Medieval and Post-Medieval Tenements at the Garden Building, Lincoln College, Oxford

Artefact and Environmental Reports

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Artefact and Environmental Reports

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Summary

The specialist contributions in this document accompany the following published report:

Teague, S, and Ford, B M, 2020 Medieval and post-medieval tenements at the Garden Building, Lincoln College, in *The Archaeology of Oxford in the 21st Century* (eds A Dodd, S Mileson and L Webley), 201–38. Woodbridge: Boydell and Brewer.

The site (centred on NGR SP 5149 0628) was located immediately to the south-east of the Chapel Quadrangle and to the north of All Saints Church (now the College Library). The earliest evidence comprised pits dating from the late eleventh to the mid thirteenth centuries that were probably located to the rear of one or more of the substantial medieval tenements in the area, fronting onto Turl Street and All Saints churchyard. The pits probably served a variety of purposes including as quarries and were later used for the disposal of rubbish. From the late thirteenth century one or more masonry buildings were constructed that subsequently extended northwards over most of the excavated area. Possibly originally domestic in character, the buildings appear to have been used for baking and metalworking during the fourteenth and early fifteenth centuries, with several phases of stone-built ovens and hearths. Notable remains include unusual quantities of rye, and crucible fragments with precious metal residues. The building was reconstructed by the early seventeenth century, with a fireplace built into its north wall associated with a flue or drain that contained furnace or mould fragments, though it may later have taken on a more domestic function with the addition of a well-house. By the early eighteenth century the area to the south and south-east of the college was occupied by cottages known as Rotten Row, and remains of some associated walls and courtyards were uncovered in the excavation. Following the extension of Lincoln College's precinct in the late eighteenth century the cottages were demolished and the area was incorporated into the Rector's and Fellows' Gardens from 1808.

1 MEDIEVAL AND LATER POTTERY *BY JOHN COTTER*

Introduction

A total of 1,785 sherds of pottery weighing 42.779kg were recovered from all areas and stages of the excavation. This report however is focused on the material from the basement area which forms the main block of the excavation and which was catalogued in detail. Pottery from the basement area comprises a total of 1,579 sherds weighing 35.613kg and with a total EVEs of 28.6. An additional quantification by rim count yielded a figure of 224 rim sherds. Of this 82% by sherd count is medieval and 18% post-medieval (*c.* 1480+). The percentages by weight differ somewhat (62% and 38% respectively). The pottery is in a fairly mixed and fragmentary condition although a small number of vessels are well preserved. A breakdown of pottery quantities by phase is presented in Table 1.1.

Table 1.1. Breakdown of the pottery assemblage by phase

Phase	Date	Sherds	%Sherds	Weight (g)	%Weight	EVEs	%EVEs	Mean sherd weight (g)
Phase 1	*c* 1075-1225	317	20.1%	4089	11.5%	3.1	10.8%	12.9
Phase 2	*c* 1225-1300	47	3.0%	550	1.5%	0.79	2.8%	11.7
Phase 3	*c* 1300-1375	472	29.9%	9612	27.0%	2.49	8.7%	20.4
Phase 4	*c* 1375-1525	104	6.6%	1849	5.2%	2.74	9.6%	17.8
Phase 5	*c* 1525-1625	272	17.2%	5118	14.4%	6.99	24.4%	18.8
Phase 6	*c* 1625-1700	135	8.5%	2491	7.0%	3.37	11.8%	18.5
Phase 7	*c* 1700-1800	170	10.8%	9873	27.7%	8.46	29.6%	58.1
Phase 8	*c* 1800-1900	6	0.4%	130	0.4%	0.07	0.2%	21.7
Phase 9	*c* 1900+	37	2.3%	1358	3.8%	0.5	1.7%	36.7
Unphased		19	1.2%	543	1.5%	0.09	0.3%	28.6
Total		**1579**	**100.0%**	**35,613**	**100.0%**	**28.6**	**100.0%**	**22.6**

The range of fabrics and vessel forms present is fairly typical of sites along or near the main thoroughfares of central Oxford. Apart from three or four small residual Roman sherds (mostly non-basement area) the rest of the assemblage is medieval and post-medieval. A few possible (residual) late Saxon sherds occur but no contexts here were dated to the late Saxon period – in this respect the present site differs markedly from the earlier excavations at All Saints Church, only a short distance to the south, which produced an important sequence of late Saxon features and pottery.[1] Occupation on the present site appears to date from the later eleventh century onwards with pottery of the twelfth, fourteenth and sixteenth centuries being particularly plentiful. Only a small number of late eighteenth- and nineteenth-century sherds occur from the site as a whole and there appears to be a cut-off in pottery deposition around 1830, which may coincide with the demolition of Rotten Row in 1808 and the conversion of this area to college gardens. Most of the pottery, as usual, is domestic in nature apart from a small but important assemblage of high medieval metalworking crucibles and one or two domestic pots probably adapted for industrial purposes. Nearly all the types present here also occur in a much larger assemblage of medieval and post-medieval pottery

[1] M. Mellor, 'Pottery from Excavations at All Saints Church', in Dodd, *Oxford Before the University*, pp. 336-9.

recently studied from Brewer Street, where these types are described in more detail.[2] A similar range of pottery has also been published from 4a Merton Street[3] while a good range of post-medieval pottery has been published from the St Ebbe's area of town.[4] Given the availability of good published local parallels for most of these types, coupled with the variable condition of the material here, what follows is a simply a quantified table of the various fabrics present and a summary report focusing on the more significant or interesting aspects of the assemblage.

