow and/or white trailing (Evison 1988; 1989; Stiff 2003), while no drinking forms with red trailing from *Lundenwic* are published to the author's knowledge. A blue-green jar fragment from 55–57 Drury Lane (DRY 99) does have a self-coloured trail containing opaque red streaking (Stiff 2013). At Flixborough, Lincs, two fragments from a vessel base have red streaks in the vivid green-blue glass and additional white and red trails (Evison 2009, fig 2.2, nos 892 and 893).

CERAMIC CRUCIBLE FROM JAMES STREET

Berni Sudds

A small rim sherd from a possible crucible was recovered from dump deposit [47]. The sherd resembles other open form crucibles identified in *Lundenwic*, namely from the Royal Opera House, evidently utilised in non-ferrous metalworking (Blackmore & Dennis 2003, 271–2). The vessel is small and fairly crudely made with a thick body and thin rim. No residue is apparent on the sherd from James Street but the presence of a crucible may suggest that metalworking was taking place in the vicinity.

LOOMWEIGHTS FROM JAMES STREET

Berni Sudds

A total of 17 individual loomweights were identified, comprising 24 separate fragments weighing 3,376g (Table 26). The weight fragments were retrieved from four separate contexts, mostly from the dark earth deposits (Phase 2e), although one was found within pit [23] (Phase 2b). Nearly all are only partially complete with the exception of a single near complete bun-shaped example from layer [38] (Fig 27, 1).

As on most other sites in *Lundenwic* the loomweights from James Street are in original fabrics 1a and 1b (Blackmore 1988c, table 13; Riddler 2004a, 20). However, ongoing analysis has shown that the division between these two sub-groups is difficult to determine and rather arbitrary, therefore they have recently been amalgamated under fabric 1a (Keily 2013, see Bedford Street report).

On the basis of profile three broad form categories have been proposed for Saxon loomweights that, to some extent, reflect method of manufacture and date (see Bedford Street report). Of the 17 weights recovered from James Street eight are intermediate ([38] & [43], Fig 27, 2–3) and four are bun-shaped (Fig 27, 1). The remaining five weights are too small or fragmented to determine form and are classified as non-diagnostic. Although 17 examples were retrieved from the site, the majority are fragmented and at least 12 of these were recovered from the dark earth deposits [38].

METAL AND OTHER SAXON SMALL FINDS FROM JAMES STREET

Märit Gaimster with coin identification by Gareth Williams

Around 15 metal and small finds were retrieved from Saxon (Phase 2) contexts, including a pseudo-coin (sf 7); with the exception of a stone hone, all finds were recovered from Area 2. Four pieces of antler-working waste are discussed separately (see Riddler below). The earliest finds belong to

Table 26. Distribution and quantification of loomweight fragments. Weight (gm); Diameter = best fit using rim chart (mm); Height = maximum value (mm)

Context	SF No.	Sample No.	Form	Number	Weight	Diameter	Height
22	2		Intermediate	1	158	116	35
38			Non-diagnostic	1	129	112	43
38			Intermediate	1	208	96	44
38			Non-diagnostic	1	150	116	48
38		13	Intermediate	1	175	112	60
38		13	Intermediate	3	230	112	35
38		13	Non-diagnostic	1	94	-	-
38		13	Bun-shaped	2	248	-	55
38		13	Bun-shaped	1	169	108	44
38		13	Intermediate	4	95	-	35
38	6		Bun-shaped	1	547	112	50
38	9		Intermediate	1	252	-	50
38	9		Bun-shaped	2	431	112	59
40			Non-diagnostic	1	91	-	-
40			Intermediate	1	118	108	44
40			Non-diagnostic	1	81	-	40
43			Intermediate	1	200	100	47

Phase 2b and include the substantial part of a hone with a characteristic tapering shape, caused by wear on the sides and centre (Fig 28, 1). Like other hones from the London region, it is of sandstone (Blackmore 2008b, 194). A greenish blue, barrel-shaped glass bead, from the secondary fill of pit [67], is characteristic of Brugmann's Phase C (Brugmann 2004, 76, fig 94), dating from the second half of the 7th century and later (Brugmann 2004, 70). A minute compact copper-alloy disc was retrieved from a Phase 2c road surface; this may be a small and illegible 3rd/4th-century Roman coin.

The majority of the metal and small finds came from the possible large midden of Phase 2d. This material contained considerable amounts of slag and other metalworking debris (see Keys below); fragments of both iron (sf 11; sf 18) and copper alloy (sf 19) may represent smithing products or off-cuts, with pieces predominantly in the form of hammered-out sheet. Particularly interesting, from the perspective of nearby metalworking and workshops, is a fine and clearly unused copper-alloy rivet with thickened and probably incomplete head (Fig 28, 2). Rivets made of sections of iron or copper-alloy wire were used to assemble objects, or to fix them onto other material, for example buckle plates or other fittings associated with leather (Leahy 2003, 149–50; *cf* Evans and Loveluck 2009, fig 1.10 nos 136–40). The possible midden also yielded a base-metal pseudo-coin that would have served as a core for a gold- or silver-plated imitation. The design is very unclear, but traces of an inscription around the central design suggest this was intended as an imitation of a Merovingian, rather than Anglo-Saxon coin; it could date somewhere between *c.*AD 580 and 750. Several plated imitations of Merovingian gold tremisses are known from Britain. These are often found pierced for suspension, suggesting such pseudo-coins were intended for personal ornament, reflecting a contemporary fashion for coin-jewellery, rather than as monetary forgeries (Gaimster 2001). However, plated imitations of both gold and silver coins are known from the period without any sign of secondary usage, so forgery is also an option (Gareth Williams pers comm).

The final two finds were recovered from

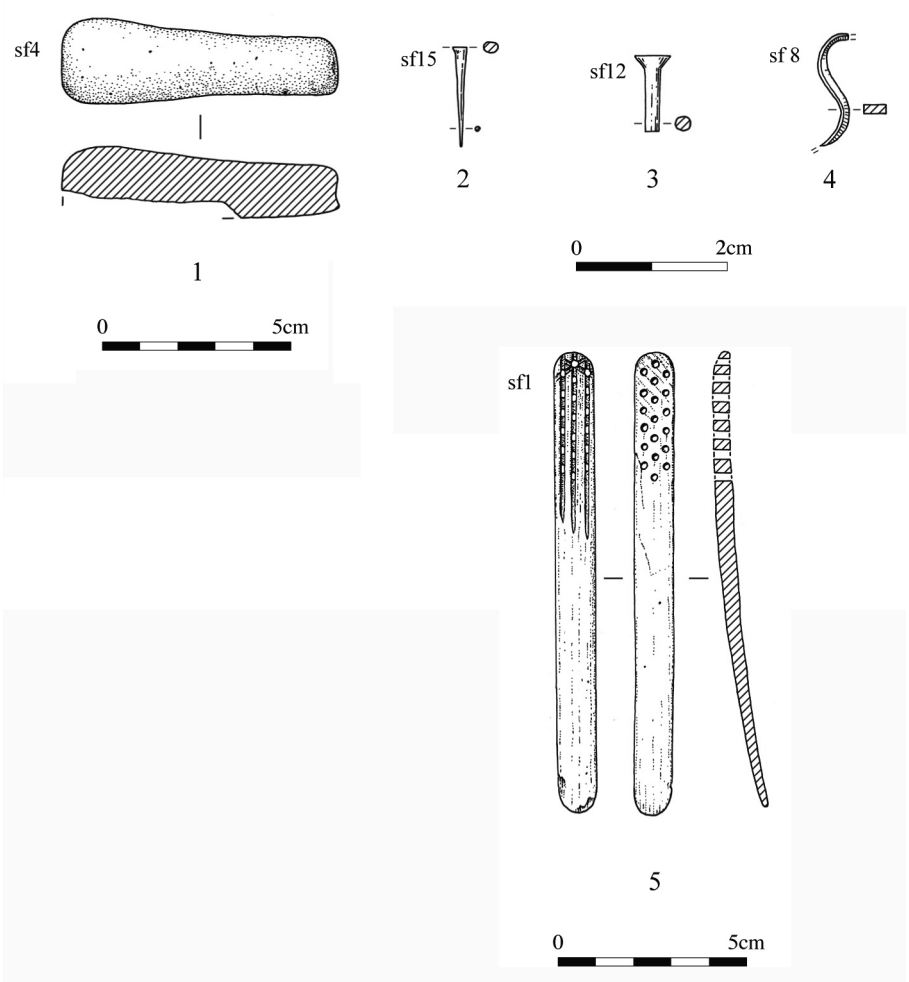

Fig 28. Saxon and later small finds from James Street: (1) sandstone hone, Phase 2b <4>; (2) fine copper-alloy rivet, Phase 2d <15>; (3) fine iron rivet with flat head, Phase 2e <12>; (4) copper-alloy strap or offcut, Phase 2e <8>; (5) post-medieval ivory tooth brush, Phase 3 <1>

the Phase 2e dark earth, again a context associated with residues of metalworking. The finds consist of a fine iron rivet with a flat head (Fig 28, 3) and a fine S-shaped strap of copper alloy (Fig 28, 4), Here, too, the finds may be associated with workshops and metalworking waste.

Finds catalogue

Context [22]: Area 1; fill of pit [23]; Phase 2b; pot date AD 600–750

Sf 4: stone hone of bonded mica greensand (source: The Weald); substantial wear on sides and centre; L 73mm; W 20mm (Fig 28, 1).

Context [66]: Area 2; secondary fill of pit [67]; Phase 2b; pot date AD 600–750

Sf 5: complete wound glass bead; greenish-blue and barrel-shaped; ht 5mm; diam 7mm.

Context [50]: Area 2; road surface; Phase 2c; pot date n/a

Sf 16: compact copper-alloy coin/disc; illegible; diam 7mm; from sample 21.

Context [43]: Area 2; redeposited brickearth; Phase 2d; pot date n/a

Sf 7: base-metal pseudo-coin, probably intended as the core for a gold- or silver-plated imitation; the design is too indistinct to ascertain exactly what coin type this is imitating, but traces of an inscription around

the central design look more typically Merovingian than Anglo-Saxon in character, although it would also broadly match a small group of Anglo-Saxon types; wt 0.49g. Date: *c.* AD 580–750.

Context [45]: Area 2; dump/levelling layer; Phase 2d; pot date n/a

Sf 15: copper-alloy rivet; pointed end and thickened head; L 12mm; gauge 0.9mm; from sample 17 (Fig 28, 2).

Context [46]: Area 2; dump/levelling layer; Phase 2d; pot date n/a

Sf 11: four corroded pieces of iron; possibly smithing waste.

Sf 18: ten corroded pieces of iron sheet; possibly smithing waste.

Sf 19: two corroded pieces of copper-alloy sheet; possibly smithing waste.

Context [38]: Area 2; ploughsoil/dark earth; Phase 2e; pot date AD 730–850

Sf 8: fine S-shaped copper-alloy strap with pointed ends; ?offcut; W 2mm; L 12mm (Fig 28, 4).

Context [40]: Area 2; ploughsoil/dark earth; Phase 2e; pot date AD 730–850

Sf 12: iron rivet with flat head; incomplete; L 11mm; gauge 2.4mm; from sample 14 (Fig 28, 3).

SAXON ANTLER- AND BONE-WORKING WASTE FROM JAMES STREET

Ian Riddler and Nicola Trzaska–Nartowski

The waste material

16 fragments of antler, weighing 282.5g, were retrieved from six separate contexts, and a small piece of worked bone, weighing 0.7g, was also found in one of these contexts. One fragment of antler came from a post-medieval context but the remainder were concentrated in Middle Saxon dump deposits of Phases 2c–2e. Two fragments of antler came from a deposit of Phase 2c, eleven from three contexts of Phase 2d, and two from a 'dark earth' deposit of Phase 2e (Tables 27–28). No burrs were present in the assemblage, or any sections from the crown area of the antler. All of the waste may derive from a single red deer antler but two pieces of beam of noticeably small diameter contrast with the remainder of the assemblage and suggest that it stems from at least two separate antlers, one larger than the other.

The dissemination of the antler waste across three Middle Saxon phases indicates that several production episodes may be represented. The earliest pieces, from Phase 2c, include a beam/tine quadrant and an unfinished tooth segment from a composite comb. Both fragments derive from secondary stages in the manufacture of antler combs. In contrast, the two tine ends from Phase 2e, the latest Middle Saxon phase, were sawn away during the initial dismemberment of the antler; both are lightly gnawed (Fig 29, a). Ten fragments of antler and another unfinished tooth segment came from dump deposits of Phase 2d and the small fragment of worked bone accompanied this antler assemblage. The antler waste includes two sections of beam from a relatively small antler, again representing the initial stage in dismemberment, when the beam is separated from the burr, crown and tines. The majority of the waste, however, stems from at least one

Table 27. Antler- and bone-working waste from James Street

Context	Phase	Antler	Bone	Unfinished Tooth Segments:			Total:
				Bone	Bone or Antler	Antler	
55	2c	1				1	2
42	2d	5	1			1	7
44	2d	4					4
45	2d	1					1
34	2e	2					2
33	3	1					1
		13	2			2	17

A

B

C

Fig 29. Examples of antler working from James Street: (a) antler discarded during the initial stages of dismemberment; (b) waste from the secondary stages of working; (c) unfinished tooth segments for composite combs (Scales in cm)

larger antler and comes from later stages in object manufacture. These secondary stages in antler working are characterised by quadrants cut from beam/tine junctions, as well as cortile tissue and sections of surface tissue sawn from the beam or tines and discarded in the course of shaping the components of combs (Fig 29, b). One offcut has been sawn from the upper part of the beam, near to the crown, and there are also two junctions of beam and tine, both of which have been quadranted. In each case the area of the beam around a tine has been sawn away and then split axially to separate it into three or four segments. The flatter pieces of outer surface have been removed for further working, whilst the junctions with the tines have been discarded. Two further fragments of waste are sections from tines split in half as the raw material for the connecting plates of composite combs. Both pieces have been discarded during the early stages of trimming these plates to shape. Alongside the unfinished antler tooth segment, there is also a fragment of comb manufacturing waste. The antler waste from Phase 2d is thus centred on comb production and consists both of waste discarded whilst trimming the

material to shape and an unfinished tooth segment and comb manufacturing waste from a slightly later stage in the process. All of the waste has been cleanly sawn and one fragment has a saw trace 1.0mm in width. There is little evidence for the use of other tools, although parts of the surfaces of one offcut from Phase 2d have been smoothed with the aid of a knife or draw knife. The only piece of worked bone is a small fragment of cattle-sized animal rib from a Phase 2d context, trimmed by knife to a rectangular shape.

Antler and bone working

The sixteen fragments of antler and single piece of worked bone can be compared, in the first instance, with an assemblage of a similar size from the site lying immediately to the south on James Street (Armitage 2004a, 34). Eighteen fragments of antler from that site were spread across three Middle Saxon phases, but the waste was largely recovered from the fills of pits and ditches, rather than dump deposits. It differs in character from this assemblage, with a greater emphasis on initial dismemberment. The waste includes three burrs, one crown and ten fragments of tines, but only one beam/tine junction (Armitage 2004a, table 12). In the same way, the assemblage of 22 fragments of antler from Exeter Street also consists largely of tines, burrs and crowns, and also represents initial dismemberment, with just a few fragments from the next stage in comb manufacture (Riddler 2004c, 56–8). The smaller assemblage of thirteen fragments of antler from Bedford Street is also dominated by fragments discarded in the initial stage of working, as is the assemblage from Maiden Lane (discussed earlier; Blackmore 1988a, 138).

The two unfinished antler tooth segments from James Street have been trimmed to shape but have not been tapered in section or riveted (Fig 29, c). One of them represents an end piece sawn from a rectangular strip of antler and is an equivalent to the fragment of comb manufacturing waste, which was also sawn away during the shaping processes of the tooth segments. Similar unfinished fragments of combs are also recorded from Exeter Street, as well as Maiden Lane and the Royal Opera House (Riddler 2004c, 58; Blackmore 1988a, 137; Malcolm *et al* 2003, 174, 302, tables 67–68). Unfinished tooth segments from Bedford Street are largely made of bone, rather than antler, and include one fragment of whale bone (discussed earlier).

Blackmore (2002, 289) has argued for a possible concentration of antler and bone working in the eastern part of *Lundenwic*. With the exception of one assemblage from Bedford Street, the emphasis of the waste from *Lundenwic* lies firmly with antler working. It would be wrong, however, to regard the antler worker as entirely separate from the bone worker and as an itinerant specialising in comb manufacture (MacGregor 1989, 109–10; Blackmore 1988a, 134). The single piece of worked bone from this excavation was found in the same context as the antler waste. At the National Portrait Gallery several fragments of worked bone were discovered, but in contexts separate from the antler (Riddler 2004e, 101). Building 3 at the Royal Opera House included 25 distal metapodial bones pressed into the floor to serve as a

Table 28. The antler waste from James Street

Context	Phase	Beam	Tines	Beam/Tine Junctions	Cortile Tissue	Shavings	Prefabricates	CMW	Context Total
55	2c			1			1		2
42	2d	2		2		1	1		6
44	2d				1	2		1	4
45	2d		1						1
34	2e		2						2
33	3		1						1
		2	4	3	1	3	2	1	16

kerb for a hearth (Malcolm *et al* 2003, 23–4, fig 16). This building was subsequently used as an antler workshop and a smithy. Although this represents only a small amount of worked bone waste, *Lundenwic* follows an established pattern in terms of the relative quantities of its antler and bone objects. The overall assemblage is dominated by combs (Riddler 2004f, 146–8) but also includes appreciable quantities of textile manufacturing implements, notably spindle whorls, needles and pin-beaters. Whilst some of these objects were made from antler, the majority were produced from bone, and they were almost certainly made by the same craftsman, who worked with antler, bone and horn (Riddler 2004f, 146; Riddler & Trzaska-Nartowski 2011, 124, 129–30).

The dominance of antler waste over worked bone and the appearance of the latter in just a few select assemblages are characteristics that *Lundenwic* shares with Middle Saxon Ipswich. Worked bone there is almost entirely confined to one site at the Buttermarket, where it was worked alongside antler and used largely in the manufacture of handled combs. Contemporary sites elsewhere in the settlement have merely provided antler waste (Riddler *et al* forthcoming b). At *Hamwic*, in contrast, worked bone is as common as antler and is sometimes present in greater quantities, as seen also at Bedford Street in *Lundenwic* (see above). Assemblages dominated by antler at *Hamwic* tend to be confined to its later, 9th-century phases (Riddler & Trzaska-Nartowski forthcoming a). These differences in the relative proportions of worked bone and antler between the settlements are partly a reflection of problems in the supply of antler to *Hamwic*, particularly in the 8th century. Ipswich, *Lundenwic* and York appear to have been able to obtain copious supplies of red deer antler throughout the Middle Saxon period, but *Hamwic* did not. The occurrence of antler waste across three Middle Saxon phases emphasises the continuity in the location of the craft, which has been noted previously (Riddler 2004f, 145). Antler and bone waste is concentrated in particular areas of each settlement and the craft continues in that location across generations, and even centuries.

IRON SLAG AND RELATED HIGH-TEMPERATURE DEBRIS FROM JAMES STREET

Lynne Keys

An assemblage of iron slag weighing 15.2kg was recovered by hand and from soil samples taken on site (Tables 29–30). The debris had been produced by secondary smithing, the hot working (using a hammer) of one or more pieces of iron to create or to repair an object. As well as bulk (larger) slags, including the smithing hearth bottom (a plano-convex slag cake which builds up in the hearth base during smithing), smithing generates tiny micro-slags; all these slag types were recovered at James Street.

Table 29. Smithing hearth bottoms: statistical data from James Street (11 complete examples)

	range (g/mm)	aver.	std. dev.
weight	181 - 810	496	242
length	80 - 150	110	19
breadth	65 - 130	90	21
depth	40 - 65	50	10

Methodology

The slag assemblage was examined by eye and categorised on the basis of morphology and colour. Each slag or other material type in each context was weighed except for smithing hearth bottoms, which were individually weighed and measured for statistical purposes. During quantification a magnet was run through soil adhering to slags and thus some hammerscale was detected. Quantification data and details are given in the slag table for the site in which weight (wt) is shown in grammes, and length (len), breadth (br) and depth (dp) in millimetres (Table 30).