Table 1.2. Pottery types and quantities in roughly chronological order

Fabric	Common name	Date	Sherds	Weight (g)	EVEs	Rims
ROM	Roman pottery (residual)	43-410 AD	1	9		
OXR	St Neots-type ware (SE Midlands)	900-1100	12	74	0.05	1
OXZ	Stamford ware (Lincs)	850-1150	4	38	0.42	1
CRUC	Medieval crucible	850-1500	30	107	2.34	18
OXBF	SW Oxon ware (Kennet Valley A)	875-1250	11	126	0.1	3
CHALK	Chalk-tempered ware	1000-1350	1	15	0.05	1
OXAC	Cotswold-type ware	1050-1250	90	1485	1.37	20
OXY	Medieval Oxford ware	1075-1300	240	2907	1.79	21
OXAQ	East Wilts ware (Kennet Valley B)	1150-1350	76	1659	0.56	5
OXCG	Olney Hyde-type shelly ware (Bucks)	1150-1400	5	110	0.24	3
OXBH	East Midlands reduced ware	1175-1350	2	31		
OXAG	Ashampstead-type ware (Berks)	1175-1400	12	197		
OXAW	Early Brill ware (Bucks)	1175-1400	95	2014	0.95	7
OXBB	Minety ware (Wilts)	1225-1525	15	603	0.28	3
OXAM	Brill/Boarstall ware (Bucks)	1225-1625	463	8597	2.71	25
KING	Kingston-type ware (Surrey)	1240-1400	1	1		
CBW	Coarse border ware (Surrey/Hants)	1350-1500	3	41	0.05	1
CHEA	Cheam whiteware (Surrey/Hants)	1350-1500	3	144	0.4	2
TUDG	Tudor green ware (Surrey/Hants)	1375-1550	6	14	0.17	3
OXBX	Late medieval Brill ware (Bucks)	1400-1625	228	3965	4.06	33
RAER	Raeren stoneware (Germany)	1475-1550	2	15		
SNTG	South Netherlands maiolica	1480-1575	3	26		
PMRE	Early post-medieval redwares	1480-1600	8	363	0.07	1
CSTN	Cistercian-type ware (mainly Brill)	1480-1700	3	9	0.06	1
KOLS	Cologne stoneware (Germany)	1500-1580	2	38		
BEAU2	Beauvais double sgraffito ware (France)	1500-1630	1	30	0.07	1
FREC	Frechen stoneware (Germany)	1525-1750	67	2449	5.56	15
OXAP	Brill proto-stoneware (Bucks)	1540-1625	2	43		

[2] S. Teague and B.M. Ford, 'Excavations in Oxford's South Suburb at Brewer Street, Littlegate Street and Rose Place', unpublished OA report (2019).
[3] P. Blinkhorn, 'Pottery', in D. Poore, D. Score, and A. Dodd, 'Excavations at No. 4A Merton St., Merton College, Oxford: The Evolution of a Medieval Stone House and Tenement and an Early College Property', *Oxoniensia,* 71 (2006), pp. 258-78.
[4] M. Mellor and G. Oakley, 'A Summary of the Key Assemblages. A Study of Pottery, Clay Pipes, Glass and other Finds from Fourteen Pits, Dating from the Sixteenth to the mid Nineteenth Century', in T.G. Hassall, C.E, Halpin and M. Mellor, 'Excavations in St. Ebbe's, Oxford, 1967-1976: Part 2: Post-medieval Domestic and the Post-Dissolution Site of the Greyfriars', *Oxoniensia,* 49 (1984), pp. 181-219.

BORDG	Border ware, green glazed (Surrey/Hants)	1550-1700	28	1196	1.53	11
BORDO	Border ware, olive glazed (Surrey/Hants)	1550-1700	2	153	0.22	2
BORDY	Border ware, yellow glazed (Surrey/Hants)	1550-1700	17	524	0.81	6
OLIV	Spanish olive jar	1550-1750	1	20		
PMR	Post-medieval red earthenwares	1550-1900	74	5033	2.01	18
TGW	English tin-glazed earthenware	1575-1825	21	1832	1.11	10
PMBL	Post-medieval black-glazed redwares	1580-1750	21	514	0.44	4
MART3	Martincamp III flasks (Normandy)	1600-1650	1	9		
BORDB	Border ware, brown glazed (Surrey/Hants)	1600-1700	2	36		
NIMS	North Italian marbled slipware	1600-1750	2	47	0.28	2
METS	Metropolitan slipware (Essex)	1630-1700	1	31	0.15	1
BRSL	Brill post-medieval slipware	1650-1800	2	426	0.2	1
LONS	London (salt-glazed) stoneware	1670-1850	2	24		
WBOT	Wessex-type bottles	1675-1750	7	391	0.4	1
STSL	Staffs-type combed slipware	1680-1900	3	68	0.1	1
SWSG	Staffs white salt-glazed stoneware	1720-1780	1	15		
STBL	Staffs fine blackware (Jackfield)	1740-1780	4	48	0.05	1
CREA DEV	Developed creamware (Staffs/Yorks)	1760-1830	2	50		1
PEAR	Pearlware (Staffs/Midlands)	1780-1830	2	86		
TOTAL			**1579**	**35,613**	**28.6**	**224**

Methodology

All pottery from the basement area was catalogued in detail including some material from the watching-brief phase with cross-joins to basement contexts. Pottery from the much smaller outlying areas of the site was recorded in more summary fashion. The detailed pottery catalogue in Table 1.2 contains the following fields of information per fabric: quantification by sherd count, weight, EVEs (a measure of surviving rim length) and rim sherd counts. Simplified vessel form and rim diameters were also recorded. Other details such as part, condition, decoration, glaze and evidence of use etc were recorded in a comments field. A series of tables were constructed from the catalogue data giving a breakdown of fabric and vessel form variation over time (by phase) and these form the basis of the summary report here. Full details of these, along with the catalogue, may be consulted in the site archive. As better parallels exist elsewhere, only a small number of the more interesting or unusual pieces has been illustrated. Detailed descriptions of the illustrated pieces are provided in the illustration catalogue below.

Pottery fabrics

Medieval pottery fabrics were recorded using the system of codes developed for the Oxfordshire county type series.[5] Post-medieval fabrics were recorded using the codes of the

[5] M. Mellor, 'Oxfordshire Pottery: A Synthesis of Middle and Late Saxon, Medieval and Early Post-Medieval Pottery in the Oxford Region', *Oxoniensia,* 59 (1994), pp. 17-217.