Discussion of the slag assemblage

As well as bulk slags, including the smithing hearth bottom, smithing generates micro-slags. Fifteen smithing hearth bottoms and significant quantities (at least 2,205g) of micro-slags (hammerscale flakes and smithing spheres) were present in deposits

Table 30. Quantification table for the iron slag and related debris from James Street

cxt	< >	slag identification	wt.	len.	br.	dp.	comment
24	1	sample	4				fired clay & undiagnostic
34	4	sample	22				lots hammerscale flake & spheres, fired clay & fired small grit
34	4	sample	14				Micro-slag runs, undiagnostic, burnt tiny flint fragments
36	5	sample	17				hammerscale spheres & flake, tiny iron pieces, minute pieces fired grit, tiny undiagnostic
38	13	sample	59				lots hammerscale flake & spheres, fired clay & fired small grit
38		ferruginous concretion	112				includes flake hammerscale from an occupation surface
38		magnetic sample	17				includes tiniest amount of broken flake
40	14	burnt bone	5				
40	14	fired clay	16				
40	14	sample	42				lots hammerscale flake, some spheres, fired clay & fired small grit
40	14	undiagnostic	0.5				half large micro-slag globule
40	14	undiagnostic	79				
42	16	sample	9				broken hammerscale flake & spheres & fired clay
42	16	sample	23				tiny undiagnostic & cinder
42		ferruginous concretion	80				
42		hammerscale	0				only tiny amount very broken flake
42		smithing hearth bottom	343	105	75	60	
42		smithing hearth bottom	432	105	80	55	
42		smithing hearth bottom	129	65	60+	30	incomplete
42		smithing hearth bottom	219	105	70+	35	incomplete
42		smithing hearth bottom	742	130	80	60	
42		undiagnostic	783				
43	15	sample	12				hammerscale flake & spheres, tiny undiagnostic, magnetised pea grit
44	18	sample	106				fuel ash slag, tiny undiagnostic, cinder
44		fuel ash slag	42				
44		hammerscale	0				tiny amount of broken flake
44		slag runs	196				
44		smithing hearth bottom	181	90	70	40	
44		smithing hearth bottom	777	110	110	60	
44		smithing hearth bottom	511	115	100	50	
44		smithing hearth bottom	205	90	70	30	incomplete
44		smithing hearth bottom	295	110	70	40	
44		smithing hearth bottom	397	100	95	40	
44		smithing hearth bottom	774	120	110	65	
44		soil sample	44				small pieces vitrified hearth lining, undiagnostic, charcoal

cxt	< >	slag identification	wt.	len.	br.	dp.	comment
44		undiagnostic	378				part of smithing hearth bottom?
44		undiagnostic	1377				
44		undiagnostic	493				part of smithing hearth bottom?
44		vitrified hearth lining	382				
45	17	cinder	54				
45	17	fuel ash slag	20				
45	17	sample	98				
45	17	sample	16				undiagnostic, cinder, fired pea grit
45	17	undiagnostic	136				
45		undiagnostic	262				
46	19	copper alloy	5				object
46	19	ferruginous concretion	168				
46	19	iron	81				smith's stock or smithing off-cuts (14)
46	19	iron flake	1				
46	19	iron-rich undiagnostic`	43				
46	19	magnetised material	291				
46	19	sample	5				
46	19	sample	285				tiny undiagnostic, cinder, fuel ash slag, burnt tiny clay, tiny hammerscale spheres & broken flake
46	19	sample	190				hammerscale spheres & some broken flake, iron shavings, tiny fired clay pieces
46		hammerscale	6				flake & tiny spheres
46		smithing hearth bottom	290	100	65	35	incomplete
47	6	charcoal	1				
47	6	cinder	75				
47	6	ferruginous concretion	11				
47	6	fuel ash slag	67				
47	6	hammerscale	10				concreted mass of flake
47	6	hammerscale	11				spheres & occasional large thick flakes
47	6	magnetised material	1127				mostly hammerscale spheres (all sizes) & broken flake (thick & thin); very tiny undiagnostic, charcoal, micro-slags
47	6	sample	837				very tiny undiagnostic, fuel ash slag, cinder, hammerscale spheres & broken flake, fired clay *etc*
47	6	undiagnostic	637				
47		smithing hearth bottom	810	150	130	40	
47		smithing hearth bottom	193	80	65	40	
47		undiagnostic	79				
50	21	sample	1				fired pea grit, tiny fragments hammerscale flake, undiagnostic
52	22	sample	1				some broken hammerscale flake, iron shavings, fired clay
54	7	sample	4				only rarely broken hammerscale flake

cxt	< >	slag identification	wt.	len.	br.	dp.	comment
56	8	fired clay	0.5				
56	8	sample	0				no hammerscale or other slags
62	10	sample	1				fired clay & pea grit
68	23	fuel ash slag	1				
68	23	sample	1				fired clay & grit, very occ. broken hammerscale flake
71	25	clay concretions	8				from around root voids; discarded
77	10	soil sample	0.5				few fragments broken flake

total wt. = 15.2kg

mainly associated with the road in Area 2. The flakes indicate ordinary hot working of a piece of iron (making or repairing an object), while the spheres are indicative of high temperature welding to join or fuse two pieces of iron. Hammerscale in any quantity in layers — particularly within a building — is the best indicator that smithing could have taken place there, but if large quantities are found in external deposits with bulk slags, the smithy which produced the slag is usually somewhere nearby; the more the bulk slags are moved, the less hammerscale is likely to remain with them.

Other finds which provide support for smithing are iron objects in the form of unfinished objects, waste pieces and/or iron objects with hammerscale from smithing still adhering. Fourteen small pieces of flat iron were found amongst the slag from layer [46]; they are probably smithing offcuts or pre-prepared iron pieces ('smith's stock'), the latter kept to hand for speedy manufacture of regularly requested objects. Ten of the pieces were flat and rectangular; the other four were corroded and not identifiable when removed from amongst the slag.

Discussion of the slag by phase

Although iron slag is concentrated in Area 2 the quantity is not significant until Phase 2c, suggesting a smithy began to operate about that time.

Phase 2c

The quantities of slag, consisting of tiny pieces and a few occasional micro-slags, are small. There was probably no intentional disposal of slag in Area 2 at this time.

Phase 2d

At this stage dumping of slag in some quantity begins with layer [46]. Large quantities of smithing micro-slags and 14 pieces of iron were deposited; however only one (incomplete) smithing hearth bottom was present. The quantity of hammerscale and spheres indicates that the slag probably came from a smithy nearby, possibly to the south of the site.

Layer [44], which impinges on the southern end of the road, was then deposited. Among the material were seven (most of them intact) smithing hearth bottoms and another possible incomplete example; significant quantities of vitrified hearth lining, which could be from a domestic or industrial hearth were also disposed of in this dumping. All of this would have impeded access along the road. Layer [47] contained two smithing hearth bottoms and some small lumps of concreted smithing micro-slags, probably smithing pan scraped up from the floor of a smithy. Dumped deposit [45] contains large quantities of hammerscale flake and spheres but quantities of other material are small. Layer [42] contained five smithing hearth bottoms but little in the way of micro-slags. Re-deposited brickearth [43], however, contains a tiny quantity of micro-slags, but very little else — as one might expect from such a deposit.

At 28–31 James Street (JES 99), next door, a significant number of smithing hearth bottoms (22 in pit [253] and 8 in pit [258])

and other slags were deposited during Phase 6 (mid-8th to early 9th centuries) (Keys 2004, 27). This ties in nicely with the deposition of iron slag at 27 James Street and suggests, as was thought at the time of the excavation at 28–31 James Street, that the road which ran across both sites was no longer in use from about the middle of the 8th century and was therefore used for dumping waste.

Phase 2e

From the 'dark earth', noticeable quantities of micro-slags were recovered from layers [40], [38] and [34]. In [38] the hammerscale flakes that constituted the bulk of the ferruginous concretion were so numerous that they may have been part of a smithy floor deposit.

ANIMAL BONES FROM JAMES STREET

Kevin Rielly

Introduction and methodology

Animal bones recovered from the Saxon and post-medieval deposits amounted to a hand-collected total of 2,164 fragments and a further 3,257 from 19 'whole earth' samples, each 40 litres in volume. The fish bones taken from these samples are described separately (see Armitage below).

The sample collections were washed through a modified Siraf tank using a 1mm mesh and the subsequent residues were air dried and sorted. The collections recovered by hand as well as by sieving were well preserved and minimally fragmented. However, refitting was carried out where required; the refitted bones counted as one fragment. Each bone or refitted fragment (excluding the fishbones) was then recorded onto an animal bone database using Microsoft Access. This database is divided into various headings, as follows: species, skeletal part, fragmentation (the proportion of the skeletal part represented), sex, age (a general age if possible, as well as teeth eruption/wear and epiphyses fusion), size, various modifications such as butchery, burning and gnawing, preservation (as noted above), working and pathology. Species could not be assigned to all the bones in these collections. This unidentifiable portion would be recorded according to size class, generally to cattle and sheep-size; these included ribs, fragments of longbone shaft and the majority of the vertebrae. Tooth eruption/wear recording uses the method devised by Grant (1982), while the measurements are essentially taken from von den Driesch (1976). Measurable bones essentially include the majority that can be classed as deriving from an adult individual. This includes complete limb bones, mandibles where the adult third molar is in wear, and various limb bones with fused intermediate and/or late epiphyses, *eg* distal tibia and proximal femur respectively.

In the analysis of the bones, quantification is based on total fragment as well as epiphysis only counts. The latter method sums the number of limb bone articular ends (whole bones, with the exception of phalanges are counted twice) alongside the minimum number of mandibles and skulls (divided into maxilla and orbit/cranium) based on non-repeatable characteristics (*eg* the number of third molars). The tooth eruption and epiphyses fusion sequences use the approximate ages shown in Schmid (1972, 75, 77) and Amorosi (1989, 98, 99). Analysis and interpretation were facilitated by dividing the data from each method into succinct age groups, based on the eruption and fusion of certain teeth and the fusion of certain groups of limb bone articular ends (Tables 36 and 38). It was also possible to allocate the majority of the mandibles to certain broad age groups (Table 37), using 'real' ages (Table 36 data) as well as 'extrapolated' ages based on knowledge of the eruption and wear sequence.

Period and phase distribution

Middle Saxon (Phase 2)

The faunal material was recovered from Areas 1 and 2, the former entirely from pits [23] and [25] and the latter mainly from a number of dump layers (including the road surfaces), with the exception of the fills of pit [67], below a relatively deep deposit of 'dark earth' (Table 31).

Throughout these deposits, the identifiable bones are invariably composed of cattle, sheep/goat and pig with a minor component of poultry and, from the

Table 31. Distribution of Phase 2 (Middle Saxon) bones from James Street by area and feature type showing hand-collected and sieved (in brackets) total fragment counts

Feature	Area 1	Area 2
pit	703(522)	45(330)
dump		686(1083)
road		49(236)
dark earth		601(1081)
All	703(522)	1381(2730)

samples, a reasonable proportion of fish (Table 32; Bedford Street reports). The non-food element consisted of one bone each of dog and cat, recovered from pit [67] and 'dark earth' deposit [33] respectively. The dog tibia represents a relatively large animal, measuring about 556mm at the shoulder (after Harcourt 1974). The deer bones can also be included in this category, comprising a wide distribution of worked antler fragments. All of these could be identified as red deer with the exception of a single roe deer antler. In contrast to the other antler fragments, which tended to be sawn beam or tine pieces, the roe deer example was relatively complete. The presence of three points suggests it was from an animal about three years old (Page 1971).

There is a notable variation in the rep-

Table 32. Total fragment counts of Saxon and post-medieval species represented in the phased hand and sieved collections from James Street (see Armitage below for further information on the fish bones)

Collection:	Hand			Sieved	
Phase:	2 (pre DE)	2 (DE)	3	2 (pre DE)	2 (DE)
Species					
Cattle	327	110	13	60	15
Cattle-size	481	154	21		
Sheep/Goat	82	93	15	48	28
Sheep	40	55	3		
Goat	2				
Pig	257	57	11	66	15
Sheep-size	256	123	10		
Red deer	8	2	1		
Roe deer	1				
Dog	1				
Cat		1	1		
Small mammal			1		
Unidentfied mammal				1840	902
Hare					1
Mouse				1	
Chicken	15	5	2	9	4
Goose	11	3		6	2
Goose size	1				
Mallard		1			
Identified fish				53	93
Unidentified fish				34	
Amphibian				60	21
Total	**1483**	**604**	**78**	**2171**	**1081**

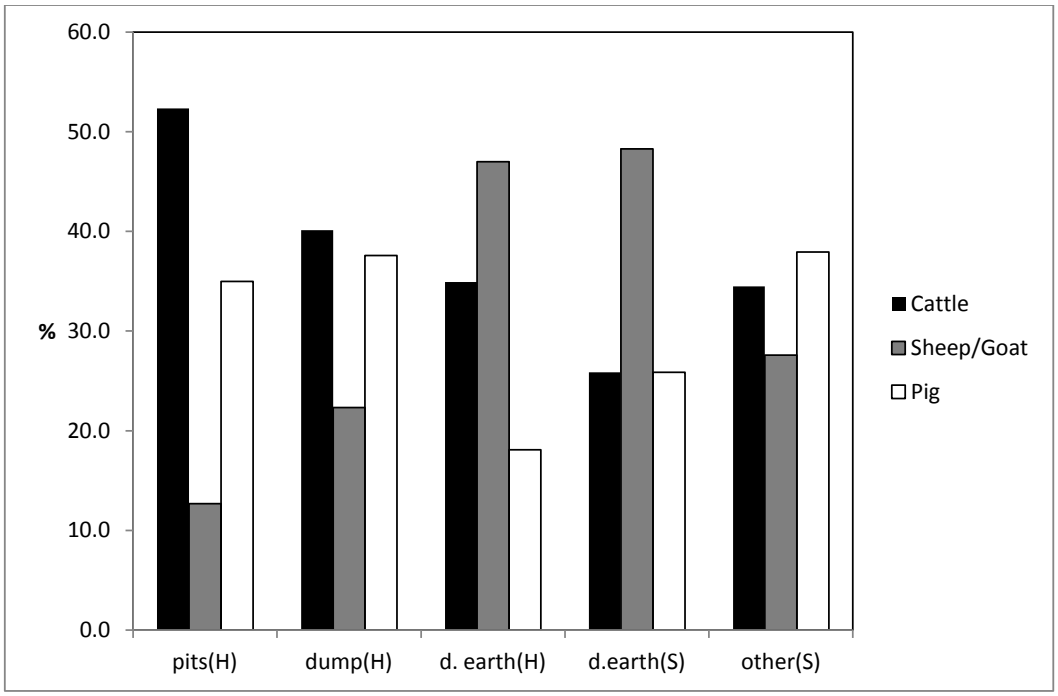

Fig 30. Percentage representation of Saxon major domesticates by feature type, where H is hand collected and S is sieved (data taken from Table 9)

resentation of the major domesticates within the main feature types (Table 33; Fig 30). The variation is particularly noticeable between the pit and 'dark earth' assemblages, with a clear change in numerical dominance from cattle and pig to sheep. The dump levels show less cattle, compared to the pit collections, but are generally closer in character to the pit rather than the 'dark earth' distribution pattern. These latter deposits are clearly the latest in the Saxon stratigraphic sequence and thus the noted differences in species abundance could represent a temporal change. Comparisons of the earlier (combined pit and dump levels) and later ('dark earth') assemblages, using the hand-collected and sieved data, clearly show this rise in sheep/goat, with

Table 33. Counts of major domesticates within Phase 2 deposits at James Street

Phase	**2**	**2**	**2**	**2**	**3**
Feature	**All**	**pit**	**dump**	**dark earth**	**All**
Hand collected					
Cattle	437	169	142	110	13
Sheep/Goat	175	30	51	93	15
Sheep	95	11	26	55	3
Goat	2		2		
Pig	314	113	133	57	11
Sieved					
Cattle	75	22	26	15	
Sheep/Goat	76	13	28	28	
Pig	81	26	33	15	

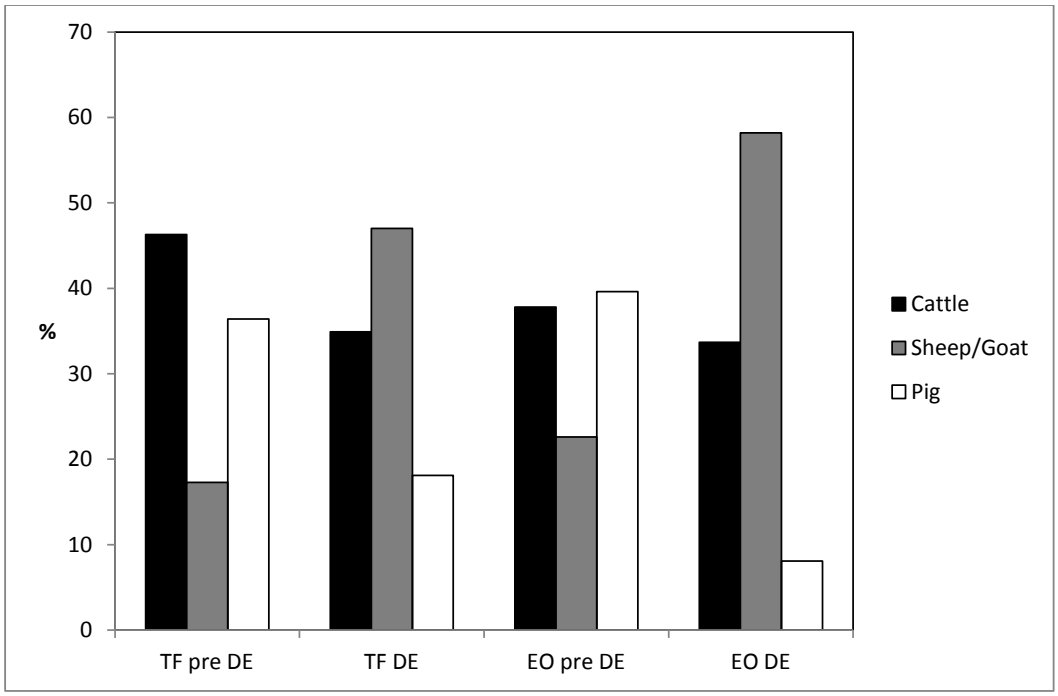

Fig 31. Percentage abundance of cattle, sheep/goat and pig within the hand-collected Saxon faunal assemblage from James Street using Total fragment count (TF) and Epiphysis only (EO) methods, where DE is dark earth (data taken from Table 10)

the application of a weighted quantitative method (see Methodology) highlighting this change as well as a major decrease in pig abundance (Table 34; Figs 30–31). This division between the 'dark earth' and earlier deposit assemblages forms the basis of all further comparisons in this report.

There was a general mix of skeletal parts throughout the major domesticate assemblages, showing that the various features and dumps comprised both processing and food waste. However, there was a general under-representation of cattle horncores, perhaps suggesting that a proportion had been removed for industrial purposes, *ie* horn working. Assuming that the horn worker required suitably aged and sizeable cores, it is interesting that five out of the thirteen horncores in this collection were juvenile and all but one of the remainder was large (size

Table 34. Percentage abundance of major domesticates in Phase 2, James Street using total fragment (TF) and epiphyses only (EO) counts, where N is the sum of cattle, sheep/goat and pig bones from that phase and % equals sum of individual species/N x 100. See text for an explanation of the epiphysis only count

Method	Phase	Cattle	Sheep/Goat	Pig	N
		%	%	%	
TF	Pre-Dark Earth (DE)	46.3	17.3	36.4	706
	DE	34.9	47.0	18.1	315
EO	Pre-DE	37.8	22.6	39.6	399.3
	DE	33.7	58.2	8.1	195.9

Table 35. The number and proportion of young major domesticate bones from James Street, identified on the basis of teeth, epiphysis fusion and size/ porosity evidence

Species	Age group	pre DE		DE	
		N	%	N	%
Pig	Foetal/Neonate	1	0.4		
	Infant	1	0.4		
	Juvenile	22	8.6	5	8.8
Cattle	Infant	2	0.6	1	0.9
	Juvenile	19	5.8	10	9.1
Sheep/Goat	Infant			2	1.4
	Juvenile	12	9.8	7	4.7

distinctions following Armitage & Clutton-Brock 1976; and age after Armitage 1982b). A notable collection of large cattle horncores, probably representing horn-working waste, generally dated to the Middle Saxon period was found at the Royal Opera House (Malcolm *et al* 2003, 184; Rielly 2003, 323–4).

Butchery marks were noticed throughout these collections, bones with cut marks accounting for 13% of the Saxon cattle assemblage, 9.6% of the sheep and just 3.5% of the pig. While cuts representing most aspects of the butchery process were evident, especially amongst the cattle bones, the most frequent cuts were those involving the splitting of the limb bones, no doubt to facilitate removal of the marrow. The most common elements with such butchery, within the cattle and sheep/goat collections, tended to be the metapodials.

While it can be assumed that a large proportion of these domesticates were imported, there were a few very young individuals (Table 35) which could represent either infant mortalities or at least the ready availability of very choice young meats, both probably indicative of local production. There appears to be no clear difference between the level of production shown by the earlier and later, *ie* 'dark earth', levels, although this may relate to the rather small dataset. However, differences in the proportions of both the juvenile (older 1st year animals) and adult (generally 3rd year and older) age groups may suggest some alteration of exploitation patterns. The data in Table 35, highlighted in Table 34 (based on the proportion of fused early epiphyses), show a greater proportion of juvenile cattle and a lesser proportion of juvenile sheep and pigs in the 'dark earth' deposits.

Referring to the older age groups, it is clear that both cattle and sheep are well represented by adult individuals (age groups 4 and 5 in Table 36 and the proportion of fused intermediate epiphyses in Table 38),

*Table 36. Age distribution of cattle, sheep/ goat and pig mandibles based on tooth eruption and wear at James Street, as follows: Age Group (AG) 1. M1 unw, 2. M1w/ M2unw, 3. M2w/ M3unw, 4. M3 early wear and 5. M3 late wear, with M3 greater or equal to wear state 12 (cattle and sheep/ goat) and wear state 9 (pig). **M** is adult molar, **w** is worn, **unw** unworn and wear states after Grant (1982)*

Phase	Species	AG				
		1	2	3	4	5
Phase 2 (pre-dark earth)	Cattle	1		2	6	2
	Sheep/Goat		1	5	5	3
	Pig	1	2	9	3	5
Phase 2 (dark earth)	Cattle			2	2	2
	Sheep/Goat		2	4	4	2
	Pig			1		

*Table 37. Age distribution of cattle, sheep/ goat and pig mandibles based on three Age Groups (AG), using real and extrapolated data from James Street, as follows: Juvenile (J) M2 unw, Sub-adult (SA) M2w/ M3w and Adult (A) M3w, where **M** is adult molar, **w** is worn and **unw** unworn (see text for details)*

Phase	Species	AG		
		J	SA	A
Phase 2 (pre-dark earth)	Cattle	2	7	22
	Sheep/Goat	1	4	9
	Pig	2	14	13
Phase 2 (dark earth)	Cattle		4	10
	Sheep/Goat	1	5	9
	Pig		1	

*Table 38. Epiphysis fusion evidence for the major domesticates at James Street, dividing the articular ends according to age of fusion, as follows: Early – scapula P, humerus D, radius P, pelvis acetabulum and 1st phalange P; Intermediate – metapodial D and tibia D; Late – humerus P, ulna P, radius D, femur P and D, tibia P and calcaneus P; and all cattle-size vertebrae, based on the anterior and posterior fusion of the centrum, where **P** is proximal and **D** is distal. **N** is the number of articular ends and %F equals the number of fused ends/ N x 100. Ages after Schmid 1972, 75*

Species	Age Group	Age (yrs)	Phase			
			2 (pre-DE)		2 (DE)	
			N	%F	N	%F
Cattle	Early	0.5-1.5	50	92.0	18	66.7
	Intermediate	2-2.5	28	42.9	10	60.0
	Late	3-4.5	47	38.3	16	37.5
	Vertebrae	7-9	52	38.4	12	9.0
Sheep/goat	Early	0.25-0.75	33	84.8	39	92.3
	Intermediate	1.25-2	20	40.0	24	58.3
	Late	3-3.5	20	35.0	32	50.0
Pig	Early	1-1.5	63	66.7	11	54.5
	Intermediate	2	70	31.4	13	7.7
	Late	2.5-3.5	46	10.9	7	0.0

yet there are clearly more adults in the 'dark earth' deposits, with a noticeably higher proportion of older sheep (the fused Late epiphyses in Table 38). The pig evidence, in sharp contrast, shows a marked decrease in adults within the 'dark earth' layers. The absence of very young and also of adult pigs in the 'dark earth' levels may be indicative of a similar absence of local production. A greater quantity of first year cattle and pigs may relate to status; however, the diminishment of similarly aged lambs could suggest a more complex interpretation. The preponderance of older cattle and sheep indicates their initial exploitation for some secondary purpose, such as milk or wool production or as work animals. A greater proportion of adults would therefore suggest a similarly greater level of secondary production. Notably, there is little difference between the proportion of cattle surviving into the Late group. This would not have caused a great difference in the quality of the meat with so-called 'prime beef' (approximately 3rd year animals) remaining the choice age of slaughter for beef animals well into the 19th century (Davis 2002). The change within the sheep age data is more profound, clearly suggesting an increased emphasis on wool and/or milk. While the sex data from these collections are rather slight, offering little or no insights regarding the exploitation of particular products, the decrease in lambs could suggest a greater use of wool, as dairying tends to produce a surplus of first year animals.

Table 39. Shoulder heights for cattle, sheep, pig and dog from Middle Saxon deposits at James Street

	Range	Mean	N
Cattle	1134.6-1352.4	1201.8	6
Sheep/Goat	553.1-668.1	621.4	18
Pig	756.4	756.4	1
Dog	556	556	1

The general size of the major domesticates is very similar to those found at other Middle Saxon sites in *Lundenwic* (Table 39 and comparing the data from the Royal Opera House (Rielly 2003, 323)). As previously mentioned, these deposits provided a small number of cattle horncores. Following Armitage and Clutton-Brock (1976), there is one Short Horn, one Medium Horn, a Short/Medium Horn and one possible Long Horned animal.

Post-medieval (Phase 3)

There were just two contexts containing animal bones: the fill of brick drain [8] in Area 1, with just three bones, and the fill of construction cut [31], with 77 bones. The combined assemblage consisted of a majority of sheep/goat fragments, with some cattle and pig and a few chicken bones (see Table 32). While generally dated between the 17th and 19th centuries, the lack of any large cattle or sheep tends to suggest these two deposits, at least, are no later than the 18th century. These clearly represent the various types/breeds of animals following the stock improvements of the late 18th century, which began entering the London meat markets towards the end of this period and into the early 19th century (Rixson 2000, 215). The wealth of sheep/goat is typical of this period (17th/18th centuries), as seen for example at Church Court and Hare Court, situated within the Inner Temple (Bendrey 2005, 104) and also at Caroone House, Farringdon Street in the City of London (Rielly in prep).

Conclusions

The interpretation of the Saxon collections cannot be achieved without some understanding of the previous work undertaken on faunal assemblages derived from *Lundenwic*. A recent gazetteer of sites, amassing data from the last 30 years, has shown that about 100 sites have been excavated within this Middle Saxon settlement (Cowie & Blackmore 2013). A significant proportion of these sites have provided relatively large assemblages (Rielly 2013). The interpretation of this mass of evidence, in terms of meat use and supply, has been the subject of much debate. It has been argued that *wic* settlements were supplied via a system of food renders (Saunders 2001, 12). Differences between typical *wic* assemblages and those from medieval urban centres, where it can be confidently assumed that the local economy was based on a market exchange system, have been sought in order to determine if the tribute system can be identified from the faunal evidence.

The two aspects most commonly used are the extremely limited range of food animals recovered from these sites (essentially cattle, sheep/goat and pig, although with a notable diversity of fish species) and the lack or very poor representation of evidence for local production, either shown by the recovery of very young individuals or of species which can be more easily accommodated in an urban context, such as domestic fowl (after O'Connor 1991, 277; 2001; Saunders 2001, 12–13). A major point is the dearth of variety amongst the collections recovered from various sites within these settlements, possibly indicating a standardised supply system.

The *Lundenwic* evidence certainly matches the limited range of food species, and most sites show very little evidence for local production. The collection from James Street is a typical example, with some poultry and a good proportion of fish adding to the general major domesticate diet. Another common feature at this site and at Bedford Street was the presence of red deer antler fragments, which were used for making combs and other artefacts (discussed earlier). In complete contrast to the relative abundance of antler fragments, red deer food waste bones are very rare finds in *Lundenwic*. For instance, at the Royal Opera House there were just two red deer bone fragments compared to a total of 3,380 cattle bones (Malcolm *et al* 2003, 104, 117; Rielly 2003, 319). The combined faunal evidence does suggest a general similarity to the type of assemblage which

could be attributed to a 'tribute' system. However, there are notable variations within the *Lundenwic* data exacerbated by apparent changes in the economic structure through time. In particular, there is good evidence for home production at a number of sites, including a possible 'piggery' at the Royal Opera House (Malcolm *et al* 2003, 65, 103) and concentrations of very young calves and lambs at a number of sites located within the south-western periphery of the settlement (Rackham & West 1989; Armitage 2004b). The latter evidence led to an interpretation of these sites as perimeter farmsteads (Rackham 1994, 130–1) supplying the settlement with meat products similar to the model proposed at Dorestadt (after Prummel 1983). This leads on to a previously recognised pattern concerning the representation of the major domesticates, whereby the interior sites tended towards a greater proportion of pig relative to sheep/goat, while the peripheral sites invariably produced the opposite result (Rackham 1994, 130; 2004, 149). Much of this work was achieved prior to a better understanding of the dating evidence. Bringing this evidence into the analysis provided a dramatic interpretative change, strongly suggesting that in most cases this variation is temporal rather than spatial. This is demonstrated in Table 40, comparing the data from 27 James Street with domesticate abundance data from 28–31 James Street (Armitage 2001; 2004a), the Royal Opera House (Rielly 2003), London Transport Museum (Pipe 2007), Hare Court (Bendrey 2005), National Gallery extension (Rackham & West 1989), National Portrait Gallery (Armitage 2004b; Philip Armitage pers comm) alongside 2–26 Shorts Gardens and 68 Long Acre (both from Rielly 2013). Notably, there are both interior and perimeter sites with a preponderance of sheep, the common factor being the lateness of the deposits. There is undoubtedly some variation regarding both the relative proportion of sheep bones and the date at which the move to greater sheep exploitation might have taken place. However, the data do appear to show a general pattern. Of interest is the greater proportion of older sheep within the James

Table 40. Percentage abundance of major domesticates from a selection of Lundenwic sites, using total fragment counts, where N is the sum of cattle, sheep/goat and pig bones from that phase/site and % equals sum of individual species/N x 100. Date is given to the nearest century or part thereof, with ***e*** *early,* ***m*** *middle,* ***l*** *late and* ***DE*** *dark earth*

Location/Site	Date	Cattle	Sheep/Goat	Pig	Totals
Covent Garden area:					
2-26 Shorts Gardens	l8-m9	41.9	47.3	10.8	2876
68 Long Acre	l7-m8	45.3	21.4	33.3	448
	l8-m9	31.5	53.9	14.6	851
Royal Opera House	l7-m8	70	12	18	734
	m-l8	54.8	19.1	26.1	4094
	l8-m9	46.7	33.5	19.8	1253
London Transport Museum	l7-m8	67.7	13.4	18.9	2420
	l8-m9	57.6	22.7	19.7	1973
27 James Street	m8-m9 (pre DE)	46.3	17.3	36.4	706
	m8-m9 (DE)	34.9	47.0	18.1	315
28-31 James Street	l7-e8	71.7	13.0	15.3	308
	m8-e9	50.5	13.6	35.9	1400
Periphery:					
National Gallery basement	m8-m9	29.5	41.1	29.4	1606
National Gallery extension	m8-m9	67	24.4	8.6	462
National Portrait Gallery	e8/9	38.1	40.5	21.3	2259
	m8/9	40.5	50.4	9.0	1164
	8/9 (DE)	41.6	48.9	9.5	190
Hare Court	l8-m9	43.9	37.1	19	476

Street 'dark earth' levels, clearly suggesting a greater use of secondary products. It can be suggested that this may relate to an increase in wool production coinciding with the perceived rise in importance of the textile industry as indicated by a greater number of buildings with loomweights and/or other textile artefacts within the late 8th- to mid-9th-century phase at the Royal Opera House (Malcolm *et al* 2003, 168–70).

In conclusion, this wealth of evidence appears to suggest a major change between the earlier and latest occupation phases. The bone assemblages can be equated with a 'typical' tribute-based food supply, which apparently ceased during the late 8th century. It appears to have been replaced by a food supply system based on perimeter farmsteads. The noted rise in sheep bones accompanying this late phase may be in response to a local increase in textile production, although this may also signify the beginnings of a general trend regarding the woollen industry noticed in the Late Saxon era (Hagen 1995, 91). The collection of bones found at James Street features the attributes defining the 'tribute' and 'perimeter farmstead' phases and can be classed as a typical 'interior' assemblage.

FISH BONES FROM JAMES STREET

Philip L Armitage

Introduction and methodology

Ten Saxon (Phase 2) contexts excavated at 27 James Street produced evidence of the presence of nine species from a total of 146 identified fish bones. This report also considers the excavated fish bone assemblages from other *Lundenwic* sites. Retrieval of all 146 fish bones resulted from the collection and subsequent wet-sieving of bulk soil samples. There were no hand-collected fish bones. For details concerning methodology see the Bedford Street report.

Results

Table 41 provides summarised counts of the numbers of identified specimens present (NISP) for each of the represented species. The species identified are listed as follows: freshwater eel *Anguilla Anguilla*; carp family (sp.indet.) *cyprinid*; roach *Rutilus rutilus*; herring *Clupea harengus*; twaite shad *Alosa fallax*; salmon *Salmo salar*; salmon/trout *salmonid*; flounder *Platichthys flesus*; plaice *Pleuronectes platessa*; flatfish (plaice/flounder); pike *Esox lucius*. It is noted that apart from sample <13> from context [38] all of the identified fish bone elements are vertebrae. In sample <13>, in addition to vertebrae there are cranial parts (1 prevomer and 2 dentaries) of freshwater eel. Context [52] <sample 22> contained one burnt/calcined freshwater eel vertebra.

The size (TL Total length) of one of the freshwater eels represented by a left dentary from context [38] is estimated at 29cm (method of Libois *et al* 1987). One very large vertebra of freshwater eel from context [66] probably derives from a female. Both of the precaudal vertebrae of roach (1 from context [34] and 1 from context [42]) are slightly smaller that those of a modern female roach

Table 41. Summary counts of the identified Saxon fish bones by taxon/ species from James Street

Taxon/species	Number of identified specimens present (NISP)
freshwater eel	88
cyprinid (carp family)	20
roach	2
herring	11
twaite shad	5
salmonid (salmon/trout)	2
salmon	1
flounder	3
plaice	5
flatfish (plaice/flounder)	8
pike	1

of TL 27.8cm in the author's collections. The majority of the flatfish appear to be small immature/juvenile fish.

Interpretation and discussion

All fish bones recovered from the Saxon deposits are recognised as a component of the food waste of the settlement and show a heavy reliance on freshwater species, especially eels (60%/total NISP) and cyprinids (15%/total NISP). The presence of flounder and plaice, however, also reveals exploitation of the Thames estuary, with the noticeable preponderance of small immature/juvenile individuals indicating that the majority of these flatfish had been taken during the autumn and winter months when the estuary formed a nursery ground for such young fish (Wheeler 1979, 197). The herring present in the samples could likewise represent winter-caught fish in the outer estuary of the Thames. The presence of twaite shad is of interest as this migratory marine species was found in great abundance in the Thames before the 19th century, ascending the river in May/June to spawn in the tidal reaches (Wheeler 1979, 143). Today the species is a rarity in the Thames.

Analysis of the James Street fish bone samples has revealed a very similar consumption pattern to that recorded from other excavated *Lundenwic* sites, especially in regard of the significant contributions made by freshwater eel, cyprinids and herring to the diet. In common with the evidence from Maiden Lane, Jubilee Hall, the Peabody site, the National Gallery, and Bedford Street (Locker 1988; 1989; Armitage 2009; report above), the James Street samples also included immature/juvenile plaice/flounder, providing confirmation of the trade in fish from fisheries operating in the outer estuary of the Thames.

CHARRED PLANT MACROFOSSILS AND CHARCOAL FROM JAMES STREET

Lucy Allott

Introduction and methodology

Twenty-three bulk samples were originally processed by PCA in a flotation tank and the flots and residues underwent assessment (Allott *et al* 2010). Analysis aimed to clarify the range of cereals, non-cereal crops and weeds present in samples <1> (if waterlogged), <6>, <16> and <14> and to establish their likely origins. Charcoal analysis was recommended for roundwood fragments present in several samples (<6>, <17>, <14>, <24>). During analysis, the selected samples underwent the following procedures: flots were measured, weighed and sieved through geological sieves (4, 2 and 1mm and 500 and 250μm) prior to being sorted for macrobotanical remains and wood charcoal under a stereo-zoom microscope at magnifications of x7-45. Macro plant remains were identified through comparison with modern reference material held at the Institute of Archaeology, University College London and with specimens documented in reference manuals (Cappers *et al* 2006; Jacomet 2006; NIAB 2004). Wood identifications have been made through comparison with modern reference material at University College London, Institute of Archaeology, and with identification manuals (Hather 2000; Schweingruber 1990; Schoch *et al* 2004). Nomenclature and habitat information used follows Stace (1997).

The charred plant remains

The richest assemblage of cereal remains was recorded in sample <14> from context [40] from the 'dark earth' (Phase 2e). Unfortunately many of these grains were also fragmented and puffed displaying few securely identifiable characteristics and were therefore classed as indeterminate. Several grains had flatter ventral surfaces and are narrower in form which may indicate the presence of glume wheat such as spelt or emmer. In the absence of glume bases or other chaff this is difficult to confirm. Non-cereal crop remains are relatively uncommon although sample <6>, context [47] contains broad/celtic bean. The samples provide limited evidence for several plants that might have been cultivated or used for fodder or that could represent arable weeds such as vetches and wild pea.

A single charred sloe stone, fragments of hazel nut shell, bramble/raspberry and elder seeds provide some evidence for wild fruit-

producing trees. Fig seeds were also recorded in samples <1> from fill [24] of pit [25] (Phase 2b) and <14>, context [40] (Phase 2e). It is possible that the deposits were sufficiently sealed to facilitate preservation of the uncharred fig, bramble and elder seed in anaerobic conditions. If the fig seeds are contemporary rather than intrusive then their presence provides a glimpse of an imported food item.

The remaining macrobotanical remains, both charred and uncharred, provide some indication of the ground conditions either at the site or on cultivated land. Sedges in pit [25] indicate wet or damp ground conditions. Many of the remaining plants such as bedstraw, fat hen, sorrel/dock, and pale persicaria/redshank are typical weeds of arable land, or of disturbed/waste ground, but are not indicative of specific ground conditions.

The wood charcoal

Analysis of wood charcoal revealed fragments of varying sizes and maturity including some round wood (Table 25). Oak, possible wild privet, elm, alder, birch, hazel and beech were recorded in dumped deposits [47] and [45] (Phase 2d). The small assemblage of oak roundwood includes both fast and slow grown wood. Some of the oak in sample <17> context [45] was from relatively large fragments (>10cm) and may be derived from posts or logs. Several smaller twigs, often with fewer than ten growth rings, were also present. Oak and hazel were the only taxa recorded in sample <24> from the secondary fill [66] of pit [67] (Phase 2b), while a broader range of woody taxa, including oak, alder, hazel, beech, wild cherry/blackthorn, ash, willow/poplar and Maloideae, was evident in sample <14>, from dark earth deposit [40]. The range of taxa present at James Street was similar, but smaller than that recorded at Bedford Street (Table 25). Wild privet was only present at James Street.

Discussion

Macrobotanical remains in samples from James Street provide some evidence for food plants including both crop and wild food resources. Given that the majority of the samples derive from dumped waste material, botanical remains in these almost certainly originate from several localities and multiple charring events rather than single, easily identifiable incidents. Nevertheless the assemblages provide evidence for barley and bread/club wheat, both of which are common on other sites in the *Lundenwic* area. Barley grains were particularly abundant in one sample from the neighbouring site at 28–31 James Street (Hunter 2004) and although it has not been possible to determine the species of barley represented in the current assemblages, they are also from a hulled variety. The lack of chaff and small quantities of arable weeds in samples from 27 James Street were not unexpected as this pattern compares well with cleaned or semi-cleaned grain assemblages from other sites in the region (Cowie 2000) and with remains from the neighbouring site where larger weeds (that are removed in the latter stages of processing) were prominent. It appears therefore that the early stages of cereal processing were undertaken elsewhere. Peas and beans may also have played an important role in the diet of people in the region and although these tend to be less well represented, broad beans are present in one of the deposits at this site. Other plants such as sorrel and fat hen may have been used for their greens, although they could also represent weeds. With the exception of the fig seeds no imported foods were recorded in these samples. The charcoal assemblage from James Street provides evidence for a diverse array of wood taxa at the site with oak and hazel identified in many of the samples.

JAMES STREET SAXON PERIOD DISCUSSION

Saxon: mid-7th century (Phase 2a)

A number of mid-7th-century human inhumations have been discovered within the Covent Garden area, leading to the interpretation of a Saxon cemetery situated to the north of the Piazza on the periphery of the early *Lundenwic* settlement (Leary *et al* 2004, 141). The single burial discovered on site provides further evidence for such a cemetery (Fig 22). Other contemporary inhumations have been discovered next door

at 28–31 James Street (Leary *et al* 2004, 6–7), and to the west at Cubitt's Yard (Telfer & Blackmore 2008, 154–5). Further proximate examples include two *in-situ* burials at the Royal Opera House (Malcolm *et al* 2003, 19) and between six and eight burials discovered at 45–47 Floral Street / 51–54 Long Acre (Humphrey 2001) (Fig 1). The roughly west–east alignment of the 27 James Street burial correlates with a number of these contemporary inhumations, the orientation of which has led to a suggestion that these individuals were nominally Christian (Leary *et al* 2004, 141–2).

Posthole group 1 and stakehole group 1 represented the earliest evidence of structural activity on the site (Fig 22). Accurate interpretation has, however, proved difficult due to the limited area exposed during the excavation. The posthole group may once have formed the south-western corner of a fence line or animal pen, and similar Middle Saxon features were interpreted as such during excavations at the Peabody site, Bedfordbury (Whytehead *et al* 1989, 38). Similar stakehole structures have been recorded at the Lyceum (Leary *et al* 2004, 41) and at Maiden Lane (Leary *et al* 2004, 74).