Museum of London, which can be applied to most post-medieval types in south-east England.[6] A breakdown of the fabrics present is given in Table 1.2.

Summary by phase

*Phase 1 (*c. *1075–1225)*

Pottery of this phase is mostly from pit fills and fairly plentiful although mostly very fragmentary and fairly worn suggesting a high degree of redeposition. Cross-joining sherds between the different fills of individual pits however suggest the rapid backfilling of some of these and the likelihood that some pit assemblages may contain vessels actually used on or near the site. Medieval Oxford ware (OXY) comprises the bulk of the phase assemblage (59% by sherd count) followed by Cotswold-type ware (OXAC, 20.2%) and East Wiltshire ware (OXAQ, 7.3%). The 11 sherds of St Neots-type ware (OXR, 3.5%) are probably residual as this fell out of use in Oxford *c.* 1075–1100 when more local Oxfordshire products replaced it (OXAC, OXY). Unglazed jars/cooking pots dominate, as usual in early medieval assemblages (77.4% by EVEs). A few bowls and glazed jugs/pitchers (OXY, OXAG, OXAW) also occur. Early Brill/Boarstall ware (OXAW) jugs appear towards the end of this phase (*c.* 1175+). One of the more interesting items is the top of a yellow-glazed Stamford ware water-sprinkler (Fig. 10, no. 1), a Stamford form rarely found in Oxford, and hinting perhaps at the presence of a fairly well-to-do household on or near the site in the eleventh or twelfth centuries. Other items of interest in this phase (or derived from it) include an OXAC jar sherd with a rare cross-in-circle stamp (Fig. 10, no.2). There are two cresset oil lamp rims (both residual): one in OXAC (not illus.) and one in OXY (Fig. 10, no. 3). There is also a sherd from an OXY storage jar with unusual combed decoration (Fig. 10, no. 4).

*Phase 2 (*c. *1225–1300)*

Only 47 fairly small sherds were assigned to this phase, which is defined by the presence of the high medieval fine Brill/Boarstall ware fabric (OXAM). Jugs now predominate (68% EVEs), mostly in Brill fabrics, including highly decorated strip jugs. There is a single jug sherd in East Midlands reduced ware (OXBH). Jars form the remainder (32%).

*Phase 3 (*c. *1300–1375)*

In terms of sherd counts this phase produced more than any other (472 sherds). Jugs, mainly Brill/Boarstall ware, continue to dominate (65.5% by EVEs). Over 50% of the pottery from this phase came from the backfill (2597) of a single feature – a large rectangular stone-lined pit (2466), interpreted as a latrine. Although sometimes highly fragmentary (crushed?) the contents of this pit appear to represent a contemporary dump of Brill/Boarstall ware jugs and a few cooking pots which were complete (or nearly so) at discard, probably within the period *c.* 1275–1350. Several vessels could be reconstructed, including a highly decorated Brill 'tripledecker' strip jug (Fig. 10, no. 5) – one of the finest products of the highly decorated phase of this industry and which probably came from a fairly well-to-do household. Substantial parts of seven Brill/Boarstall jugs (OXAM and OXAW) came from this pit of which

[6] MoLA 2014 Medieval and post-medieval pottery codes (http://www.mola.org.uk/medieval-and-post-medieval-pottery-codes) (Accessed September 2017).

five are illustrated here (Fig. 10, nos 5–8; Fig. 11, no. 9). Single sherds from several other jugs probably represent residual material. The illustrated group of jugs – some more complete than previously published examples – may well have originated from the same household. Parts of at least three East Wiltshire ware (OXAQ) cooking pots were also recovered (Fig. 11, no. 10) and may have come from the kitchen area of the same house; two are sooted from use and have oily soot trails externally from the overspill of their boiling contents. To the north of this another cess pit (2572, fill 2573) produced substantial parts of several other OXAM vessels including a dripping pan and six plain jugs which may date to the later fourteenth century. This had several cross-joins with a neighbouring Phase 3 cess pit (2578). One of the jug bases from pit 2572 had at least one (ancient) perforation through the base while one of the jug bases from the stone-lined pit also had a perforation through the wall just above the base (Fig. 11, no. 9). These may have been adapted for use as water-sprinklers. A stem fragment from a Brill double-shelled oil lamp probably dates from this phase (2060, residual in Phase 5) as does a sherd from a characteristic Brill bottle (2242, ditto). A single small rim sherd from a medieval crucible (CRUC) was also recovered from a Phase 3 occupation/levelling deposit (2145). Most of the other crucible sherds are from Phase 4 and are discussed below.

*Phase 4 (*c. *1375–1525)*

This phase produced 104 sherds of pottery including 17 of the 30 medieval crucible sherds from the site. They form 16.4% of the assemblage by sherds and 63.5% by EVEs but only 3.8% by weight. The excavator has suggested they may be largely residual from the industrial activity in Phase 3, associated with the two possible industrial ovens and the hearth. The dating associations broadly support a fourteenth- to early fifteenth-century date for the use of the crucibles, so some industrial activity into Phase 4 is possible. The crucibles are fairly small and of round-bottomed medieval type with a pinched lip and a hard, sandy, grey-brown fabric (possibly OXAW; Fig. 13). Many show evidence of use in the form of scorching and slaggy deposits. Scientific analysis of a sample of crucibles confirms they were used for precious metalworking. They may therefore have been connected with the Goldsmith family who may have occupied part of the site in the fourteenth century. Given their importance the crucibles and their contexts are treated in more detail in a separate report (see below). A few heat-altered sherds from jugs or bowls (OXAW?) might also have been used as industrial vessels/crucibles.