Saxon: mid–late 7th century (Phase 2b)

The grey layer sealing both posthole group 1 and stakehole group 1 has previously been identified on a number of sites within the *Lundenwic* settlement. These include the excavations at 28–31 James Street (Leary *et al* 2004, 7), the Lyceum (Leary *et al* 2004, 41), Maiden Lane (Leary *et al* 2004, 74), the Royal Opera House (Malcolm *et al* 2003, 20–1), and also the Peabody site (Whytehead *et al* 1989, 57–8). Organic material recovered from these horizons has mostly comprised animal bones, pottery sherds and shells along with faecal matter, indicating the disposal of human waste (Malcolm *et al* 2003, 20–1). This has led to an interpretation of such 'grey layers' as forming midden deposits situated on the outskirts of *Lundenwic*. It has been suggested that *Lundenwic* was expanded during this period and this area (including the former cemetery) was now being used as a rubbish tip (Malcolm *et al* 2003, 28).

Further evidence of settlement expansion during the mid- to late 7th century was represented by the erection of structures and the excavation of pits on the formerly open land (Fig 23). The three pits were suggestive of domestic activity and had been utilised for the purposes of waste disposal. Similar features were revealed during the investigations to the south of the site at 28–31 James Street where it was proposed that such pits may demarcate property boundaries (Leary *et al* 2004, 9). This interpretation has been supported by the absence of rubbish pits at Cubitt's Yard to the west of the site, implying that specific areas were demarcated for household refuse within delineated property plots (Telfer & Blackmore 2008, 167). It is possible that the pits revealed during the James Street excavations were associated with the two buildings excavated at Cubitt's Yard, and that a waste disposal area was situated within the eastern portion of these properties. One of these pits contained fig seeds which are unusual in that they represent an imported food source (see Allott above), although fig seeds were also recovered from Saxon features on the Royal Opera House site (Malcolm *et al* 2003, 296).

The structural evidence belonging to this period of activity consisted of stakehole group 2 and the linear cut interpreted as a beamslot, which implies the existence of a small structure (Fig 23). The arrangement of the stakeholes is suggestive of a boundary fence or an animal pen. Similar arrangements of posts and stakeholes have been recorded at 28–31 James Street (Leary *et al* 2004, 7) and at the Royal Opera House (Malcolm *et al* 2003, 22–3).

Saxon: late 7th century (Phase 2c)

Following the removal of stakehole group 2, Area 2 reverted to a midden as material was dumped directly over the former structure. Identical deposits were recorded at 28–31 James Street (Leary *et al* 2004, 8), suggesting that this area of *Lundenwic* was temporarily abandoned. The discovery of disarticulated human remains within these dumped deposits indicates that some burials were being disturbed by this time, implying that *Lundenwic* continued to expand over the former cemetery during the late 7th century.

Evidence of a major change of land-use, presumably connected with the expansion of *Lundenwic*, was provided by the construction of the metalled gravel surface situated directly over the midden material (Fig 25). Although it is possible that the gravel layer represents a yard surface such as that at Cubitt's Yard (Telfer & Blackmore 2008), an identical surface was recorded at 28–31 James Street which was interpreted as part of a north-west to south-east aligned road (Leary *et al* 2004, 8). Interestingly, a substantial parallel road was also discovered at the Royal Opera House (Malcolm *et al* 2003, 34–5). These discoveries imply the existence of a gridded street system within *Lundenwic* linking the Roman roads of New Oxford Street to the north and the Strand to the south (Malcolm *et al* 2003, 146). The establishment of a gridded street pattern indicates that a degree of central organisation and planning was involved in the late 7th-century expansion of *Lundenwic*. The alignment of the James Street road also correlates with the linear arrangement of stakehole group 2, implying that the construction of the road respected previously existing property plots and boundary lines.

There are, however, a number of differences between the sections of road discovered at 27 James Street and at 28–31 James Street (Fig 25). The previous excavations suggested that the road was resurfaced on at least five separate occasions and that a flanking drainage ditch was situated on the eastern side of the road (Leary *et al* 2004, 8). No evidence for this drainage ditch was discovered at 27 James Street and only two phases of resurfacing were revealed during the recent investigations.

Saxon: mid-8th–early 9th century (Phase 2d)

The late 7th-century road surface had gone out of use by the mid-8th century. Sealing the metalled surface were dumped soil horizons, which suggest that this area of the settlement had reverted to open land by this time and was once again being used for the disposal of waste. This change of land-use is in complete contrast with the majority of the evidence from mid-8th-century *Lundenwic*, which indicates that the settlement expanded during this period (Malcolm *et al* 2003, 101). At the Royal Opera House buildings and yards associated with iron smithing, weaving and antler working have been dated to AD 730–770 (Malcolm *et al* 2003, 72). Contemporary evidence from 28–31 James Street also provides evidence of expansion in the form of at least four phases of building construction with associated pits and gravel and brickearth surfaces (Leary *et al* 2004, 12–13). However, it must be stated that the excavated area at 27 James Street was very small and may represent an episode of isolated dumping not representative of the settlement as a whole.

Considerable quantities of iron slag were recovered from the dumped deposits at 27 James Street (see Keys above), related finds included offcuts and waste in the form of hammered out sheet metal (see Gaimster above). Similar material was also retrieved from the contemporary pits discovered to the south of the site at 28–31 James Street, where it was interpreted as originating from a proximate smithy (Leary *et al* 2004, 13). The fragments of sheet metal at 27 James Street are worthy of note and represent offcuts of pre-prepared sheet which may have been utilised in the production of metal objects such as brooches and even hanging bowls (Leahy 2003, 147–8). Similar sheet fragments have previously been found at both the Royal Opera House (Malcolm *et al* 2003, 274) and farther afield at Flixborough (Evans & Loveluck 2009, 336). Additional evidence for the assembly of such fine objects in the immediate vicinity of the study site was represented by the copper-alloy rivet also recovered from this sequence of dumped horizons. The recovery of a loomweight and antler-working waste from the James Street dumped deposits provided evidence for other craft activities including both textile and comb manufacture during the mid-8th century (see Riddler above).

Saxon: 9th century (Phase 2e)

The homogeneous soil deposits sealing the latest phase of Saxon activity are a common occurrence throughout *Lundenwic* and have previously been recorded on numerous sites including 28–31 James Street, Maiden Lane and the National Portrait Gallery (Leary *et al* 2004, 145), the Royal Opera House

(Malcolm *et al* 2003, 130), and the Peabody site (Whytehead *et al* 1989, 56). Often described as 'dark earth', these layers have been recorded as extending up to 1.2m in thickness at Maiden Lane (Leary *et al* 2003, 145) and have previously been linked with the abandonment of the settlement during the mid-9th century (discussed earlier).

Analysis of the Roman 'dark earth' within the City of London and Southwark suggests that this soil formation occurs as a result of both natural accretion and the biological reworking of occupation deposits following a period of abandonment (Yule 1990, 625–6). As the final occupation layers are left exposed, floral and faunal incursions begin to break down the upper horizons and an organic-rich deposit, the 'dark earth', begins to form (Malcolm *et al* 2003, 132). The deposit recorded at James Street measured *c.*0.50m in thickness and the pottery recovered dated to between AD 770 and 850, correlating with the perceived desertion of the *Lundenwic* settlement.

Further finds recovered from the 'dark earth' are also of interest, with a higher rate of sheep/goat bones recorded along with a larger percentage of older sheep present within this soil when compared to the earlier phases of Saxon occupation (see Rielly above; Table 40). This increase in the number of sheep may be connected with a contemporary boost in woollen cloth production, which is indicated by the number of loomweight fragments recovered from the 'dark earth' deposits at James Street (see Sudds above). Clearly the inhabitants of *Lundenwic* only raised a tiny fraction of the livestock and other food stuffs that they consumed. This raises the question of how *Lundenwic* was supplied with livestock. It has been suggested that originally *Lundenwic* received the majority of its comestibles via a tribute system of food renders, but that by the late 8th century a number of peripheral sites were increasingly involved in livestock farming.

POST-MEDIEVAL ACTIVITY AT BEDFORD STREET

Early to late 17th century (Phase 3)

The next phase of activity at Bedford Street consisted of the excavation of 36 intercutting pits of broadly 17th-century date, which were recorded across the western area of the excavation (Fig 32). Truncating the earlier Middle Saxon pits, and in many cases one another, these features varied in size but were generally recorded as either sub-rounded or sub-square in shape. Extending up to 0.88m in depth, the largest of these pits [117] measured 3.66m from north to south and 3.02m from east to west, whilst the smallest [219] measured 0.66m in depth and 0.50m in diameter. All of the pits were backfilled with homogeneous dark coloured sediments, but with textures ranging from silts to clays suggesting that these features were backfilled with waste material derived from various sources. These features are interpreted as the result of gravel extraction. Their excavation was probably connected with the construction of Bedford Street in the 1630s and the Covent Garden Piazza between 1631 and 1637 (discussed earlier). A horseshoe recovered from these deposits indicates how the quarried material was perhaps removed from site (see Gaimster below).

Two thirds of the pottery recovered from these features consisted of redeposited Middle Saxon material, suggesting that a considerable number of Saxon features were destroyed during the excavation of the pits. However, the recovery of post-medieval ceramic building material and pottery, including post-medieval redwares, from the backfill of these pits confirms their true date. The basal fill of pit [228] is also broadly dated to 1580–1700 by the presence of post-medieval redware variants together with Border ware and Frechen stoneware. The upper fills ([214]/[226]) date from 1620 or 1630 given the additional presence of brown glazed Border ware and an English tin-glazed bowl or dish (see Sudds this report). Other finds from these pits included an elephant bone and a small fragment of possible human frontal bone. One large pit [260] is probably of late 17th-century date (Fig 33).

A number of these pits respect the line of a north-east to south-west aligned wall [277] (Fig 33). Measuring 3.2m in length and 0.38m in width, this wall was constructed from pre-18th-century bricks bonded with a firm sandy mortar. With only two courses

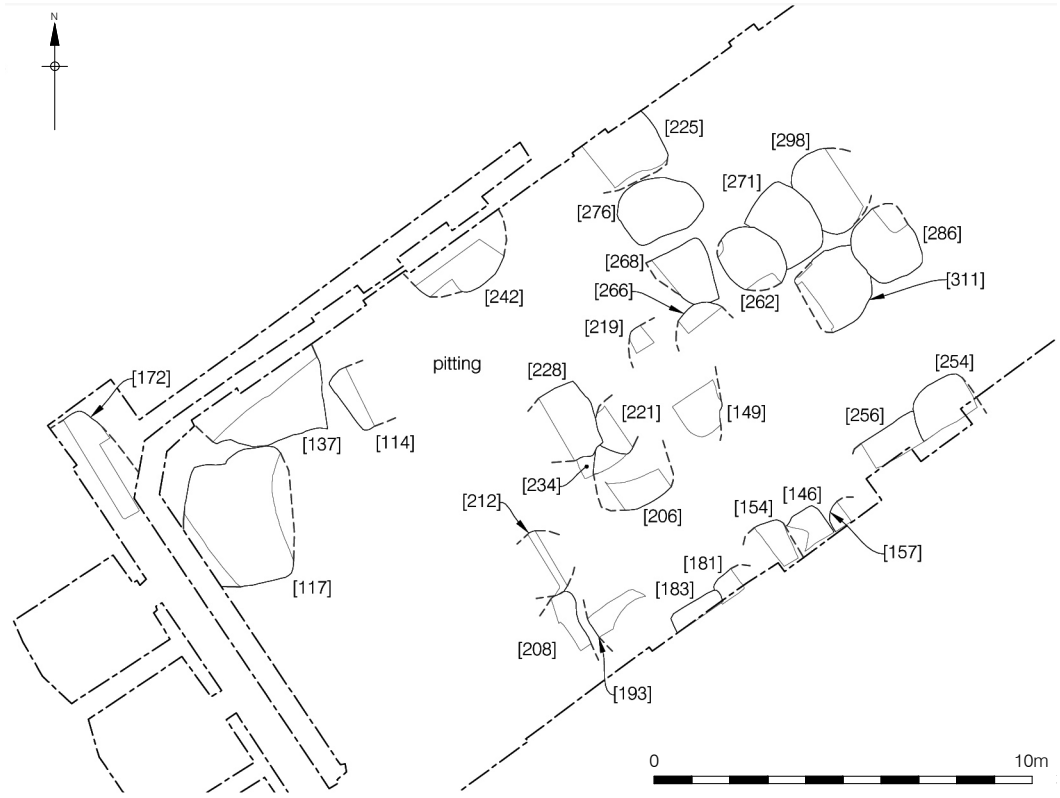

Fig 32. The 17th-century gravel pits at Bedford Street (Phase 3), showing their excavated and conjectured extents

of the wall remaining no specific bonding pattern could be identified, although in several instances broken and re-used bricks appeared to have been utilised during the construction process. As the surviving portion of this wall was aligned at right-angles to Bedford Street, it may have been part of a building constructed soon after the establishment of the street.

The most significant feature belonging to this phase of activity was the southern portion of a 0.80m deep brick-lined cesspit, [82], the northern portion of which had been removed by a Phase 5 wall. This cesspit went out of use during Phase 4.

Late 17th–18th century (Phase 4)

During this period cesspit [82] went out of use, and instead of being scoured out and then refilled with waste materials, it was simply abandoned. Its final fill consisted of a dark brownish grey sandy silt, mainly derived from decayed organic rubbish and faecal material [80], but it also contained a very rich finds assemblage, which may represent a clearance deposit from an inn or tavern (Fig 33). The pottery recovered from this deposit primarily consisted of English tin-glazed ware, Surrey/Hampshire border redware and post-medieval redware, suggesting a deposition date of 1680–1720. The clay tobacco pipes retrieved from this feature date to 1690–1710, whilst the glass dates to between the late 17th and early 18th centuries (see Jarrett, Shepherd & Sudds below). The high number of serving vessels and chamber pots and the presence of a large quantity of clay tobacco pipes recovered from the backfill of [82] suggest it was attached to an inn. The glass comprised a stemmed drinking vessel and at least three 'English' wine bottles (see Shepherd below). The animal bone assemblage consisted of

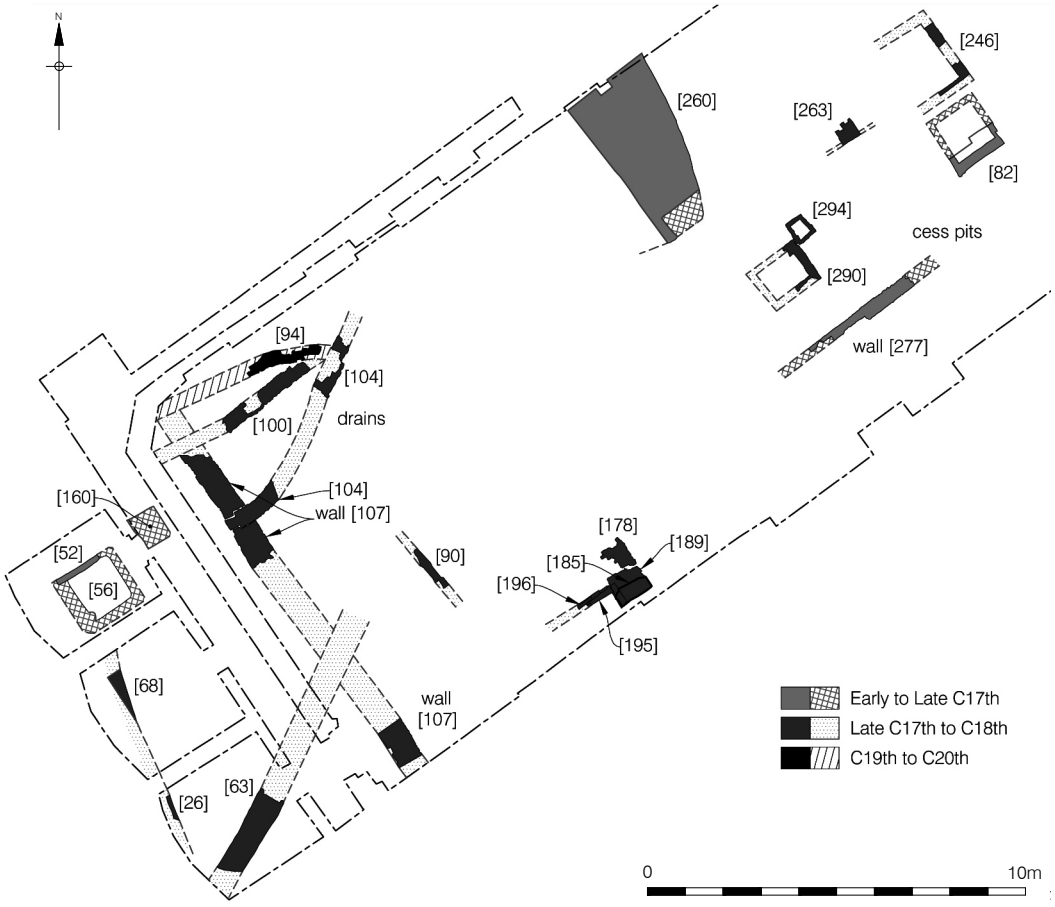

Fig 33. Post-medieval structural and other features at Bedford Street (Phases 3, 4, 5 and 6)

kitchen and table waste. Good preservation of the animal bone indicates deposition soon after consumption. Beef/veal represent the largest proportion of the bone recovered followed by mutton/lamb and pork, with high grade cuts of meat present within the bone assemblage along with chicken and turbot (which were relatively expensive items during the 18th century) (see Armitage below). This assemblage implies that the premises associated with the cesspit was a 'fashionable' eating house. A pipe clay cockerel figurine was also recovered from the backfill of the cesspit. Study of the symbolism attached to this creature has produced a number of possible interpretations for this unusual figurine (see Jarrett below).

The remaining Phase 4 features included a robbed out brick-lined cesspit [56] in the western area of the excavation and another two pits (Fig 33). No diagnostic dating material was recovered from either the cesspit or pit [260]. Sealing a number of the 17th-century gravel pits in the western area of the excavation were two identical levelling layers of dark brown sandy silt. The recovery of a pipe clay hair curler from one of the layers suggests a deposition date between 1690 and 1720. Cutting through these levelling layers was a truncated north-west to south-east aligned brick wall [107] (Fig 33). Only four courses of this brick structure remained and all were bonded in an irregular pattern. It is interpreted as the front wall of a building facing onto Bedford Court.

At the northern end of [107] two drains were exposed, both of which extended downwards along a shallow gradient from

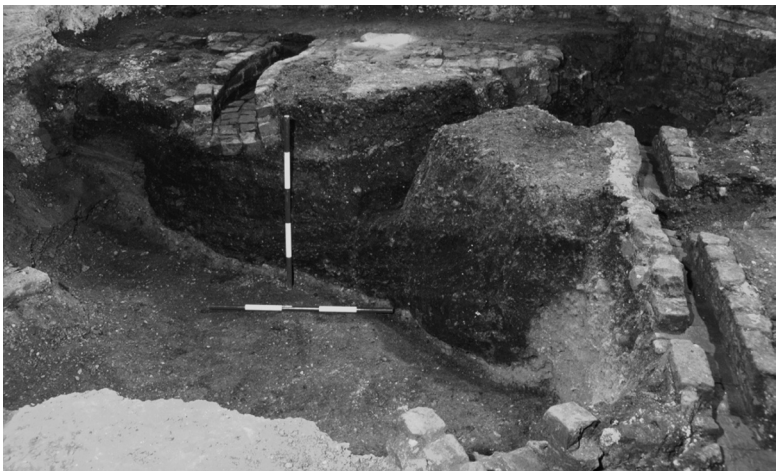

Fig 34. The 18th-century brick and tile lined drains in the north-west corner of Bedford Sreet, view looking south-west

the north-east towards the south-west (Figs 33–34). The earliest of these structures [100] was constructed from brick and was lined with a tile base. Only two courses of [100] remained and were bonded in an irregular fashion with a sandy mortar. To the south of [100] was drain [104]. Unlike [100], [104]'s base was lined with brick. With so little of these drains remaining their precise stratigraphic relationships could not be identified. Although not contemporary, they are believed to have served the same function and originated from the same source, and therefore represent separate phases of drain construction. The relationship between the drains and wall [107] was unclear, although both appeared to flow towards Bedford Court. The remnants of three further fragmentary drains were also recorded in the western area of the excavation.

A total of four brick-lined cesspits was recorded to the east of wall [107], some distance back from the street frontage indicating that this area of the site was utilised throughout the 18th century as external yards (Fig 33). It is probable that toilet cubicles would have existed above each of these cesspits. Interestingly, one contemporary cesspit [56] and several pits on the western side of wall [107] were presumably dug along the eastern edge of Bedford Court. Both cesspits [263] and [246] were heavily truncated and no finds were recovered from either feature. Cesspit [290] also survived in a fragmentary condition. A small square downpipe measuring 0.60m in width [294] had been bonded onto [290] during an episode of rebuilding, although no datable material was recovered from either the downpipe or the cesspit itself. To the south-west of [290], brick-lined cesspit [195]/[196] also survived in a fragmentary condition. No datable material was recovered from [195]/[196], which had subsequently been built over with both a brick pier base [189] and the remnants of a brick-paved cellar floor surface [178]/[185].