Brill/Boarstall ware (OXAM) continues to dominate with a few sherds of the later medieval fabric (OXBX) also making an appearance. Cess pit 2190 (fill 2191) contained sherds from two late Brill moneyboxes including one with a slot and one with internal greenish copper staining (from coins?). These had been intensely burnt and had possibly been reused as crucibles. A scorched Minety ware jar rim in the same context might be from an industrial vessel similar to the perforated Minety jar in Phase 5 (see below). A late medieval conical OXAM jug containing a thick internal limescale-like deposit may have been used as a urinal (layers 2370 and 2408). Other OXAM items of note from this phase (but possibly residual from Phase 3?) include sherds from a highly decorated stamped strip jug (Fig. 11, no. 11) and a sherd from an unusual dish or lid with decoration on both sides (Fig. 12, no. 12). A sherd from a late fourteenth/fifteenth-century OXAM anthropomorphic mug (Fig. 12, no. 13) and a few other

mugs/cups and small jugs reflect social drinking during this period. A sherd from a bunghole jar or jug for brewing or storing ale was also recovered (2363, OXAG?).

*Phase 5 (*c. *1525–1625)*

Late medieval Brill/Boarstall ware (OXBX) is now the predominant fabric (44.5% sherds) with OXAM in second place (12.5%). Some of the phase assemblage, however, including 11 sherds of medieval crucible, is undoubtedly residual by now. Jugs are still the dominant form (49.6% by EVEs) but a wider variety of vessels forms was now in use compared to previous phases. Sherds of imported German stoneware drinking jugs (FREC, KOLS, RAER) reflect an increase in social drinking activities – a trend seen on many college and domestic sites in central Oxford. Frechen stoneware jugs (FREC) alone comprise 41% (by EVEs) of the pottery in use, although this figure is exaggerated by the durability of this ware which survives breakage better than local earthenware forms (FREC, in contrast, forms only 11% by sherds). A number of unusual vessel forms are present including a partly scorched Minety ware jar (Fig. 12, no. 14) with post-firing perforations through the wall suggesting it was used as an industrial vessel. This would seem to be confirmed by pXRF analysis, which identified traces of silver and gold (see *Crucibles* below). While it may have been used in the earlier part of this phase, and was found in a Phase 5 robber trench (2144), one cannot rule-out the possibility that, like the crucible sherds, it derives from the earlier industrial activity in Phase 3 or 4. A sherd from a second Minety ware jar with neater perforations came from a modern deposit. It seems fairly certain from these examples that Minety ware jars were adapted for use in some kind of industrial process in late medieval Oxford – perhaps because their limestone tempering gave them some sort of thermal advantage over local sandy wares. Other unusual items include most of a green-glazed Border ware 'fuming' pot profile with a hollow pedestal base and multiple circular and triangular perforations through the body wall (2205, not illustrated but similar to examples from London).[7] These were used for dispelling foul odours and warding-off plague. Another vessel concerned with domestic hygiene is represented by the perforated top and base of an OXBX water-sprinkler (2139 and 2148).[8] The form was little changed from the eleventh- or twelfth-century Stamford ware water-sprinkler found in Phase 1 (Fig. 10, no. 1). One OXBX jug base is unusual in having combed decoration all the way down to the base instead of stopping at the girth, as is more usual (Fig. 12, no. 15). Aside from stoneware jugs Continental imports are rare; a hint of luxury however is provided by the base of an attractive South Netherlands maiolica flower vase with polychrome decoration (Fig. 12, no. 16) and the rim of a Beauvais sgraffito ware dish also with polychrome glazes (Fig. 12, no. 17). These display items would have originated from a fairly well-to-do sixteenth-century household. The ubiquitous post-medieval red earthenwares (PMR, also from Brill?) make their appearance towards the latter part of this phase as ordinary domestic crockery items. These include black-glazed mugs (PMBL) which become commoner in Phases 6 and 7.

*Phase 6 (*c. *1625–1700)*

This small phase assemblage is very similar to that in Phase 5 with late Brill (OXBX) and Frechen stoneware continuing to dominate. Much of the assemblage is probably residual and

[7] J. Pearce, *Post-medieval pottery in London, 1500-1700, 1: Border wares* (London, 1992), fig. 45.430-5.
[8] Mellor, 'Oxfordshire Pottery', fig. 66.5.

there is certainly some evidence too of contamination with eighteenth-century wares. Apart from the high number of black-glazed mugs (PMBL) the assemblage contains little of note.

*Phase 7 (*c. *1700–1800)*

At least 27% of the sherds in this phase comprise residual medieval wares (mainly OXBX). Post-medieval redware crockery predominates (PMR, 20%), closely followed by Border wares (BORD, collectively 19.4%) and English tin-glazed wares (TGW, 11.2%). A considerable proportion of Phase 7 pottery (68 sherds, 5.581kg) came from the fill (2301) of well construction cut 2300, datable to *c.* 1700–30 on the basis of its clay pipes (*c.* 1690–1720), tin-glazed wares and part of a jug in Staffordshire-type fine blackware (STBL, formerly Jackfield-type). This last fabric is usually assigned a date of *c.* 1740–80 in London, but in Oxford STBL (or a very similar black-glazed fine redware) occasionally turns up in late seventeenth-century contexts. Pit 2300 contained no Staffordshire white stoneware (SWSG, *c.* 1720–80), or Chinese porcelain (mainly *c.* 1720+), which again points to an early date. The 68 sherds from this pit (some quite large) come from a minimum of 44 broadly contemporary domestic vessels (including one or two mid/late seventeenth-century items, and clay pipes), and a single medieval sherd. Several pottery cross-joins exist with the contents of two adjacent or related pits (2302 and 1093, which add another 23 sherds, 2.309kg). Analysis of the evidence suggests that all three 'pits' are part of the same construction trench for the Phase 7 stone-lined well 2305 in the north-west corner of the basement area. Collectively these contexts account for 54% of all pottery sherds from this phase, but as much as 80% by weight. There were also cross-joins between these contexts and other neighbouring features from the watching-brief stage including a stone-lined cess pit (1028, *c.* 1740–80).

The PMR forms from pit (2300) included robust deep bowls, storage jars, a dripping pan and flower pot sherd; the deep bowls and jars have strong similarities with pottery from the later seventeenth- and early eighteenth-century pit assemblages published from the St Ebbe's area.[9] There are 18 border ware (BORD) vessels from (2300), mainly dishes, bowls, a tripod pipkin and a chamber pot. Despite the fairly large size of all these sherds it is evident from the abrasion on several vessels that much of the PMR and BORD assemblage has been redeposited from elsewhere – possibly from some of the nearby rubbish pits to the north. The construction trench for the well would not have remained open for long and was probably back-filled with slightly older material from nearby rubbish pits, but it appears that a few contemporary nearly-complete vessels were also thrown in during this operation as some items seem remarkably fresh. These include the profile of a rare whiteware 'Wessex bottle' (Fig. 12, no. 18) and a small bowl in North Italian marbled slipware (Fig. 12, no. 19). Tin-glazed ware vessel forms from the pit included parts of two cylindrical drug jars with late Lambeth-style geometric decoration in polychrome colours (*c.* 1680–1750, eg Britton 1986, pl. 24) and large parts of two or three other Lambeth-style drug jars were found in nearby pits. These may have come from a household medicine cupboard, or perhaps even a nearby apothecary shop. Other tin-glazed forms include part of an octagonal dish with blue 'Chinaman among the grasses' decoration (*c.* 1680–1720)[10], and a chamber pot rim. Other notable English wares

[9] Mellor and Oakley, 'St. Ebbe's, Oxford, 1967-1976: Part 2', fig. 19.11-12, fig. 25.6.
[10] F. Britton, *London Delftware* (London, 1986), pl. 97.

include the lower part of a globular cup in reverse Staffordshire slipware (STSL) decorated with concentric white slip circles.[11] The function and precise source of the 'Wessex bottle' (Fig. 12, no. 18) is unknown; it has been suggested they come from Normandy but a West Country source is also possible. Several other examples are known from Oxford (see illustration catalogue for details). The example here may, like the associated drug jars, have been used as a container for medicines. Parts of three German stoneware 'Bellarmine' jugs (FREC) and one London stoneware jug (LONS) were also recovered. Pit 2300 also produced 15 clay pipe bowls – the largest collection from the site – and a group of wine bottles (see reports below).

*Phase 8 (*c. *1800–1900) and Phase 9 (*c. *1900+)*
Material from these phases is almost entirely residual/redeposited. The latest pieces from the basement area comprise a couple of sherds each of late eighteenth- or early nineteenth-century mass-produced Staffordshire-type tablewares (CREA DEV and PEAR). One small sherd probably from the rim of a creamware dish is of some interest as it bears part of the owner's surname on the upper surface in hand-painted underglaze blue letters: '[Mus]sgro[ve]' (Ctx 1074, watching brief phase). The owner can probably be identified as William Musgrove, one-time cook at Christ Church and coffee-house keeper in the Cornmarket, *c.* 1778–81. Two other dishes with his name on the back were identified amongst a group of marked tablewares from a stone-lined pit or latrine on the St Ebbe's excavations near the present-day Westgate Shopping Centre.[12] Marked dishes such as these, sometimes with college names on, turn up occasionally on Oxford excavations – often quite far from where the owner lived or worked. The smaller pottery assemblage from non-basement areas included a handful of other late pieces. Probably the latest piece is a transfer-printed whiteware (TPW) pot lid of *c.* 1900 for a fish sauce jar.

Illustration catalogue (Figs 10–12)

1 (OXZ). Stamford ware. Four joining sherds from neck and discoid top of a water-sprinkler. Near-complete but heavily abraded top (diameter *c.* 48mm) with central perforation. Series of at least four incised horizontal grooves on shoulder (probably spiral). Fine-medium sandy whiteware. Crazed pale yellow glaze all over ext. Rare iron streaks in glaze. See example from London.[13] Ctx 2624. Fill of 2602. Phase 1.

2 (OXAC). Cotswold-type ware. Jar shoulder sherd with cross-in-circle stamp (diameter 18mm). Dark grey. Fine oolitic limestone temper. Worn. Tenth/eleventh century? Ctx 2484. Phase 1 pit fill.

3 (OXY). Medieval Oxford ware. Oil lamp rim (diameter 100mm). Dark grey/burnt. Sooted int. Traces yellow glaze int. Wheel-turned. Date *c.* 1075–1300. Ctx 2356. Residual in Phase 4.

4 (OXY). Medieval Oxford ware? Body sherd from ?storage jar with unusual decoration. Deeply combed decoration of interlaced chevron bands forming lozenges in-between, plus

[11] Similar to Mellor and Oakley, 'St. Ebbe's, Oxford, 1967-1976: Part 2', fig. 22.4.
[12] Ibid., pl. 4. nos 7-8.
[13] A.G. Vince and A. Jenner, 'The Saxon and Early Medieval Pottery of London', in A.G. Vince (ed), 'Aspects of Saxon and Norman London 2: Finds and Environmental Evidence', *LAMAS Special Paper*, 12 (1991), pp. 19-119.

traces of a vertical band of combing on right side. Also (very unusually) the potter has incised or scored a pair of thin vertical lines through the combed decoration while the vessel was still leather-hard. Fabric slightly coarser than usual, brown ext, grey int, with abundant red quartz and rare coarse white ?sandstone inclusions (or possibly SE Oxfordshire Fabric OX162?). Twelfth century? Ctx 2495. Phase 1.