19th–20th century (Phases 5 and 6)

Very little archaeological evidence was recorded in association with the 19th century (Phase 5). Several of the 18th-century drains went out of use during this period; the fills of drains [63] and [104] contained pottery dating to between 1820 and 1840 (Fig 33). Replacing either drain [100] or [104] was brick drain [94], which measured 0.4m in width. It was lined with a pan-tile base and sloped downwards from the east to the west. Pottery recovered from the backfill of its construction cut suggested a construction date of 1800–20.

A total of five pits was also observed; they probably relate to the construction of 15–16 Bedford Street during the late 19th century

(not illus). Artefacts recovered from pit [141] included waste from a printing press and adverts for a tailor on Queen Victoria Street. Two large 20th-century pits were probably associated with cellar renovation works (Phase 6). Recovered from one of these pits was a residual 19th-century clay tobacco pipe depicting the acronym for the Royal Antediluvian Order of the Buffaloes (see Jarrett below).

POST-MEDIEVAL POTTERY FROM BEDFORD STREET

Berni Sudds

This assemblage was catalogued using the Museum of London pottery type codes (see Introduction for details). The medieval and post-medieval pottery recovered from Bedford Street is listed in Table 42. The fabrics represented can be well-paralleled in the Covent Garden area (Haslam 1975; Jarrett 2001a; Telfer 2006) and the rest of London. Three sherds of medieval pottery were recovered as residual finds in later features.

Phase 3: early to late 17th-century pottery

Over two thirds of the Phase 3 assemblage was comprised of residual Middle Saxon pottery (Table 8). The primary 17th-century assemblage is relatively dispersed. Pit [117] produced the earliest post-medieval pottery. The lower of the two fills, [158], contained a single sherd of Raeren stoneware (RAER) dating from *c.*1480–1610 and the upper fill, [133], a carinated Post-medieval slipped redware bowl or dish (PMSRY) dating from *c.*1480–1650. Other more broadly dated groups include pits [242], [271], [286] and [311], containing non-diagnostic Surrey/Hampshire border redware and whiteware products (RBOR, BORDY/G) or Post-medieval fine redware (PMFR) dating from *c.*1550 or 1580 to 1700 to 1800.

The basal fill of pit [228] is also broadly dated from 1580 to 1700 by the presence of Post-medieval redware variants (PMBL/PMFR/PMFRB) with Border ware and Frechen stoneware (FREC). The upper fills ([214]/[226]) date from 1620 or 1630 given the additional presence of brown glazed Border ware (BORDB) and an English tin-glazed bowl or dish with Orton-type D decoration (TGW D).

Phase 4: late 17th- to 18th-century pottery

The backfill [80] of cesspit [82] produced the largest feature assemblage from the site (108 sherds; 38 vessels); it can be dated to *c.*1680–1720, although if deposited during the early 18th century the earlier material is not likely to represent a residual presence, but rather the discarding of more long-lived vessels. The group primarily comprised English tin-glazed ware (TGW/C/F; 72% by sherd count), Surrey/Hampshire border redware (7%) and Post-medieval redware (PMR; 8%) products. Surrey/Hampshire border whiteware, local and imported stoneware and Chinese porcelain account for the remaining material. The presence of Border ware, a Westerwald (WEST) rounded mug with a stamped and engraved design and Tin-glazed ware decorated with scroll borders and 'Chinamen in Grasses' all suggest a late 17th-century date. A couple of straight-sided tin-glazed ointment pots have also been identified; however, these are more likely to be of 18th-century date. Finally, a London stoneware (LONS) cylindrical mug was recovered that dates to the late 17th or early 18th century. Other form types identified include English tin-glazed rounded and flared bowls, cylindrical jars, chamber pots, a plate, a globular posset pot, and an unusually decorated small ointment pot (Fig 35, 1). Part of the design of the latter can be paralleled on an ointment pot whose decoration is described as floral, with a provenance attributed to London and a date of *c.*1760–1780 (Archer 1997, J.28, 389). A similar provenance may be suggested for the example from Bedford Street, although a date in the early 18th century, contemporary with the remainder of the group, is proposed. The base of an unparalleled form was also identified (Fig 35, 2).

The Westerwald stoneware includes a tankard, in addition to the rounded mug mentioned above, and the Post-medieval redware and red border ware include rounded and flared bowls and a rounded skillet. A Chinese porcelain rounded bowl represents the remaining diagnostic form.

Table 42. The medieval and post-medieval pottery fabrics from Bedford Street, including number of sherds and minimum number of vessels (MNV)

Medieval pottery

Fabric code	Common name/ expansion	Date range		No.	MNV
CBW	Coarse Surrey-Hampshire border ware	1270	1500	1	1
LCOAR	Coarse London-type ware	1080	1200	1	1
LOND	London-type ware	1080	1350	1	1

Post-medieval pottery

Fabric code	Common name/ expansion	Date range		No.	MNV
BLUE	Blue stoneware	1800	1900	2	1
BORD	Surrey-Hampshire border whiteware	1550	1700	2	2
BORDB	Surrey-Hampshire border whiteware with brown glaze	1600	1700	2	2
BORDG	Surrey-Hampshire border whiteware with green glaze	1550	1700	4	3
BORDG CHP2	Surrey-Hampshire border green-glazed whiteware flat-rimmed chamber pot	1650	1750	1	1
BORDO	Surrey-Hampshire border whiteware with olive glaze	1550	1700	6	5
BORDY	Surrey-Hampshire border whiteware with yellow glaze	1550	1700	7	7
CHPO	Chinese porcelain	1580	1900	1	1
CHPO BW	Chinese blue and white porcelain	1590	1900	4	1
CHPO IMARI	Chinese Imari porcelain	1680	1900	1	1
CHPO VERTE	Chinese porcelain with *famille verte* decoration	1690	1730	1	1
CREA DEV	Creamware with developed pale glaze	1760	1830	1	1
EBORD	Early Surrey-Hampshire border whiteware	1480	1550	1	1
ENGS	English stoneware	1700	1900	1	1
ENGS BRST	English stoneware with Bristol glaze	1830	1900	4	1
ENPO HP	English hard paste porcelain	1780	1900	1	1
FREC	Frechen stoneware	1550	1700	4	4
LONS	London stoneware	1670	1926	3	3
MPUR	Midlands purple ware	1400	1500	6	3
PEAR	Pearlware	1770	1840	2	2
PEAR BW	Pearlware with underglaze blue painted decoration	1770	1820	3	1
PEAR SPON	Pearlware with sponged or spattered decoration	1800	1840	1	1
PEAR TR	Pearlware with underglaze transfer-printed decoration	1770	1840	1	1
PMBL	Post-medieval Essex black-glazed redware	1580	1700	2	2
PMBR	London-area post-medieval bichrome redware	1480	1600	1	1
PMFR	Post-medieval fine redware	1580	1700	3	3
PMFRB	Post-medieval fine redware with brown glaze	1580	1700	1	1
PMR	London-area post-medieval redware	1580	1900	13	8
PMREC	London-area early post-medieval calcareous redware	1480	1600	1	1
PMSRY	London-area post-medieval slipped redware with clear (yellow) glaze	1480	1650	3	1
RAER	Raeren stoneware	1480	1610	1	1
RBOR	Surrey-Hampshire border redware	1550	1900	9	3
SUND	Sunderland-type coarseware	1800	1900	1	1
TGW	English tin-glazed ware	1570	1846	15	9
TGW C	Tin-glazed ware with plain white glaze (Orton style C)	1630	1846	68	23
TGW D	Tin-glazed ware with external lead glaze/polychrome painted (Orton style D)	1630	1680	2	2
TGW F	Tin-glazed ware with 'Chinaman among grasses' decoration (Orton style F)	1670	1690	2	1
TPW	Transfer-printed refined whiteware	1780	1900	1	1
WEST	Westerwald stoneware	1590	1900	5	2
YELL	Plain yellow ware	1820	1900	4	3
MISC	Miscellaneous unsourced post-medieval pottery	1480	1900	1	1

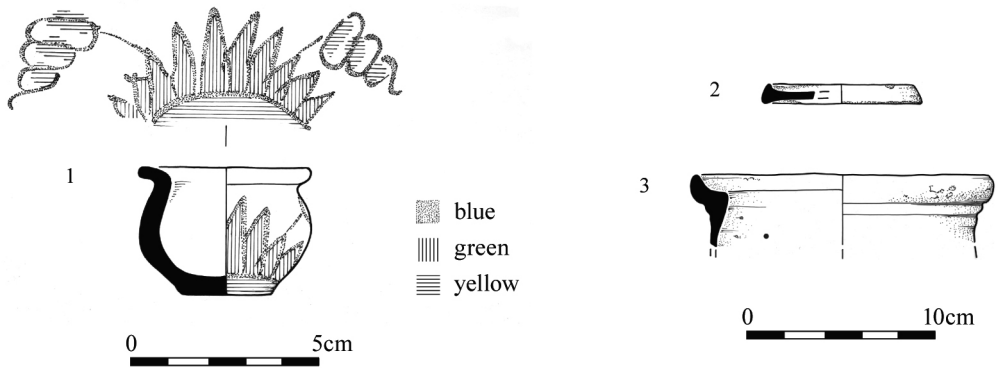

Fig 35. Phase 4 post-medieval pottery from Bedford Street. (1) English tin-glazed small ointment pot with floral decoration [80]; (2) English tin-glazed ware base of unparalleled form [80]; (3) unsourced vessel, white-firing sandy fabric with green glazed decoration [168]

The preponderance of serving forms is a notable feature of this group. Additionally, chamber pot forms are also fairly well represented, perhaps proportionally more so than to be expected within an assemblage of this size. Relatively high quantities of serving and drinking forms in particular, but also of sanitary wares, could well be indicative of the presence of an inn or tavern assemblage (Pearce 2000, 173–5; Sudds 2008, 91–2; Jarrett in prep a).

The fill of construction cut [106] is also dated to the late 17th to early 18th century, but in this case due to the recovery of both Border ware and Chinese porcelain with *famille verte* (CHPO VERTE) decoration. Both cesspit [34] and pit [108] produced yellow and green-glazed Border wares, including a type 2 chamber pot. It is possible that this material is residual but Border ware, and particularly type 2 chamber pots, have been found in early 18th-century assemblages where they were considered to be primary.

Both pit fills [112] and [168] can only be broadly dated. The former contained a single base sherd of a Midlands purple (MPUR) butter pot dating from *c.*1400–1750 along with residual Saxon material. Pit fill [168] produced only a single sherd from an unsourced post-medieval vessel, possibly of non-local origin. The example is white-firing, sandy and has a glossy green glaze but cannot be paralleled to fabrics commonly found in London (Fig 35, 3). The sherd is from a jar-type form with a lid-seated rim, but the glossy and even glaze suggests that a late 16th- or 17th-century date is most likely.

Construction cut [93] contained Tin-glazed ware, London stoneware, Chinese porcelain, developed Creamware (CREA DEV), and transfer-printed ware (TPW), but the additional presence of both a Sunderland-type ware (SUND) bowl or dish and a shell-edged Pearlware (PEAR BW) plate may indicate that the group dates to the first quarter of the 19th century.

Phases 5 and 6: 19th and 20th centuries

The presence of both Pearlware (PEAR/PEAR SPON/PEAR TR) and Yellow ware (YELL) in Phase 5 drain fills [61] and [103] suggests it was backfilled during the early 19th century, perhaps *c.*1820–1840. Pearlware plates, an English hard paste porcelain teacup and a Post-medieval redware flowerpot represent the only diagnostic forms recovered. Much of the pottery recovered from Phase 6 features was residual. Pit fill [209] contained Post-medieval redware and Tin-glazed ware but the additional presence of a Yellow ware flared bowl suggests the group was deposited after *c.*1820. Four sherds from the same English stoneware vessel with Bristol glaze were recovered from drain fill [237], indicating a date post *c.*1830.

CLAY TOBACCO PIPES AND OTHER PIPE CLAY OBJECTS FROM BEDFORD STREET

Chris Jarrett

The clay tobacco pipes were classified according to Atkinson and Oswald (1969) and prefixed AO, but as the 18th-century bowls were fragmentary there was no need to subdivide the AO25 bowls under Oswald's classification (Oswald 1975). The site produced a total of 122 fragments of clay tobacco pipes with bowls dating to between 1610 and 1840/60.

An important 17th-century clay tobacco pipe was recovered from the Phase 4 wall [34] (which was the southern element of wall [107]) and is of a non-local type. This bowl with a rounded 'chinned' front and nearly straight back has a quarter of the bowl milled, but otherwise it is very nicely finished and burnished. On the underside of the oval heel is a stamp with a border of two concentric oval lines enclosing in relief a shield with an open-hand or gauntlet symbol (Fig 36, 1). West Country type pipes with different gauntlet stamps are known from London.[1] The bowl and stamp have also been previously found in London (Hilton Price 1900, fig 17). Gauntlet stamps and marks are particularly well known in the West Country, and similar stamps, but with heart-shaped surrounds, are known at Bath (Lewcun 1985, 15–19). This type of stamp has also been associated with the Gauntlet family who were working in Amesbury, Wilts, *c.*1651–63 and had a reputation for making a quality item (Oswald 1975, 198). Hilton Price (1900) attributed the bowl to the Gauntlet family at Winchester. David Higgins has commented on the non-local bowl and believes that the form is not quite right for the West Country. He suggests it may have come from the Thames Valley, although it does not fit the London typology. Besides the West Country, examples of the famous gauntlet stamp were also used elsewhere, such as the Staffordshire/Cheshire area and at Much Wenlock, Shropshire, pipe makers, such as Samuel Deacon, used the emblem, but surrounded by their initials (D Higgins pers comm). The stamped bowl occurs with a spurred AO15 type, dated 1660–80.

The largest group of clay tobacco pipes recovered from the site came from the backfill [80] of cesspit [82] and represents a group with contemporary bowl types all dating to 1690–1710. The 62 fragments of tobacco pipe can be quantified as 26 heeled bowls, 4 nibs and 32 stems; many of the stems conjoin with each other or bowls to reconstruct near complete examples. It would therefore appear that they were discarded all together, in one event and possibly represent clearance of a property. No makers' marks are found on the pipes. The bowls are mainly as the AO21 type (21 examples) and many of these have a slightly splayed heel. Fifteen of these bowls have no milling of the rim and the remainder have a quarter milling, typical for this period when this practice disappeared. The quality of the finish of the bowls varies between fair and good. One of the AO21 bowls could be completely reconstructed and has a total length of 367mm. The other bowl types present in cesspit [82] are four AO20 bowls of a good quality finish; three examples have half milling of the rim, but all have a more constricted profile above the heel compared to the example published by Atkinson and Oswald (1969, 180, fig 2). The single straight-sided AO22 bowl is of fair quality with a quarter milling of the rim. The consistency in the AO20 and AO21 bowl types may indicate that they were made in the same mould and are the product of a local pipe maker.

Analysis of London 1680–1710-dated clay tobacco pipe assemblages shows that the heeled AO22 bowl was the preferred type of pipe across most of London, and that the spurred AO19 type had a limited attraction at the southern end of Borough High Street. The AO20 bowl is usually present in most London pipe groups, but generally second in preference to the AO22, whereas the AO21 bowl is rarely found, but is more common in the Covent Garden area, where it probably originated (Jarrett forthcoming).

Such a large group of clay tobacco pipes recovered from the heavily truncated cesspit [80] alludes to the type of premises the group of finds came from. Large quantities of clay tobacco pipes are one of the criteria for defining a tavern or inn assemblage, but they also occur very frequently in dining room and coffee house groups (Pearce 2000; Jarrett in prep b). Such establishments were plentiful

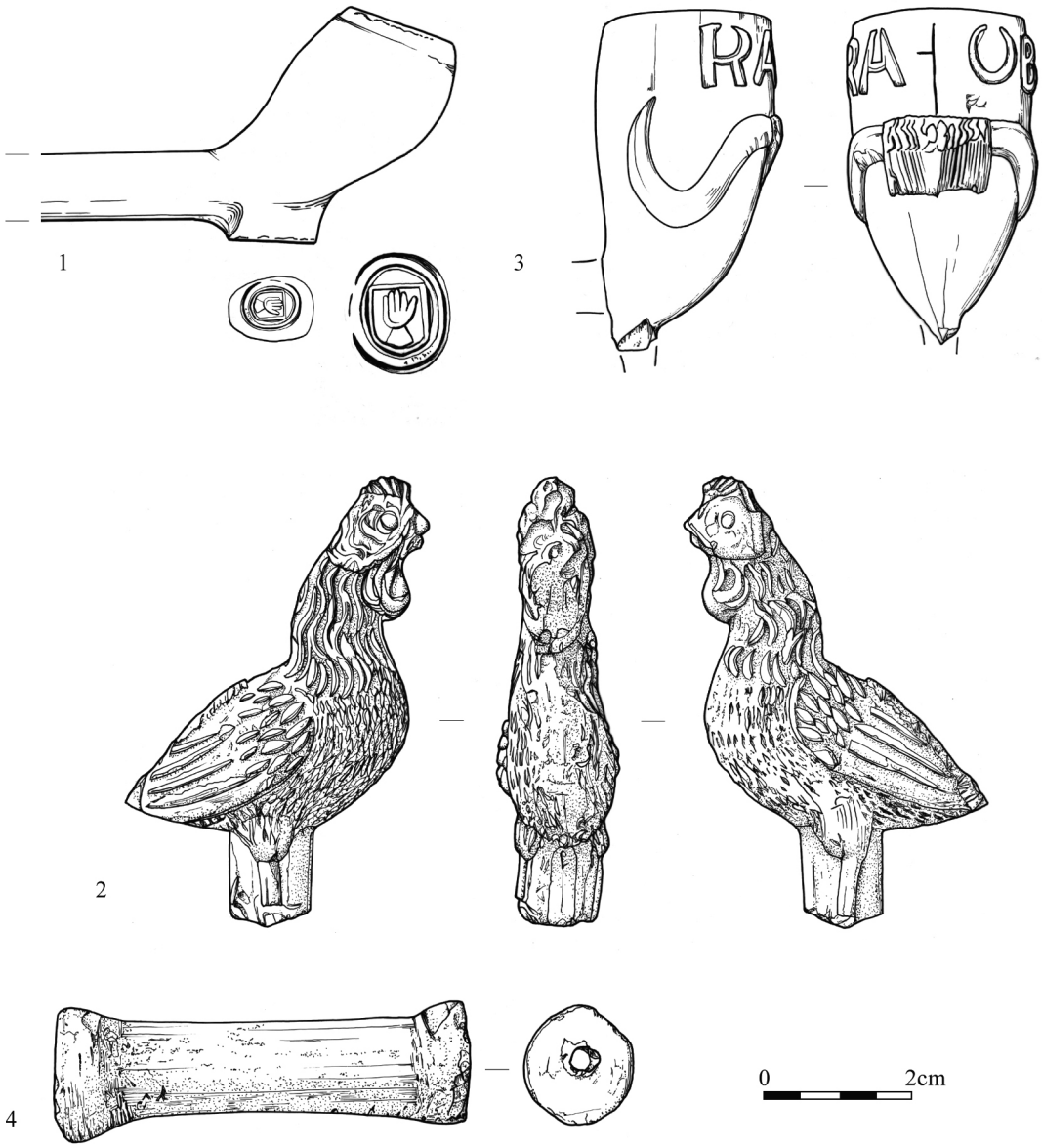

Fig 36. Pipe clay objects from Bedford Street. (1) Clay tobacco pipe bowl with open-hand or gauntlet stamp [34]; (2) cockerel figurine <2> [80]; (3) Royal Antediluvian Order of the Buffaloes clay tobacco pipe [residual in Phase 6 pit 85]; (4) hair curler <6> [115]

in the playground of post-medieval London: Covent Garden. The clay tobacco pipes from the cesspit may therefore represent the disposal of rubbish from or the clearance of a drinking establishment or coffee house — the proprietor having bought a batch of clay pipes from a local pipe maker to either give or sell to his customers with a plug of tobacco. At Uxbridge, the entire collection of maker-marked clay tobacco pipes recovered from a *c.*1785–1800 closed group at the King's Arms was made by one master (Pearce 2000, 167–8). However, the very large group from a late 19th-century coffee house/dining

rooms at Fulham included a wide range of clay tobacco pipes and designs, and almost certainly represented the customers' own personal pipes (Jarrett in prep b).

One unusual pipe clay object from cesspit [80] was a cockerel figurine (Fig 36, 2). It weighs 17g, has a surviving height of 60mm, a length of 40mm and a width of 15mm. The item is complete except for damage to the beak, the comb and the tail. Formed in a two-piece mould, the detail is crisp and the finishing (paring of seams) on the figurine is quite well done. There is, however, a noticeable scar on the back of the bird; this may have been for a 'suspension lug', which was removed pre-firing. The base of the figurine was rather poorly trimmed. The figurine is solid with no evidence for cavities as found on other pipe clay cockerels. There is also evidence for red paint on and around the wattles. The pipe clay cockerel could be a religious or secular item. In the Christian faith the cockerel is associated with St Peter and his denial of Christ (*John* 13: 38; *Luke* 22: 34; *Mark* 14:30; *Matthew* 26:34) and the Mass of St Gregory (Murray & Murray 1998, 219). A late 15th- to early 16th-century North Germany or Rhineland pipe clay cockerel perched on a column has been recovered from the City of London and is interpreted as a religious item (Gaimster 2003, 131, fig 6). The cockerel is also a symbol of the new day, vigilance, and lust personified. If interpreted as a secular item the figurine might have been a toy or perhaps even a depiction of the name of a public house.

Other pipe clay cockerel figurines have been recovered from excavations, notably from Launceston Castle, Cornwall and Fulham, London as fragmentary mid- to late 17th-century larger examples (Higgins 2006, 414–15; Jarrett in prep c). A similar sized, but slightly larger cockerel figurine was found at 15–16 Church Street, Dorking in a 17th- to early 19th-century context, but its true date is open to question (Higgins 1985, 414). Other pipe clay figurines, notably lions, were made in Germany and the Low Countries.

There are two 19th-century clay tobacco pipes that can be associated with secret societies. The first is a fragmentary bowl from the masonry drain [104]; this has Masonic symbols surviving as a crescent moon and set square with an oak leaf and grass border and probably came from an AO28 bowl, dated 1820–40/60, as this is the most common bowl shape for such designs. The Freemasons have their origins in the 17th century, but a grand lodge was established in London in 1717 at the Goose and Gridiron Ale House, St Paul's Churchyard. The second secret society bowl came from the large modern pit [95] and is definitely of an OA28 type, but its spur and the evidence for who made it is missing. On the front of the bowl is the acronym RAOB above buffalo horns, all in relief (Fig 36, 3); many different moulds with variations on this design are known, sometimes with a full bull's bust in relief. RAOB stands for Royal Antediluvian Order of the Buffaloes; this was a secret society set up by stagehands and theatre technicians in 1822 at the Harp Tavern, Great Russell Street, to the north-east of the site (<<http://www.raobgle.org.uk/prder.htm>> accessed 2009).

Hair curler

A single hair-curler was recovered from the Phase 3 external dumping [115] (Fig 36, 4). Under Le Cheminant's (1984) classification system it fits his type 3 hair curler, dated *c.*1690, while it is a type 1 by the Aldgate typology (Grew 1984, fig 56.83), dated *c.*1700–20. The hair curler is 56mm long with a maximum diameter of 14mm. It is complete except for a small number of chips and a little wear. The item is handmade with a cylindrical body and the ends thickened but flattened. Along the length and at the centre of the hair curler is a hole 4mm in diameter, made by a wire used to form the object.

Pipe clay hair curlers were fashionable in England from the mid-17th century to *c.*1800 and were used to keep curls in wigs at a time when it was fashionable to wear them; pipe clay hair curlers were also used for dressing natural hair. There is evidence from tobacco pipe kiln sites (but not yet found in the London area) that pipe makers made these items and that they were more expensive than tobacco pipes. Hair curlers with their association with wig wearing are seen as middle and high class status items and therefore these items would be expected in a fashionable area of post-medieval London. Four mid to late 18th-century fragments of pipe clay hair curlers were also recovered

from an excavation at 28–30 James Street (Jarrett 2001b).

POST-MEDIEVAL GLASS FROM BEDFORD STREET

John Shepherd

A total of 141 fragments of glass was recovered from the site; none of this material is considered to be of Saxon date. In fact, all of the fragments are post-medieval in date, the earliest datable being late 17th-century from context [80]. In general, the glass from Bedford Street consists mainly of fragments from utilitarian vessels such as bottles, phials and jars. Included also, however, are a couple of finer vessels, such as the gadrooned drinking vessel and a decanter or bottle from context [80].

Phase 3: 17th-century activity

Only three fragments of glass were recovered from this phase; they tell us little about the glass supply to the site during this phase of activity. The fragment from the rim of a small bowl or jar is a standard type of the 17th century or later.

Phase 4: 18th-century activity

This material is dominated by a very large assemblage from context [80]. This assemblage contains at least three standard sized 'English' wine bottles, one half sized bottle, a tall prismatic case bottle, fragments of at least two cylindrical pharmaceutical phials, a natural bluish green bulbous vessel with deep surface decomposition, a clear glass bottle or decanter, and a stemmed drinking vessel. The bottles and the drinking vessel are contemporary, dating from the late 17th to early 18th century. The glass of the clear bulbous bottle or decanter is particularly interesting. It is a bright colourless glass, with a faint yellow tint, and the surface shows signs of crizzling — very fine cracks on the surface of the glass itself. This is probably an indication that the glass is a high lead oxide content vessel but in a relatively unstable condition; it probably dates from the end of the 17th century. This makes it contemporary with the other datable vessels from this assemblage.

Phase 5: 19th-century activity

This phase included fragments of two machine made vessels datable to the late 19th or early 20th century. Fragments from a standard cylindrical wine or beer bottle and from a pharmaceutical bottle were also recovered.

POST-MEDIEVAL METAL AND SMALL FINDS FROM BEDFORD STREET

Märit Gaimster

A small assemblage of metal finds was recovered from the Phase 3 and 4 deposits (Table 43). In addition, there is an incomplete horseshoe <59> of a type dating from the period *c.*1300–1600 (Clark 1995, 96–7; Egan 2005, 179). Associated with pottery dating

Table 43. Catalogue of post-medieval accessioned finds from Bedford Street

Context [89] sf <1>
copper-alloy sewing pins; fine with twisted-wire heads; very fragmentary; one only complete; Type C; tinned; L 28mm
Phase 4

Context [173] <59>
incomplete iron horseshoe; Clark Type 4; one rectangular nail hole present, very close to outer edge; W *c.*25mm
Phase 3

Context [176] <60>
Complete iron H-hinge; narrowing towards round, pointed ends; L 120mm W 20mm
Phase 4

Context [296] <53>
copper-alloy mount or ferrule; rolled-up and now flattened sheet; no decoration but raised edge at one end; L 50mm W 13mm; possibly fitting for a parasol handle
Phase 4

from 1480–1550, it reflects the mostly open ground of the area until the development of the Covent Garden piazza in the first half of the 17th century.

The finds include a handful of fine copper-alloy sewing pins, with one showing traces of being tinned <1>. An iron H-hinge <60> with decorative finials, probably for a piece of furniture, has parallels in a range of *in-situ* fittings from late 17th- and early 18th-century buildings (Alcock & Hall 1994, 25). The hinge was associated with residual 17th-century pottery. A tube-shaped copper-alloy mount <53> may be the casing for a parasol handle; it was retrieved from the backfill of an 18th-century drain.

FAUNAL REMAINS FROM THE CESSPIT AT BEDFORD STREET

Philip L Armitage

Introduction

Context [80], the fill of cesspit [82] (Phase 4), yielded a bone assemblage dated to *c.*1690–1710, which was believed to derive from a nearby inn or tavern. All the bones from this context were recognised as kitchen/table food waste and they appeared to have been deposited into the cesspit very soon after being discarded, as indicated by the good state of preservation and absence of any signs of weathering, erosion, or dog gnawing. Although the quantity of bone recovered was relatively small (NISP=223), the presence of 17 bones from the skeleton of a calf was considered noteworthy, and given the presumed source of the animal bones it was decided that the assemblage as a whole merited more detailed study.

All the larger bone elements/fragments (*ie* from cattle, sheep and pigs) were hand collected during the site excavation, while the smaller specimens (*ie* the rabbit, bird and fish bones) all came from a sieved environmental sample: [80] <No. 2>.

Species represented and descriptions of the animals

Four mammalian, one bird and six fish species were identified (Table 44).

Table 44. Species present in context [80] at Bedford Street and the total number of bone fragments which were identifiable to taxa/ species and anatomy (NISP)

Species	NISP
Cattle *Bos* (domestic)	64
Sheep *Ovis* (domestic)	94
Pig *Sus* (domestic)	19
Rabbit *Oryctolagus cuniculus*	4
Domestic fowl *Gallus gallus* (domestic)	15
Unidentified small bird bones	2
Large flatfish cf. turbot *Scophthalmus maximus*	1
Sole *Solea solea*	2
Herring *Clupea harengus*	1
Gadoid (cf. Cod *Gadus morhua*)	2
Small *gadoid*	3
Freshwater eel *Anguilla anguilla*	1
Tench *Tinca tinca*	1
Unidentified fish spines/rays/vertebrae	14
TOTAL	**223**

Cattle

The cattle bones include a high frequency of calf elements, representing at least two animals. The recovered skeletal remains of one of these calves comprises 17 bone elements, including the cranium (Table 45); the age at death (under 10 months) is indicated by the unfused acetabulum in the innominate bones. Adult cattle bones are

Table 45. Skeletal elements of the calf recovered from context [80] at Bedford Street

Element	Right	Left
cranium	1	
thoracic vertebra	1	
lumbar vertebra	2	
innominate bone	1	1
femur	1	1
tibia	1	1
calcaneum	1	1
astragalus	1	
naviculocuboid	1	
phalanx I	2	
phalanx III (hoof core)	1	

also represented, including ribs and long bone shaft fragments (pieces of broken/smashed 'marrow bones').

Sheep

There is a single cranium from a polled (naturally hornless) adult sheep, and the single mandible recovered comes from a lamb aged two to six months at time of death (based on dental wear criteria of Payne 1973). Analysis of the epiphyseal fusion recorded in the long bones also supports the presence of lambs aged two to ten months at time of death, together with slightly older animals, the majority aged less than three to three and a half years at time of slaughter (Table 46).

Table 46. Sheep bones recovered from context [80] at Bedford Street, showing stage of epiphyseal fusion (age at death)

Age	Element	Fused	Unfused
6 – 10 months	Innominate bone		1
	Humerus distal	1	1
	Radius proximal	1	
1.5 – 2 years	Tibia distal		3
2.5 – 3 years	Femur proximal		2
3 – 3.5 years	Radius distal	1	1
	Ulna proximal		2
	Femur distal		2
	Tibia proximal		1

Pig

Three mandibles represent three individuals; two of them immature, under one year old at time of death (lower second molar just visible in the crypt) and one slightly older (sub-adult) animal aged just over one year (lower second molar erupted but unworn).

Rabbit

Three animals are represented: two adult and one immature.

Domestic fowl

Both immature and adult birds are represented (Table 47), the latter including at least one hen (identified by its unspurred tarsometatarsal bone — criteria of West 1982).

Table 47. Domestic fowl bones recovered from context [80] at Bedford Street

Element	Immature	Adult
Scapula		1
Coracoid	1	
Humerus		2
Ulna	1	1
Pelvis		2
Femur		1
Tibiotarsus	1	1
Tarsometatrsus		1
Rib		1
Sternum		1
Furculum		1
Totals	3	12

Fish

Both marine and freshwater species are represented. A cleithrum is identified as coming from a large flatfish (*cf.* turbot) and two caudal vertebrae from sole. A single vertebra comes from a small herring and a parasphenoid and ray from a gadoid (*cf.* cod). There is a posterior abdominal vertebra of freshwater eel and a maxilla of tench. Using the formula of Libois and Hallet-Libois (1988, 22) the total length of the tench is established from the length of the maxilla (L = 15.2mm) (TL = 18.488 x L – 4.946). The calculated TL value of 27.6cm falls within the average size range of adult tench (20–30cm) documented by Newdick (1979, 52).

Interpretation and comparisons

Calculations of the relative frequencies of the weights of bone from the three principal meat-yielding species indicate that beef/veal provided the greatest proportion of meat consumed, with mutton/lamb making a secondary contribution, and pork third in importance (Table 48). Adult chickens and pullets also featured in the diet, with additional variety provided by marine and freshwater fish. Although seemingly not an especially extravagant diet, the beef, mutton and pork consumed nevertheless included very respectable proportions of the highest grade butchers' cuts of meat. The presence of veal and lamb, together with sheep killed

Table 48. Relative percentages of the main meat species present in context [80] at Bedford Street, numbers based on weight of bones

Beef/veal	Mutton/lamb	Pork	Total wt. bone (gm)
51.2%	29.2%	19.6%	3240

in their prime at two to three years of age, also provides further supporting evidence that the assemblage included the best quality and most succulent meats. Interestingly, chickens and pullets were being consumed, which during this period were expensive food items, with a single chicken costing as much as one shilling and four denarii (Drummond & Wilbraham 1939, 130). Turbot also was an expensive food item, costing as much as 18 shillings for two (Drummond & Wilbraham 1939, 132), so its presence among the food waste provides yet another indication of the quality of the food being consumed.

Comparisons may be made with virtually contemporary assemblages at two other sites. First, the food debris recovered from the backfill of a timber-lined storage pit [239] and a cesspit [287] at 43–53 Narrow Street, Tower Hamlets, London E14 — deposits dating from *c.*1680–1750, believed to derive from the Noah's Ark Inn that once stood on the site (Armitage 2005b). Secondly, the food debris from the backfill of a stone-lined pit at 16 Tunsgate, Guildford, Surrey, dated *c.*1702–1714, believed to derive from the Tun Inn, which was probably frequented by well-off people living in the locality (Smith & Serjeantson 1997).

With regard to the array of meat, poultry and fish available to patrons at the three premises, the Tun Inn surpasses the other two. This is especially the case with reference to the greater variety and quantity of fish (freshwater as well as marine) consumed at the Tun Inn (Table 48). However, caution must be applied in interpreting the data shown in Table 49 as the apparent comparative limited evidence (in the case of the Narrow Street site, absence) of fish species/bone elements at the London sites could reflect deficiencies in the degree of recovery of the remains. At the Narrow Street site all the bone was hand collected, whilst at Bedford Street the hand-collected material was augmented by a single sieved environmental sample. By comparison, at the Guildford site the entire infill of the pit was sieved in order to maximise recovery of small bones such as those of fish species.

Table 49. Comparison of the food debris recovered from Bedford Street cesspit, compared with assemblages from Noah's Ark Inn, East London and the Tun Inn, Guildford. Summary counts of all the various food species are listed

Species	Bedford Street	Noah's Ark Inn	Tun Inn
Cattle	64	98	83
Sheep	94	75	78
Pig	19	10	33
Fallow deer	0	0	1
Rabbit	4	3	3
Domestic fowl	15	6	39
Goose	0	1	49
Pigeon	0	0	14
Duck	0	0	14
Carp	0	0	16
Chub	0	0	1
Tench	1	0	0
Perch	0	0	1
Freshwater eel	1	0	0
Cod	2	0	2
Turbot	1	0	0
Sole	2	0	0
Mackerel	0	0	6
Herring	1	0	3
Thornback ray	0	1	0

In respect of the quality of the meat consumed, it seems the diners at both the Tun Inn and Bedford Street enjoyed prime beef and mutton (with a high proportion of the meatier cuts represented), as well as succulent veal, lamb, and young piglets. Rabbits, chickens and pullets were served at all three locations, but duck and pigeon apparently only at the Tun Inn. Evidence for venison consumption was also limited to the Tun Inn.

Conclusion

In urban communities across Britain during the later 17th and 18th centuries, people often dined at taverns and inns, where they could purchase hot or cold meat dishes and various baked/fried fish, supplemented by bread, cheese and ale. As in pubs today, the range and quality of the meals provided varied greatly. From the results of this

present study (Table 49), it would seem that although the meals served at the Bedford Street apparently did not quite match up to those enjoyed at the Tun Inn, Guildford, the overall quality of the meat and availability of choice foods (especially pullets, turbot and tench) would nevertheless have been very much in keeping with a 'fashionable' eating establishment frequented by well-to-do diners.

BEDFORD STREET POST-MEDIEVAL DISCUSSION

Early to late 17th century (Phase 3)

The 36 intercutting features are interpreted as a phase of gravel extraction which took place during the 17th century (Fig 32). Whilst much of the diagnostic material recovered from these pits broadly dates to between 1550 and 1700, the pottery retrieved from pit [228] offers a far more concise date of 1580–1620/30. This period correlates with a major episode of development in the area, with both the construction of the Covent Garden piazza 1631–37 and Bedford Street during the 1630s (discussed earlier). With the natural terrace gravels forming part of the underlying geology of the Covent Garden area, considerable expense would have been spared in extracting the gravel locally rather than in having it imported from elsewhere. With further roads being established as part of Lord Russell's development (including Bedford Street), large quantities of gravel would have been required.

A brick wall [277] may have been part of a building constructed soon after the establishment of Bedford Street (Fig 33). Leases are known to have been granted on this street from as early as 1631, and by 1673 John Lacy's map depicts the area as heavily developed. This building is neither extant on Horwood's map of 1813, nor on Rocque's map of 1746 which, although lacking in detail, depicts an almost identical outline to the block of buildings present on the 1813 map. This suggests that this building had been completely demolished by the mid-18th century, and redevelopment of Bedford Court is known to have taken place in 1688 (Sheppard 1970, 263).

Cesspit [56] and a contemporary pit [160] appear to have been situated within Bedford Court itself (Fig 33). Lacy's map of 1673 depicts this courtyard as a large open area with access routes located to the south from Chandos Street and to the east from Bedford Street. During the late 17th century Bedford Court was used as a stable and coach house yard by Thomas Brigham, a coachmaker. Redevelopment took place in 1688, when the fifth Earl of Bedford converted the yard into a regular court and constructed a number of houses and shops (Sheppard 1970, 263). Although little diagnostic material was recovered from the two pits recorded within the courtyard area, both of these features are likely to have been backfilled prior to the late 17th-century redevelopment.

Late 17th to 18th century (Phase 4)

Between *c.*1690 and 1710, an earlier brick-lined cesspit [82] went out of use (Fig 33). The final fill of this feature contained a rich finds and faunal assemblage including clay tobacco pipes, glass ware, ceramics and a cockerel figurine (Fig 35, 2; Table 49) (see Armitage, Jarrett, Shepherd & Sudds above). This entire assemblage is very indicative of a clearance group derived from a fashionable inn or tavern. Another possible tavern clearance group of late 17th-century date has been discovered nearby at the National Gallery site (Telfer 2006, 204). According to Lacy's map of 1673 this cesspit was located within a yard area, which was surrounded by buildings fronting onto Bedford Street to the north and south and to the west by the property fronting onto Bedford Court. The precise building to which the cesspit belonged was unclear, although drinking establishments dating to this period are certainly noted within the area. From as early as 1633 a tavern known as the Cross Keys was located on the northern side of the corner between Bedford Street and Henrietta Street to the immediate north-east of the study site (Sheppard 1970, 253–63).

The date of the backfilling of cesspit [82] is comparable with the levelling layers recorded in the western area of the excavation. This suggests that a number of changes occurred on the site during this period and this activity was probably related to the late 17th-century phase of redevelopment on the eastern

side of Bedford Court (discussed earlier). Further alterations also took place along the Bedford Street frontage, with the open yard area previously occupied by cesspit [82] being partially built over. The precise date for the Bedford Street alterations is unclear, but Lacy's map certainly differs from Rocque's of 1746. Both the cartographic and archaeological evidence suggest that the Bedford Street and the Bedford Court developments were contemporary.

The north-west to south-east aligned wall [107] recorded along the western side of the site is interpreted as the frontage of a building erected during the 1688 redevelopment of Bedford Court (Fig 33). According to Horwood's map of 1813, this wall was part of the façade of two adjoining dwellings known as 2 and 3 Bedford Court. Following the erection of these new buildings, a requirement was stipulated within the lease whereby the lessee was to make a sewer from his house, and to contribute to the cost of the sewer and the paving which the Earl was to provide in the court (Sheppard 1970, 263). Clear evidence of this stipulation was revealed by the presence of drains [100] and [104] at the northern end of the wall (Fig 33), which flowed towards Bedford Court from directly beneath No. 3. Bedford Court was described in 1720 as

> a very handsome large Court, with an open Square in the Midst: Its Houses … are very good, and well inhabited; being a great Through-fare, and a Place of Trade. (Strype 1720, 93)

The various truncated brick-lined cesspits were associated with properties fronting onto Bedford Court, with [290] situated to the rear of No. 1 and [195]/[196] located to the rear of No. 4. With these features surviving in such fragmentary condition limited finds were recovered, and the diagnostic material offered little insight into the trades and practices being carried out within the associated establishments. Occupants in 1726 included two upholsterers, two tailors, a mantuamaker (dress/cloak maker), a stay-maker, a mercer, a peruke (periwig) maker, a grocer, a pastry-cook and a coffee-house keeper (Sheppard 1970, 263). Cesspits [246] and [263] were located towards the rear of 6 Bedford Street, which was also noted as

> a handsome and broad Street, with very good Houses … the West Side of this Street is the best. (Strype 1720, 93)

The introduction of drain [94] beneath 3 Bedford Court suggested that the lessees of the Bedford Court properties were still required to repair and replace their own sewers into the 19th century (Fig 33). The buildings fronting onto Bedford Street and occupying the site boundary were demolished between 1862 and 1863 and were subsequently replaced with 15 and 16 Bedford Street, to which the present façade belonged. The Bedford Court properties were demolished in 1879 (Sheppard 1970, 263).