5 (OXAM). Brill/Boarstall ware. Tripledecker strip jug. Reconstruction drawing based on 73 sherds (vessel *c.* 60–70% complete). Near-complete profile minus rim and handle (lower handle scar present on shoulder). Baluster-shaped body. Complete base (diameter 146–150mm). Splayed flat base with very slight pad. U-shaped wire- or string-mark under base on one side (not often seen on Brill jugs of this period). Base unglazed under and showing some use-wear. Maximum girth diameter *c.* 250mm. Surviving height *c.* 355mm. Highly decorated with applied and rouletted strips in 'white' (body clay) and red clay. All strips with square rouletting apart from sinuous body strips and base cordon. Shoulder angles or carinations also rouletted; the rouletting often over-runs onto the body area in-between strips. Lower limit of decoration defined by plain horizontal strip (not rouletted) forming a cordon at base/body junction. Flattened shoulder defined by pair of slight carinations dividing vessel into three decorative zones as follows. Body decoration: vertical strips comprising groups of four sinuous strips in 'white' body clay (not rouletted) alternating with groups of four straight red strips. Shoulder: closely set straight diagonal strips (NW-SE) alternating red and 'white'. Neck: spaced vertical red and white strips becoming closer higher up. Pink-buff fabric. Unglazed areas of base/lower wall with redder ext surface probably from accidentally smeared slip. Basal pedestal unglazed apart from large accidental splashes and dribbles of green glaze. Patchy copper-flecked or mottled green glaze ext on lower body; thick rich green glaze all over higher up becoming very glossy dark green-brown in shoulder area due to bleeding from red strips. Glaze condition in upper half of vessel is remarkably fresh. Glaze runs and bleeding suggest an inverted firing position. Two small sherds with lower handle scar show a hole or socket was pushed through from the outside with the finger to anchor the handle. On the complete tripledecker jug from St Aldates in the Ashmolean Museum the handle is of rod-section and the shoulder decoration consists of large rosettes above chevron strips.[14] General decorative parallels in contemporary London-type ware[15] and Kingston-type ware.[16] Date *c.* 1275–1350. Ctx 2597. Fill of stone-lined latrine 2466. Phase 3.

6 (OXAM). Brill/Boarstall ware. Near-profile biconical strip jug. Fragmentary (22 sherds). Extant height *c.* 220mm. Rim and most of handle and front area missing. Thin-walled. Flat/pad base (diameter 138mm, 62% complete). Fairly messy decoration of applied vertical strips in alternating red and 'white' (body) clay all with square rouletting. Roughly horizontal red strip on neck. Red strips wider than white strips. Red flaked-off in places. Strips on upper and lower half of vessel only occasionally line-up correctly and strips more crowded together towards

[14] Mellor 'Oxfordshire Pottery', fig. 56.1, pl. 7; complete height = 430mm; B. Rackham, *Medieval English Pottery* (London, 1972), pl. 83.
[15] J.E. Pearce, A.G. Vince and M.A. Jenner, 'A Dated Type-series of London Medieval Pottery: Surrey Whitewares', *London and Middlesex Archaeological Society*, Special Paper 6 (1985), fig. 40.135, 45.148, 52.185
[16] J.E. Pearce and A.G. Vince, 'A Dated Type-series of London Medieval Pottery, Part 4: Surrey Whitewares, London', *Middlesex Archaeol Soc, Special Paper,* 10 (1988), pl. 11, figs. 52.9, 66.85.

the front. Traces of possible red strip down back of handle stub. Body wall deformed during handle attachment. Handle socket probably pushed through from outside, then plugged internally. Pale brown-buff fabric with darker red-brown surfaces (possibly discoloured by soil conditions?). Mottled copper green glaze mostly on upper half of vessel, dark and glossy in places. Thin yellow glaze on lower half of vessel with some large dark green splashes (probably accidental) and some large rough areas where glaze has 'crawled-off' or failed to fire properly. Biconical angle shows heavy use-wear, also basal angle. Form similar to Mellor 1994, fig. 60.1–4. Date *c.* 1275–1350. Ctx 2597 with few joining sherds from 2494. Both fills of stone-lined latrine 2466. Phase 3.

7 (OXAM). Brill/Boarstall ware. Profile squat globular or sub-biconical jug with scrolling strip decoration. Fragmentary (64 sherds). Rim diameter *c.* 100mm (30%). Flat base diameter 130mm (*c.* 50%). Height *c.* 220mm. Horizontal band of deeply combed decoration on shoulder. Body decoration comprised of fairly crude repeating design of running scrolls in applied body clay. Complete narrow strap handle with row of deep sub-triangular stabbing down the midline. Attachment method unclear but lower internal junction is plugged. Soft, underfired buff-brown fabric with redder internal surfaces (possibly discoloured?). Dull underfired or denatured glaze – yellow with copper green splashes, all over upper half of vessel. Worn around the girth and under base.[17] Scrolled decoration known on several other Brill jugs of various shapes. Date *c.* 1275–1350. Ctx 2597. Fill of stone-lined latrine 2466. Phase 3. Rim from 2361, Phase 2 pit.

8 (OXAW). Early Brill/Boarstall ware. Profile plain rounded jug probably copying metalware forms. Fragmentary (30 sherds). Height *c.* 290mm. Shoulder area decorated with fine horizontal rilling or light combing. Two non-joining rim sherds (diameter 120mm) of squared section with cordon on neck. Front rim sherd with most of pulled lip and slight facets either side. Handle, almost complete, of narrow strap form with central furrow and thickened edges. Row of deep circular stabs down midline of handle and three transverse stabs securing top of handle. Lower internal handle junction clearly shows a hole or socket pushed through from the outside with the finger to anchor handle, a circular plug was then inserted (or else the plugged-through end of the handle was flattened to rivet it to the inside?). Upper internal handle junction less clear but also shows flattened plug. Short splayed flat/pad base with slight sag (diameter 145mm, *c.* 75% complete). Base angle showing use-wear. Dull cream fairly sandy fabric with buff external margin and pale grey core. Dull to glossy mottled dark copper green glaze all over upper half but patchy in lower half. Iron bleeding in glaze suggests inverted firing position. Top of rim sooted/scorched probably from heating of jug contents; the base is also slightly scorched.[18] Also general parallels with Kingston-type rounded jugs.[19] Date *c.* 1275–1350. Ctx 2597. Fill of stone-lined latrine 2466. Phase 3.