POST-MEDIEVAL ACTIVITY AT JAMES STREET (PHASE 3)

James Street was constructed as part of the Covent Garden development undertaken in 1631 (discussed earlier). It seems likely that the mortar surface, redeposited brickearth and stakehole observed in Area 1 related to this development (not illus). The brick-lined well [32] recorded to the rear of the building has been dated to between *c.*1666 and 1725 by the bricks used in its construction, whilst pottery dated to 1650–1800 was recovered from the backfill of the well suggesting an 18th-century date for its disuse. It would have been situated within the courtyard of 27 James Street, which is depicted on the 1680–85 Survey of Covent Garden. The various brick-lined drains ([08] and [10]) and the fragmentary brick structures ([01] and [09]) are believed to have been constructed as part of the 19th-century alterations to the building (Fig 37). A similar early 19th-century drain constructed with a curved pan-tile base has been recorded at Bedford Street (see above). The later wall [03] constructed on top of the eastern drain [08] was most probably erected during either the late 19th or early 20th century. The animal bones recovered from the backfill of the well construction trench [31] and the fill of one of the drains [08] were discussed earlier (see Rielly above).

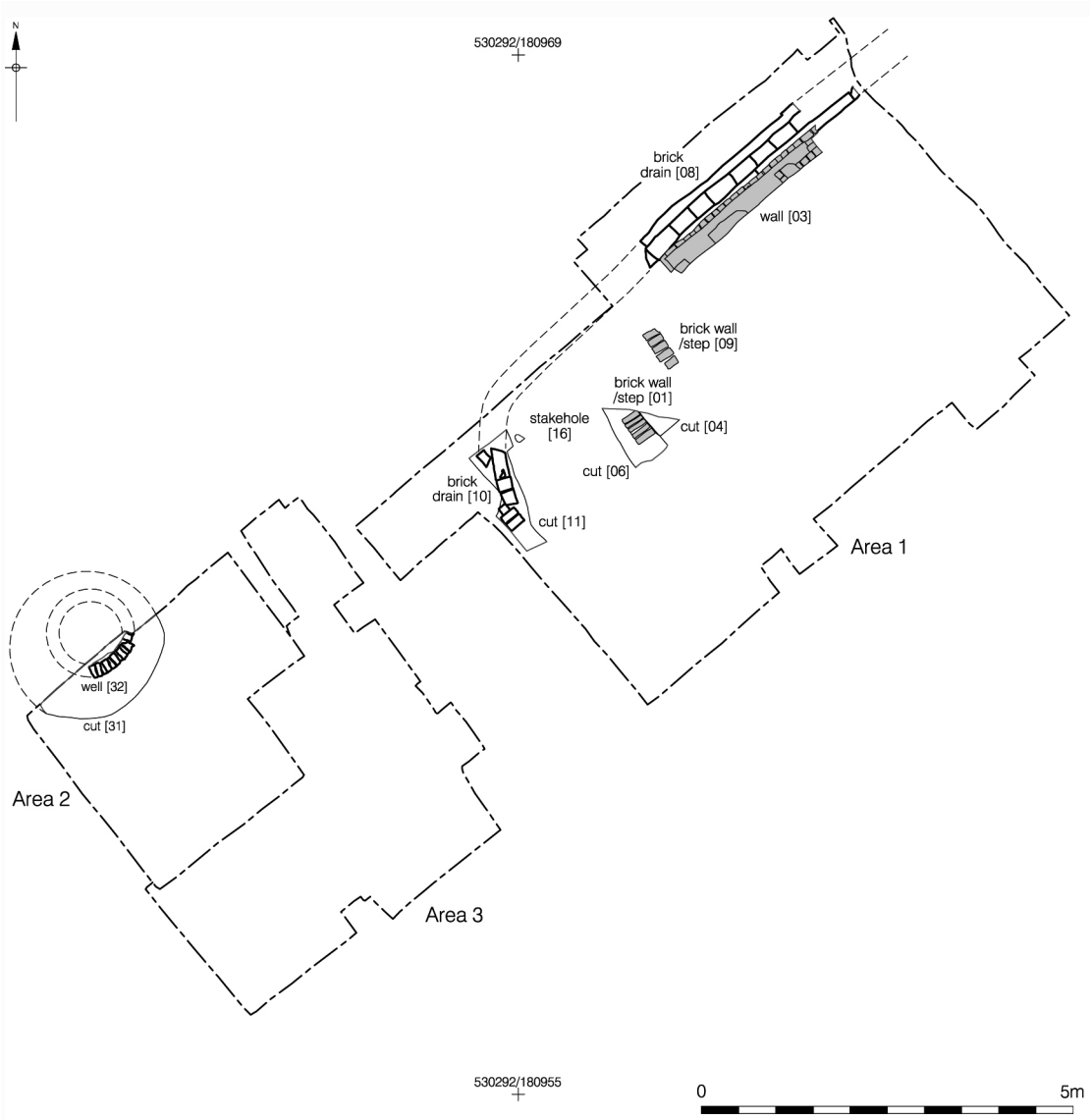

Fig 37. Post-medieval structural features (Phase 3) at James Street

POST-MEDIEVAL SMALL FINDS FROM JAMES STREET

Märit Gaimster

Besides an iron nail from the fill of stakehole [16], the only post-medieval find consisted of a simple straight-handled ivory toothbrush (Fig 28, 5). This find was unstratified, but is likely to date from the late 18th or 19th centuries. A very similar toothbrush from Chichester, with the head and straight handle in one piece, was associated with early 19th-century pottery (Gaimster in prep).

Sf 1: ivory toothbrush with three rows of bristle holes; straight head and handle with rounded ends; L 120mm

ACKNOWLEDGEMENTS

Pre-Construct Archaeology Ltd would like to thank Lothbury Property Trust Company Ltd for generously funding the archaeological

work at 15–16 Bedford Street and 27 James Street, and Richard Hughes of IHCM for commissioning the work on their behalf and Galliford Try for their assistance throughout the excavations. Thanks also to Diane Walls of the Greater London Archaeology Advisory Service (GLAAS) for monitoring both sites on behalf of the local authority.

Bedford Street

The principal author (Alexis Haslam) would like to express his gratitude to Jon Butler for his project management during both the fieldwork and the post-excavation work; Josephine Brown, Victoria Osborn and Mark Roughley of the PCA Graphics Department for the illustrations; and Lisa Lonsdale for technical and logistical support.

Finally, the author would like to thank all of the excavation staff for their hard work and effort throughout. Particular thanks to Jim Leary for his supervision of the project and to Eliott Wragg for taking over supervisory duties during Jim's absence.

Chris Jarrett would like to thank David Higgins for his comments on the gauntlet stamped bowl.

James Street

The author would like to thank Helen Hawkins for project managing the fieldwork; Jon Butler for managing the post-excavation; Mark Roughley of the PCA Graphics Department for the illustrations; Helen Davies for the finds illustrations; Strephon Duckering for the photography; Aidan Turner and Nathalie Barrett for the surveying; and Lisa Lonsdale for technical and logistical support.

Finally, the author would like to thank all of the excavation staff for their hard work and effort throughout: Iain Bright, Joe Brooks, Pat Cavanagh, Luciano De Camillis, Matt Edmonds, Paw Jørgensen, James Langthorne, Tomasz Mazurkiewicz, Paul McGarrity, Rhiannon Rhy, Guy Seddon and Sophie White.

JButler@pre-construct.com

NOTE

[1] www.museumoflondon.org.uk/claypipes/pages/marks.asp, accessed 2009: 8–11 Crescent Street, EC3, site code: CRT89 and 26 Magdalen Street, SE1, site code: MGS96; Le Cheminant 1981, 164, 166, fig. 22.32.

BIBLIOGRAPHY

Abbot, P, Lowore, J, Khofi, C, & Werren, M, 1997 'Defining firewood quality: a comparison of quantitative and rapid appraisal techniques to evaluate firewood species from a southern African savanna' *Biomass & Bioenergy* 12, 429–37

Alcock, N W, & Hall, L, 1994 *Fixtures and Fittings in Dated Houses 1567–1763* Practical Handbooks in Archaeology No. 11, York

Allott, L, Batchelor, R, & Green, C, 2010 'Environmental assessment' in Haslam 2010

Ambrosiani, K, 1981 *Viking Age Combs, Comb Making and Comb Makers in the Light of Finds from Birka and Ribe* Stockholm Studies in Archaeology 2, Stockholm

Ambrosiani, K, 1982 'Vikingatida kammar i öst och vast. Ett diskussionsinlägg' *Fornvännen* 77, 180–3

Amorosi, T, 1989 *A Postcranial Guide to Domestic Neo-natal and Juvenile Mammals* BAR Int Ser 533, Oxford

Anderson, S, 2003 'Post-Roman pottery' in C Gibson with J Murray 'An Anglo-Saxon settlement at Godmanchester, Cambridgeshire' *Anglo-Saxon Studies in Archaeology and History* 12, 174–83

Andersson, E, 2003 *Tools for Textile Production from Birka and Hedeby* Birka Studies 8, Stockholm

Archer, M, 1997 *Delftware: The Tin-glazed Earthenware of the British Isles: a Catalogue of the Collection in the Victoria & Albert Museum*, London

Armitage, P L, 1977 *The Mammalian Remains from the Tudor Site of Baynard's Castle, London: A Biometrical and Historical Analysis* unpub PhD thesis: Royal Holloway College & British Museum (Natural History)

Armitage, P L, 1982a 'Developments in British cattle husbandry from the Romano-British period to early modern times' *The Ark* 9, No. 2, 50–4

Armitage, P L, 1982b 'A system for ageing and sexing the horn cores of cattle from British post-medieval sites (17th to early 18th century) with special reference to unimproved British Longhorn cattle' in Wilson *et al* 1982, 37–54

Armitage, P L, 2001 'The mammal and bird bone assessment' in J Leary *Phased Summary and Assessment Document of an Archaeological Excavation at 28–30 James Street, Covent Garden, City of Westminster, SW1* PCA unpub report

Armitage, P L, 2004a 'The animal bone (James St)' in Leary *et al* 2004, 28–35

Armitage, P L, 20004b 'The animal bones (National Portrait Gallery)' in Leary *et al* 2004 105–12

Armitage, P L, 2004c 'The fish bones (James Street)' in Leary *et al* 2004, 33–4

Armitage, P L, 2005a 'The fish bones' in Butler 2005, 66–7

Armitage, P L, 2005b 'The mammal, bird and fish bones from the post-medieval contexts' in D Killock & F Meddens 'Pottery as plunder: a 17th century maritime site in Limehouse, London' *Post-medieval Archaeol* 39/1, 1–91

Armitage, P L, 2009 'The fish bones from Phase 2: Saxon pits at Bedford Street (BDO04)' PCA unpub report

Armitage, P L, & Clutton-Brock, J, 1976 'A system for the classification and description of the horn cores of cattle from archaeological sites' *Journal Archaeol Science* 3, 329–48

Atkinson, D, & Oswald, A, 1969 'London clay tobacco pipes' *Journal Brit Archaeol Assoc* 32, 171–227

Becker, C von, 1980 *Untersuchungen an Skelettresten von Haus- und Wildschweinen aus Haithabu*, Neumünster

Bendrey, R, 2005 'Animal bone' in Butler 2005, 64–6

Bishop, B, 2010 'Lithic assessment' in Haslam 2010

Blackmore, L, 1988a 'The worked bone and antler' in Cowie *et al* 1988, 134–8

Blackmore, L, 1988b 'The pottery' in Cowie *et al* 1988, 81–110

Blackmore, L, 1988c 'The loomweights and spindlewhorls' in Cowie *et al* 1988, 111–14

Blackmore, L, 1989 'The pottery' in Whytehead *et al* 1989, 71–107

Blackmore, L, 2001 'Pottery: trade and tradition' in D Hill & R Cowie (eds) *Wics: The Early Medieval Trading Centres of Northern Europe* Sheffield Archaeological Monographs 14, Sheffield, 22–42

Blackmore, L, 2002 'The origins and growth of Lundenwic, a mart of many nations' in B Hårdh & L Larsson (eds) *Central Places in the Migration and Merovingian Periods* Uppåkrastudier 6, Acta Archaeologia Lundensia Series 80 (39), Stockholm, 273–302

Blackmore, L, 2003a 'Worked bone and antler objects and waste' in Malcolm *et al* 2003, 302–15

Blackmore, L, 2003b 'The pottery' in Malcolm *et al* 2003, 225–41

Blackmore, L, 2003c 'The iron objects' in Malcolm *et al* 2003, 251–64

Blackmore, L, 2008a 'The pottery' in Cowie & Blackmore 2008, 168–93

Blackmore, L, 2008b 'The accessioned finds' in Cowie & Blackmore 2008, 193–211

Blackmore, L, with Dennis, M, 2003 'Non-ferrous metalworking' in Malcolm *et al* 2003, 271–3

Blackmore, L, Vince, A, & Cowie, R, 2004 'The origins of Lundenwic? Excavations at 8–9 Long Acre/16 Garrick Street, WC2' *London Archaeologist* 10, No. 11, 301–5

Blinkhorn, P, 1989 'Middle Saxon pottery from the Buttermarket kiln, Ipswich, Suffolk' *Medieval Ceramics* 13, 12–16

Blockley, K, Blockley, M, Blockley, P, Frere, S S, & Stow, S, 1995 *Excavations in the Marlowe Car Park and Surrounding Areas*, The Archaeology of Canterbury 5, Canterbury

Bond, J M, & O'Connor, T P, 1999 *Bones from Medieval Deposits at 16–22 Coppergate and Other Sites in York*,The Archaeology of York 15/5, York

Bourdillon, J, 2003 'Bias from boneworking at Middle Saxon Hamwic, Southampton' in I D Riddler (ed) *Materials of Manufacture: the Choice of Materials in the Working of Bone and Antler in Northern and Central Europe during the First Millennium AD* BAR Int Ser 1193, Oxford, 49–64

Bourdillon, J, & Coy, J, 1980 'The animal bones' in P Holdsworth *Excavations at Melbourne Street, Southampton, 1971–1976* CBA Res Rep 33, York, 79–118

British Geological Survey 1994, 1:50,000 Series, Sheet 256, North London, Solid and Drift Edition

Brown, D, 1974 'Problems of continuity' in T Rowley (ed) *Anglo-Saxon Settlements and Landscape* BAR Brit Ser 6, Oxford, 16–19

Brugmann, B, 2004 *Glass Beads from Early Anglo-Saxon Graves. A Study of Provenance and Chronology of Glass Beads from Early Anglo-Saxon Graves, Based on Visual Examination*, Oxford

Butler, J, 2005 *Saxons, Templars & Lawyers in the Inner Temple: Archaeological Excavations in Church Court & Hare Court* PCA Monograph 4, London

Cappers, R T J, Bekker, R M, & Jans, J E A, 2006 *Digital Seed Atlas of the Netherlands* Groningen Archaeological Series 4, Groningen

Clark, J, (ed) 1995 *The Medieval Horse and its Equipment* Museum of London: medieval finds from excavations in London 5, London

Clason, A T, 1978 'Voorwerpen uit ben en gewei' *Spiegel Historiael* 13, 294–7

Clason, A T, 1980 'Worked bone and antler objects from Dorestad Hoogstraat I' in W A van Es & J H Verwers *Excavations at Dorestad 1, The Harbour: Hoogstraat I* Nederlandse Oudheiden 9, 238–47

Clutton-Brock, J, 1984 *Neolithic Antler Picks from Grimes Graves, Norfolk, and Durrington Walls, Wiltshire: a Biometrical Analysis, Excavations at Grimes Graves, Norfolk, 1972–1976* Fascicule 1 British Museum Press, London

Clutton-Brock, J, Dennis-Bryan, K, Armitage, P L, & Jewell, P A, 1990 'Osteology of the Soay sheep' *Bulletin British Museum (Natural History) Zoology* Series 56, No. 1, 1–56

Cowie, R, 1988 'A gazetteer of Middle Saxon

sites and finds in the Strand/Westminster Area' *Trans London Middlesex Archaeol Soc* 39, 37–46

Cowie, R, 2000 'Londinium to Lundenwic: Early and Middle Saxon archaeology in the London region' in I Haynes, H Sheldon & L Hannigan (eds) *London Under Ground: the Archaeology of a City*, Oxford, 175–205

Cowie, R, & Blackmore, L, 2008 *Early and Middle Saxon Rural Settlement in the London Region* MOLAS Monograph 41, London

Cowie, R, & Blackmore, L, with Davis, A, Keily, J, & Rielly, K, 2013 *Lundenwic: Excavations in Middle Saxon London, 1987–2000* **MoLA** Monograph Series 63, London

Cowie, R, Whytehead, R L, with Blackmore, L, 1988 'Two Middle Saxon occupation sites: excavations at Jubilee Hall and 21–22 Maiden Lane' *Trans London Middlesex Archaeol Soc* 39, 47–163

Davis, S J M, 2002 'British agriculture: texts for the zoo-archaeologist' *Environmental Archaeology. The Journal of Human Palaeoecology* 7, 47–60

Deschler-Erb, S, 1998 *Römische Beinartefakte aus Augusta Raurica. Rohmaterial, Technologie, Typologie und Chronologie* Forschungen in Augst 27, Augst

Dodwell, N, 2004 'The human bone (James Street)' in Leary *et al* 2004, 39

Driesch, A von den, 1976 *A Guide to the Measurement of Animal Bones from Archaeological Sites* Peabody Museum of Archaeology & Ethnology Bulletin 1, Harvard

Driesch, A von den, & Boessneck, J, 1974 'Kritische Anmerkungen zue Widerristhöhenberechnung aus Langenmassen vor- und frühgeschichlicher Tierknochen' *Saugetierkundliche Mitteilungen* 22, 325–48

Driver, J C, 1984 'Zooarchaeological analysis of raw-material selection by a Saxon artisan' *J Field Archaeology* 2, 397–403

Drummond, J C, & Wilbraham, A, 1939 *The Englishman's Food: a History of Five Centuries of English Diet*, London

Dyson, T, 1980 'London and Southwark in the seventh century and later' *Trans London Middlesex Archaeol Soc* 31, 83–95

Egan, G, 2005 *Material Culture in London in an Age of Transition: Tudor and Stuart Period Finds c 1450–c 1700 from Excavations at Riverside Sites in Southwark* MoLAS Monograph 19, London

Evans, D H, & Loveluck, C, (eds) 2009 *Excavations at Flixborough Vol. 2. Life and Economy at Early Medieval Flixborough, c. AD 600–1000: the Artefact Evidence*, Oxford

Evison, V I, 1988 'The glass' in Cowie *et al* 1988, 119–23

Evison, V I, 1989 'The Saxon glass' in Whytehead *et al* 1989, 12–16

Evison, V I, 2009 'Vessel glass' in Evans & Lovelock 2009, 103–15

Fock, J, 1966 *Metrische Untersuchungen an Metapodien Einiger Europäischer Rinderassen* unpub dissertation University of Munich

Gaimster, D, 2003 'Pots, prints and Protestantism: changing mentalities in the urban domestic sphere, *c.*1480–1580' in D Gaimster & R Gilchrist (eds) *The Archaeology of the Reformation, 1480–1580*, Soc Post-Medieval Archaeol Monograph 1, Leeds, 122–234

Gaimster, M, 2001 'Gold bracteates and necklaces: political ideals in the sixth century' in B Magnus (ed) *Roman Gold and the Development of the Early Germanic Kingdoms. Aspects of Technical, Socio-political, Socio-economic, Artistic and Intellectual Development, A.D. 1–550* Kungl Vitterhets Historie och Antikvitets Akademien, Konferenser 51, 143–56

Gaimster, M, in prep 'The metal and small finds from phase 13 (18th–19th centuries)' in J Taylor *Excavations at the Shippams Factory and Sports and Social Club, Chichester* PCA Monograph Series

Gaimster, M, & Riddler, I D, 2005 'The small finds' in Butler 2005, 56–64

Gale, R, & Cutler, D, 2000 *Plants in Archaeology: Identification Manual of Vegetative Plants Used in Europe and the Southern Mediterranean*, Westbury and The Royal Botanic Gardens Kew

Galloway, P, & Newcomer, M, 1981 'The craft of comb-making: an experimental enquiry' *University of London Institute of Archaeology Bulletin* 18, 73–90

Gibbard, P L, 1994 *Pleistocene History of the Lower Thames Valley*, Cambridge

Goffin, R, 2003a 'The loom weights' in Malcolm *et al* 2003, 216–22

Goffin, R, 2003b 'The quernstones' in Malcolm *et al* 2003, 204–9

Grant, A, 1982 'The use of toothwear as a guide to the age of domestic ungulates' in Wilson *et al* 1982, 91–108