9 (OXAW). Early Brill/Boarstall ware. Complete splayed flat base from baluster jug with traces of dark red slip decoration – probably lattice scheme. Base unglazed external but traces of clear yellow glaze higher up on body. Thin glaze speckling underside. Bold throwing ring/ridge

[17] Form similar to Mellor, 'Oxfordshire Pottery', fig. 65.1.
[18] ibid., fig. 50.1.
[19] Pearce and Vince, 'Surrey Whitewares, London', figs 72-7.

on internal base floor (ring diameter 83mm). A horizontal slit-like hole 17mm wide through the lower wall is probably ancient (edges coated in grime) and possibly made with the tip of a knife? Some use-wear on base. Cream-buff fabric.[20] Diameter 134mm. Date *c.* 1275–1350. Ctx 2597. Fill of stone-lined latrine 2466. Phase 3.

10 (OXAQ). East Wiltshire ware (Kennet Valley B ware). Fresh, near-profile, globular jar/cooking pot. Rim diameter 230mm. Beaded/clubbed rim on short flaring neck. Evidence of wheel-finishing on upper half. Brown ext, dark grey int. Sooted lower down ext. Date *c.* 1275–1350. Ctx 2597. Fill of stone-lined latrine 2466. Phase 3.

11 (OXAM). Brill/Boarstall ware. Highly decorated stamped strip jug. Body/neck sherds. Possibly baluster or rounded body form. One or two girth grooves. Attractive decoration of applied square-rouletted strips repeating around upper half of vessel. Design units of three conjoining strips, like a crow's foot or upright arrow, with fairly large applied circular pads (diameter 15–18mm), with square gridiron stamps, in spaces between – possibly phytomorphic in inspiration? Very hard buff fabric. Upper two-thirds covered with deep green copper-mottled glaze fading to yellow on lower wall. Sherds scattered through several contexts. Mainly Ctx 2420, Phase 4. Also 2376, 2398 and 2447. Manufactured *c.* 1350–1400?

12 (OXAM). Brill/Boarstall ware. Very unusual flattish ?base sherd from open vessel form – reversible dish/bowl or lid? Decorated on both sides with two concentric bands of combed decoration with intervening bands of wavy decoration. Copper green glaze both sides – scorched on more convex side. Max diameter of outer combed circle *c.* 110mm. Max sherd length 39mm. Ctx 2360. Phase 4 ash layer. A 'pan' base with similar (internal) decoration from the Hamel is dated *c.* 1250–1300.[21]

13 (OXAM). Brill/Boarstall ware. Body sherd from cylindrical mug/tankard with applied 'Green Man'-style face[22]. Stamped ring and dot eyes, incised eyebrows, nostrils and trace of horizontal slit mouth. Very hard light brown fabric with glossy mottled green glaze external and even green glaze int. Max sherd length 66mm. Late fourteenth/fifteenth century. Ctx 1043. Phase 4.

14 (OXBB). Minety ware. Jar with crude (post-firing) perforations through wall (and base?). Probably industrial function. Rim diameter *c.* 310mm. Oxidised fabric. Frosted green glaze all over int. Traces of possible vertical applied strip ext. Perforations *c.* 20mm diam, approx every 43mm apart? Traces of softer clay ?luting on top of rim near lip overlying glaze. Wheel-thrown. Rim from ctx 2143 (fill of robber cut), base from ctx 2169. Phase 5. A similar base from a second vessel with neater perforations from 2533, Phase 9.

15 (OXBX). Late medieval Brill/Boarstall ware. Splayed pad base from a jug (or bunghole cistern?). Unusual for its combed decoration which extends all the way down to the base. Diameter 160mm. Hard buff fabric. Thin yellow glaze ext. Fifteenth/early sixteenth century? Ctx 2143. Phase 5.

[20] Form as Mellor, 'Oxfordshire Pottery', fig. 56.2-3.
[21] ibid., fig. 54.7.
[22] ibid., fig. 53.14-15

16 (SNTG). South Netherlands maiolica. Flower vase. Pad base diameter *c.* 90mm. White tin glaze all over interior and ext. External decoration comprising roundel (part of) within vertical borders in cobalt blue tones. Trace of handle scar. Ctx 2263. Phase 5.

17 (BEAU2). Beauvais double sgraffito ware. Worn dish rim (diameter 260mm). White slip over red slip on fine white fabric. Incised rays/triangles on rim. Alternating green-glazed and white (clear-glazed) triangles with double-incised border. Glaze/slip flaked off in places. Clear glaze ext. Ctx 2061. Phase 6.

18 (WBOT). Wessex bottle. Unglazed whiteware bottle. Complete baluster-shaped profile (broken). Height 187mm. Rim diameter 50mm. Splayed pad base (complete) fairly roughly finished underside, messily potted outside with fingerprint/textile denting in several places. Lower wall slightly dented/distorted in one place. Fabric very similar/identical to Surrey/Hampshire Border ware (BORD): sandy cream fabric with pale brown/brown discolouration mostly internally (post-deposition). Moderate black and red iron-rich clay pellets – rarely to 2mm across. Ctx 2301. Pit 2300, construction cut for well 2305. Phase 7. Ctx spot-date *c.* 1700–30.

There is no close parallel for this unusual bottle-like form in the published corpus of Border ware from London[23], nor from the Cove production site in Hants.[24] The form compares loosely with a class of small rounded jars in this fabric from London[25] sometimes described as inkwells, and rather more closely with a broad class of straight-sided jars which includes a few drug jars or albarellos and a possible butter pot.[26] All these forms are rare in London and none compares very closely with the vessel here although the straight-sided jars are of similar height. On this basis it might be suggested the vessel was used as an apothecary jar, although there is no firm evidence for this.