Green, C P, & Vaughan-Williams, A, 2005 'Environmental assessment' in Leary 2005, 88–95

Green, H J M, 1963 'Secrets of Whitehall: evidence of Roman, Saxon and medieval Westminster revealed during the current rebuilding of the Treasury and Downing Street – Part 1' *Illustrated London News* 242, 29 June 1963, 1004–7

Grew, F, 1984 'Pipe clay ('wig') haircurlers' in A Thompson, F Grew & J Schofield 'Excavations at Aldgate, 1974' *Post-Medieval Archaeol* 18, 112–14

Grigson, C, 1982 'Sex and age determination of some bones and teeth of domestic cattle: a review of the literature' in Wilson *et al* 1982, 7–23

Hagen, A, 1995 *A Second Handbook of Anglo-Saxon Food and Drink: Production and Distribution*, Wilton, Norfolk

Harcourt, R A, 1974 'The dog in prehistoric and early historic Britain' *Journal Archaeol Science* 1, 151–75

Haslam, A, 2010 *An Assessment of an Archaeological Excavation at 27 James Street, London WC2, City of Westminster* PCA unpub report

Haslam, J, 1975 'The finds' in M J Hammerson 'Excavations on the site of Arundel House in The Strand, WC 2, in 1972' *Trans London Middlesex Archaeol Soc* 26, 221–42

Hather, J G, 2000 *The Identification of the Northern European Woods: a Guide for Archaeologists and Conservators*, London

Hatting, T, 1975 'The influence of castration on sheep horns' in A T Clason (ed) *Archaeological Studies*, Amsterdam, 345–51

Higgins, D A, 1985 'Clay tobacco pipes from the Dorking area of Surrey' in P Davey (ed) *The Archaeology of the Clay Tobacco Pipes IX* BAR Brit Ser 146 (ii), Oxford, 405–22

Higgins, D A, 2006 'The pipe clay objects' in A Saunders (ed) *Excavations at Launceston Castle* Society Medieval Archaeology Monographs 24, Leeds, 381–416

Hill, D, & Cowie, R, (eds) 2001 *Wics: the Early Medieval Trading Centres of Northern Europe* Sheffield Archaeological Monographs 14, Sheffield

Hilton Price, F G, 1900 'Notes Upon Some Early Clay Tobacco Pipes, from the Sixteenth to the Eighteenth Centuries, Found in the City of London, in the Possession of the Author' *Archaeol Journal* 57, 224–40

Hodges, R, 1981 *The Hamwih Pottery: the Local and Imported Wares from 30 Years Excavations at Middle Saxon Southampton and their European Context* Southampton Archaeol Research Committee Report 2 / CBA Research Report 37, York

Holdsworth, P E, 1976 'Saxon Southampton: a new review' *Medieval Archaeol* 20, 26–61

Humphrey, R, 2001 *45–47 Floral Street/ 51–54 Long Acre Archaeological Excavation – Post-Excavation Assessment* AOC unpub report

Hunter, K L, 2004 'The plant remains' (28–31 James Street) in Leary *et al* 2004, 35–8

Hurst, J G, 1959 'Middle Saxon pottery' in G C Dunning, J G Hurst, J N L Myres & F Tischler 'Anglo-Saxon pottery: a symposium' *Medieval Archaeol* 3, 13–31

Hurst, J G, 1976 'The pottery' in D M Wilson (ed) *The Archaeology of Anglo-Saxon England*, Cambridge, 283–348

Jacomet, S, 2006 *Identification of Cereal Remains from Archaeological Sites* (2nd edn), Basal: IPAS Basal University

Jarrett, C, 2001a 'The pottery' in Leary 2001, 62–7

Jarrett, C, 2001b 'Haircurler assessment' in Leary 2001, 98

Jarrett, C, 2004a 'The pottery (James St)' in Leary *et al* 2004, 14–19

Jarrett, C, 2004b 'The pottery (Maiden Lane)' in Leary *et al* 2004, 77–82

Jarrett, C, 2004c 'The pottery (Lyceum Theatre)' in Leary *et al* 2004, 48–52

Jarrett, C, 2004d 'The pottery (National Portrait Gallery)' in Leary *et al* 2004, 91–4

Jarrett, C, forthcoming 'The distribution of 17th-century clay pipes in London' Society of Clay Pipe Research

Jarrett, C, in prep (a) 'The post-Roman pottery' in G Brown & C Pickard *Excavations at Borough High Street, Southwark* PCA Monograph

Jarrett, C, in prep (b) 'The coffee house/dining room' in C Picard, C Jarrett & C Phillpotts 'The transformation from village life to urban sprawl at Fulham Island, London borough of Hammersmith' *Post-Medieval Archaeol*

Jarrett, C, in prep (c) 'The pipe clay cock figurine' in C Picard, C Jarrett & C Phillpotts 'The transformation from village life to urban sprawl at Fulham Island, London borough of Hammersmith' *Post-Medieval Archaeol*

Keepax, C, 1988 *Charcoal Analysis with Particular Reference to Archaeological Sites in Britain* unpub PhD thesis University of London

Keily, J, 2013 'Ceramic spindle whorl, loom weights and other finds' in Cowie *et al* 2013

Keys, L, 2004 'The iron slag (28–31 James Street)' in Leary *et al* 2004, 27

Keys, L, 2010 'Iron slag and related high-temperature debris assessment' in Haslam 2010

Laidlaw, M, 2004 'The small finds' in Leary *et al* 2004, 82–5

Langthorne, J Y, 2010 'Human bone assessment' in Haslam 2010

Leahy, K, 2003 *Anglo-Saxon Crafts: Revealing History*, Stroud

Leary, J, 2001 *Phased Summary and Assessment Document of an Archaeological Excavation at 28–30 James Street, Covent Garden, City of Westminster, SW1* PCA unpub rep

Leary, J, 2004 *An Archaeological Watching Brief on Geotechnical Test Pits and Boreholes at 15–16 Bedford Street, City of Westminster, London* PCA unpub rep

Leary, J, 2005 A*n Archaeological Excavation at 15–16 Bedford Street, City of Westminster, London* PCA unpub rep

Leary, J, with Brown, G, Rackham, J, Pickard, C, & Hughes, R, 2004 *Tatberht's Lundenwic: Archaeological Excavations in Middle Saxon London* PCA Monograph 2, London

Le Cheminant, R, 'Clay tobacco pipes from London and the South East' in P Davey (ed) *The Archaeology of the Clay Tobacco Pipe VI. Pipes and Kilns in the London Region* BAR Brit Ser 97, Oxford, 127–72

Le Cheminant, R, 1984 'The development of the pipe clay hair curler – a preliminary study' in P Davey (ed) *The Archaeology of the Clay Tobacco Pipe VII* BAR Brit Ser 100, Oxford, 345–54

Lewcun, M, 1985 'Mould modification in the 17th century' *Society of Clay Pipe Research Newsletter* 6, 15–19

Libois, R M, & Hallet-Libois, C, 1988 'Éléments pour l'identification des restes crâniens des poissons DulÇaquicoles de Belgique et du Nord de la France 2 – Cypriniformes' *Fiches d'Ostéologie Animale pour l'Archaéologie 4* Centre de Recherches Archéologiques – CNRS (France)

Libois, R M, Hallet-Libois, C, & Rosoux, R, 1987 'Éléments pour l'identification des restes crâniens des poissons DulÇaquicoles de Belgique et du Nord de la France 1 – Anguilliformes, Gastéiformes, Cyprinodontiformes et Perciformes' *Fiches d'Ostéologie Animale pour l'Archaéologie 3* Centre de Recherches Archéologiques – CNRS (France)

Lobisser, W, 1997 'Versuche zum Bau von dreilagigen Beinkämmen' in M Fansa *Experimentelle Archäologie 18. Bilanz 1996*, 67–86

Locker, A, 1988 'The fish bones' in Cowie *et al* 1988, 149–50

Locker, A, 1989 'Fish bones' in Whytehead *et al* 1989, 148–50

MacGregor, A, 1985 *Bone, Antler, Ivory and Horn: the Technology of Skeletal Materials since the Roman Period*, London

MacGregor, A, 1989 'Bone, antler and horn industries in the urban context' in D Serjeantson & T Waldron (eds) *Diet and Crafts in Towns* BAR Brit Ser 199, Oxford, 107–28

MacGregor, A, 1991 'Antler, bone and horn' in J Blair & N Ramsay (eds) *English Medieval Industries; Craftsmen, Techniques and Products*, London, 355–78

MacGregor, A, 1992 'Antler, bone and horn 400–1500: industries in transition' *Medieval Europe Research Congress York Pre-Printed Papers G7e*, 163–8

MacGregor, A G, & Currey, J D, 1983 'Mechanical properties as conditioning factors in the bone and antler industry of the 3rd to the 13th century AD' *Journal Archaeol Science* 10, 71–7

Macpherson-Grant, N, 2001 'The local Saxon and later pottery' in M Gardiner, R Cross, N Macpherson-Grant & I Riddler 'Continental trade and non-urban ports in mid-Anglo-Saxon England: excavations at Sandtun, West Hythe, Kent' *Archaeol J* 158, 208–23

Malcolm, G, & Bowsher, D, with Cowie, R, 2003 *Middle Saxon London: Excavations at the Royal Opera House 1989–99* MoLAS Monograph 15, London

Mayer, J J, & Brisbin, I L, 1988 'Sex identification of *Sus scrofa* based on canine morphology' *Journal Mammalogy* 69 (2), 408–12

Morton, A D, 1992 *Excavations at Hamwic, Volume 1: Excavations 1946–83, excluding Six Dials and Melbourne Street* CBA Res Rep 84, London

Murray, P, & Murray, L, 1998 *The Oxford Companion to Christian Art and Architecture: the Key to Western Art's Most Potent Symbolism*, Oxford

Newdick, J, 1979 *The Complete Freshwater Fishes of the British Isles*, London

NIAB, 2004 *Seed Identification Handbook: Agriculture, Horticulture and Weeds* (2nd edn), Cambridge

O'Connor, T P, 1991 *Bones from 46–54 Fishergate* The Archaeology of York, the Animal Bones, fascicule 15(4), York

O'Connor, T, 2001 'On the interpretation of animal bone assemblages from *Wics*' in Hill & Cowie 2001, 54–60

Oswald, A, 1975 *Clay Pipes for the Archaeologist* BAR Brit Ser 14, Oxford

Page, F J T, 1971 *Field Guide to British Deer*, Oxford

Payne, S, 1973 'Kill-off patterns in sheep and goats: the mandibles from Asvan Kale' *Anatolian Studies* 23, 281–303

Pearce, J, 2000 'A late 18th-century inn clearance assemblage from Uxbridge, Middlesex' *Post-Medieval Archaeol* 34, 144–86

Pietzsch, H, 1979 'Nachbildungen von Knochen- und Geweihkämmen aus der römischen Kaiserzeit und der Volkerwanderungszeit' *Arbeits- und Forschungberichte zur sächsischen Bodendenkmalpflege* 23, 57–72

Pipe, A, 2007 *The Animal Bones from the London Transport Museum, Covent Garden, London WC2, City of Westminster (LTM03)* MoLAS unpub report

Prummel, W, 1983 *Excavations at Dorestad 2 – Early Medieval Dorestad, an Archaeozoological Study* Amersfoort

Rackham, J, 1994 'Economy and environment in Saxon London' in J Rackham (ed) *Environment and Economy in Anglo-Saxon England* CBA Res Rep 89, London, 126–35

Rackham, D J, 2004 'The environmental evidence from Lundenwic' in Leary *et al* 2004, 148–50

Rackham, J, & Snelling, A, 2004 'The environmental archaeology (Lyceum Theatre)' in Leary *et al* 2004, 61–72

Rackham, J, & West, B, 1989 'Animal remains' in Whytehead *et al* 1989, 148–70

Riddler, I D, 1990a 'Eine Stielkamm aus Haithabu' *Berichte über die Ausgrabungen in Haithabu* 27, Neumünster, 177–81

Riddler, I D, 1990b 'Saxon handled combs from London' *Trans London Middlesex Archaeol Soc* 41, 9–20

Riddler, I D, 1992 'Worked bone and antler' in Morton 1992, 182–4

Riddler, I D, 1997 'Combs with perforated handles' *Archaeologia Cantiana* 117, 189–98

Riddler, I D, 1998 'Worked whale vertebrae' *Archaeologia Cantiana* 118, 205–15

Riddler, I D, 2001a 'The spatial organisation of bone-working at *Hamwic*' in Hill & Cowie 2001, 61–6

Riddler, I D, 2001b 'The small finds' in M Gardiner, R Cross, N Macpherson-Grant & I Riddler 'Continental trade and non-urban ports in mid-Anglo-Saxon England: excavations at *Sandtun*, West Hythe, Kent' *Archaeol Journal* 158, 228–52

Riddler, I D, 2004a 'The loomweights (28–31 James Street)' in Leary *et al* 2004 19–22

Riddler, I D, 2004b 'The non-ceramic finds (28–31 James Street)' in Leary *et al* 2004, 22–6

Riddler, I D, 2004c 'The small finds (Lyceum Theatre)' in Leary *et al* 2004, 52–60

Riddler, I D, 2004d 'The antler waste (Lyceum Theatre)' in Leary *et al* 2004, 56–8

Riddler, I D, 2004e 'The non-ceramic finds (National Portrait Gallery)' in Leary *et al* 2004, 98–102

Riddler, I D, 2004f 'Production in *Lundenwic*: antler, bone and horn working' in Leary *et al* 2004, 145–8

Riddler, I D, & Andrews, P, 1997 'Bone and antler working' in P Andrews *Excavations at Hamwic: Volume 2: Excavations at Six Dials* CBA Res Rep 109, London, 227–30

Riddler, I D, & Trzaska-Nartowski, N I A, 2011 'Chanting upon a dunghill: working skeletal materials in Anglo-Saxon England' in M Hyer & G Owen-Crocker *Daily Life in Anglo-Saxon England*, Manchester, 116–41

Riddler, I D, & Trzaska-Nartowski, N I A, forthcoming a *Bone, Antler and Horn Working in Middle Saxon Hamwic*

Riddler, I D, Trzaska-Nartowski, N I A, & Hatton, S, forthcoming b *An Early Medieval Craft, Antler and Bone Working from Ipswich Excavations 1974–1994* East Anglian Archaeology Report

Rielly, K, 2003 'The animal and fish bone' in Malcolm *et al* 2003, 315–24

Rielly, K, 2013 'The animal bones' in Cowie *et al* 2013

Rielly, K, in prep 'The animal bones' in A Haslam 'Excavations at Caroone House, 14 Farringdon Street' *Trans London Middlesex Archaeol Soc*

Rixson, D, 2000 *The History of Meat Trading*, Nottingham

Rogers, N S H, 1993 *Anglian and Other Finds from 46–54 Fishergate* The Archaeology of York fascicule 17/9, York

Saunders, T, 2001 'Early medieval emporia and the tributary social function' in Hill & Cowie 2001, 7–13

Schmid, E, 1972 *Atlas of Animal Bones for Prehistorians, Archaeologists and Quaternary Geologists*, Amsterdam, London & New York

Schoch, W, Heller, I, Schweingruber, F H, & Kienast, F, 2004 *Wood Anatomy of Central European Species*. Online version: www.woodanatomy.ch (accessed 2009)

Schweingruber, F H, 1990 *Mikroskopische Holzanatomie. Anatomie microscopique du bois. Microscopic Wood Anatomy*, Swiss Federal Institute of Forestry Research

Serjeantson, D, 1989 'Animal remains and the tanning trade' in D Serjeantson & T Waldron (eds) *Diet and Crafts in Towns. The Evidence of Animal Remains from the Roman to the Post-Medieval Periods* BAR Brit Ser 199, Oxford, 129–46

Sheppard, F H W, 1970 *Survey of London: volume 36 – Covent Garden*, London

Sidell, J, 2000 'Environmental archaeology in London 1995–8, Part 3' *London Archaeologist* 9, No. 7, 188–94

Smart, T L, & Hoffman, E S, 1989 'Environmental interpretation of archaeological charcoal' in C A Hastorf & V S Popper (eds) *Current Palaeoethnobotany*, Chicago, 167–205

Smith, P, & Serjeantson, D, 1997 'Food remains: the bones and shells' in K Fryer & A Selley 'Excavation of a pit at 16 Tunsgate, Guildford, Surrey, 1991' *Post-Medieval Archaeol* 31, 208–20

Stace, C, 1997 *New Flora of the British Isles* (2nd edn), Cambridge

Stiff, M, 2003 'The glass finds' in Malcolm *et al* 2003, 241–50

Stiff, M 2013 'The glass' in Cowie *et al* 2013

Strype, J, 1720 *A Survey of the Cities of London and Westminster and the Borough of Southwark* vol 2, bk VI (revised edn of Stow's 1603 Survey of London), London

Sudds, B, 2008 'Pottery' in T Bradley & J Butler From Temples to Thames Street – 2000 Years of Riverside Development: Archaeological Excavations at the Salvation Army International Headquarters, 99–101 Queen Victoria Street, City of London PCA Monograph 7, London, 88–93

Sudds, B, 2010 'Ceramic building material assessment' in Haslam 2010

Swanton, M, 1996 (trans & ed) *The Anglo-Saxon Chronicle*, London

Tabutia, J R S, Dhilliona, S S, & Lyea, K A, 2003 'Firewood use in Bulamogi County, Uganda: species selection, harvesting and consumption patterns' *Biomass and Bioenergy* 25, 581–96

Tannahill, R, 1973 *Food in History*, New York

Telfer, A, 2006 'Rich refuse: a rare find of late 17th-century and mid-18th-century glass and tin-glazed wares from an excavation at the National Gallery, London' *Post-Medieval Archaeol* 40, part 1, 191–213

Telfer, A, & Blackmore, L, 2008 'A farewell to arms: a Saxon shield burial and later occupation at Covent Garden' *Trans London Middlesex Archaeol Soc* 59, 153–69

Tutin, T G, & Heywood, V H, *et al* 1964–1993 *Flora Europaea vols* 1–5, Cambridge

Ulbricht, I, 1978 *Die Geweihverarbeitung in Haithabu* Die Ausgrabungen in Haithabu 7, Neumunster

Ulbricht, I, 1984 *Die Verarbeitung von Knochen, Geweih und Horn im mittelalterlichen Schleswig* Ausgrabungen in Schleswig. Berichte und Studien 3, Neumünster

Vince, A, 1990 *Saxon London: an Archaeological Investigation*, London

Walton, I, 1653 *The Compleat Angler* (reptd 1997), Oxford World's Classics

Walton Rogers, P, 2007 *Cloth and Clothing in Early Anglo-Saxon England, AD 450–700* CBA Res Rep 145, York

West, B A, 1982 'Spur development: recognising caponised fowl in archaeological material' in Wilson *et al* 1982, 255–61

West, B, 1988 'Birds and mammals' in Cowie *et al* 1988, 150–4

West, B, 1989 'Material hand-collected PEA87' in Whytehead *et al* 1989, 150–67

West, S E, 1985 *West Stow. The Anglo-Saxon Village* East Anglian Archaeology 24, Ipswich

Westphalen, P, 1999 'Die Kleinfunde aus der frühgeschichtlichen Wurt Elisenhof' *Offa-Bücher* 80, 1–232

Wheeler, A, 1977 'Fish bone' in H Clarke & A Carter *Excavations in King's Lynn 1963–1970* Society for Medieval Archaeology Monograph Series 7, London, 403–8

Wheeler, A, 1978 'Pharyngeal teeth' in *The Marshall Cavendish Fisherman's Handbook Part 44*, 1226–9

Wheeler, A, 1979 *The Tidal Thames: the History of a River and its Fishes*, London

Wheeler, A, & Jones, A K G, 1989 *Fishes*, Cambridge

Wheeler, R E M, 1935 *London and the Saxons*, London Museum Catalogue 6, London

Whitelock, D, 1955 *English Historical Documents: I, c. 500-1042* (2nd edn), London

Whytehead, R L, & Cowie, R, with Blackmore, L, 1989 'Excavations at the Peabody Site, Chandos Place and the National Gallery' *Trans London Middlesex Archaeol Soc* 40, 107–10

Williams, C, 1989 'Loomweights and spindle-whorls' in Whytehead *et al* 1989, 107–10

Wilson, B, Grigson, C, & Payne, S, (eds) 1982 *Ageing and Sexing Animal Bones from Archaeological Sites* BAR Brit Ser 109, Oxford

Wilson, C A, 1976 *Food and Drink in Britain from the Stone Age to Recent Times*, London

Winkelmann, W, 1977 'Archäologische Zeugnisse zum frühmittelalterlichen Handwerk in Westfalen' *Frümittelalterliche Studien* 11, 111–15

Wouters, W, Muylaert, L, & van Neer, W, 2007 'The distinction of isolated bones from plaice (*Pleuronectes platessa*), flounder (*Platichthys flesus*) and dab (*Limanda limanda*): a description of the diagnostic characters' *Archaeofauna* 16, 33–72

Yule, B, 1990 'The "dark earth" and late Roman London' *Antiquity* 60, 620–8