While no published Border ware parallels appear to exist there are in fact several identical and near-identical parallels for this vessel form from Oxford itself including five complete vessels in the Ashmolean Museum shown in a group photograph (together with post-medieval French and Portuguese imports) where they are described as “Normandy bottles originally with earthen stoppers” (that is the standing bottles only).[27] The Normandy identification appears to have been based on comments made by the late Bob Thomson and John Hurst who visited the museum in 1995 and examined the bottles. At the time some of the bottles are said to have had earthen stoppers which rattled inside the vessels. Seven such vessels originally came from the New Bodleian Library site, Broad Street. The others came from various sites around the city.[28] Two identical bottles are published from a mid-eighteenth-century pit at Poole, Dorset[29] although the pit contained much seventeenth-

[23] Pearce, *Post-medieval pottery in London*
[24] J. Haslam, ‘The Excavation of a Seventeenth Century Pottery Site at Cove, East Hampshire’, *Post-medieval Archaeology*, 9 (1975), pp. 164-87.
[25] Pearce, *Post-medieval pottery in London,* figs 44.403-13, 417.
[26] ibid., figs. 44.414-16, 418-25 and 45.426-7.
[27] M. Mellor, *Pots and People* (Oxford, 1997), fig. 59.
[28] ibid., 78; Maureen Mellor pers. comm.
[29] I. P. Horsey, *Excavations in Poole 1973-1983*, Dorset Natural History and Archaeological Society Monograph Series 10 (1992), fig. 41.212-3.

century material including many clay pipes of *c.* 1670–90 but was cut by another pit of *c.* 1730–50.[30] The pottery from Poole was identified by Bob Thomson, Ken Barton and others and the two bottles are described in the catalogue (p. 78) as follows: "*Small jars. Grey-buff fabric with fine quartz inclusions. See also Nos. 244 and 817. These small containers are thought to be French and are possibly from Martincamp [Normandy]. They are widely distributed along the South Coast and there are many unpublished examples from Southampton and Portsmouth. They are usually in eighteenth-century contexts*." The two other examples illustrated are of identical form with 817 described as having a red-buff fabric.[31]

Another identical form is published from the village of East Worth, in east Dorset, and is said to be of eighteenth-century date.[32] The latter has a pale buff colour and is unglazed and apparently a waster as the neck is severely flawed. A pottery kiln is known to have existed at East Worth in the eighteenth century and the implication is that the bottle was produced there. In the same report a group of eighteenth-century bottles of similar form (but with sharply angled shoulders) is described from Holtwood.[33] These last two East Dorset bottles are likely to have been locally produced and are probably part of the wider Verwood-type ware tradition that existed along the East Dorset/Hampshire border, although they might perhaps be copies of imported forms. A similar bottle form is published from Woolwich, London. This has a coarse red fabric and is described as a probable Spanish import similar to Merida-type ware, although it is acknowledged that the fabric nor the form is very typical of this type.[34] The source of this type of bottle requires further investigation; despite being very similar in appearance to the fabric of Surrey/Hampshire white Border ware (at least in the case of the Lincoln College bottle) the form is not closely paralleled in the known corpus from London, or from the Cove kiln site, whereas the known distribution is heavily weighted to the south and west along the Dorset/Hampshire coast, and at Oxford. Despite some possibility that the form was also sometimes produced (copied?) by the Verwood potters it is highly unlikely that both Bob Thomson and Ken Barton (both very familiar with Verwood-type ware) would not have recognised this if it had been a Verwood product, unless perhaps it was an unusual/finer fabric variant. The Lincoln College bottle however is not Verwood ware.[35] The distribution evidence seems to favour either a south-west coast origin or a north-west France origin, but the author has not come across any close parallels from north-west France to date and their apparent absence from London seems unusual. A programme of scientific analysis may eventually solve the origin of these unusual vessels and perhaps identify what they originally contained.

[30] ibid., p. 70.
[31] ibid., figs.42.244 and 69.817.
[32] P. Copland-Griffiths, 'Earthenware Jars from East Worth and Holtwood'*, Proceedings of the Dorset Natural History and Archaeological Society*, 117 (1995), pp. 141-2, fig. 6, right.
[33] ibid, fig. 6, left.
[34] S. Pryor and K. Blockley, 'A Seventeenth Century Kiln Site at Woolwich', *Post-medieval Archaeology*, 12(1) (1978), pp. 12, 30-85, fig. 22.122.
[35] Duncan Brown, pers. comm.

19 (NIMS). North Italian marbled slipware. Small bell-shaped bowl (diameter 130mm). Ribbed ext. Swirling cream slip design on red background all over interior and lower ext. Clear glaze all over interior and external but avoids base area. Ctx 2301. Pit 2300, construction cut for well 2305. Phase 7. Ctx spot-date *c.* 1700–30.

2 CRUCIBLES *BY JOHN COTTER*

Introduction and summary

Probably the most interesting aspect of the ceramic assemblage is the presence of 30 (mostly smallish) sherds from around 21 small round-bottomed sandy crucibles with a pouring lip (Fig. 13). One of these occurs in Phase 3 (context 2145, *c.* 1300–75) where it may be associated with the possible industrial ovens and stone-lined pits. Most however occur in Phase 4 (*c*. 1375–1525), where some (or all of them?) may be residual from the previous phase. The majority of sherds (23 sherds) were recovered from the sieved samples and only 7 sherds (6 vessels) were recovered from the 'hand-excavated' material – although these include the three most complete vessel profiles. Most crucible sherds show evidence of use (scorching, slaggy deposits internally/externally); in one case a crucible base contains tiny droplets of gold embedded in a purplish glassy deposit internally (Fig. 13, no. 5) and several other sherds contain dull grey sub-metallic globules which may be decomposed silver or lead. These residues and the small size of the crucibles suggest they were used for the smelting of precious metals and probably derive from the workshop of a gold/silversmith or jeweller located somewhere in the vicinity of the site. Six crucible samples were submitted for scientific analysis by pXRF, and the results of this broadly confirm the initial suggestions of precious metalworking based on visual inspection of the sherds. A summary of the pXRF findings is presented in Table 2.1.

The crucibles form a cohesive group, despite firing differences. They are in a very sandy brown or grey fabric and, although heat-altered in some cases, they most closely resemble the coarse sandy fabric of early Brill/Boarstall ware (OXAW, *c.* 1175–1400). The fabric code CRUC however has been used here for the time being. No other groups of high medieval crucibles appear to have been identified or published from Oxford, until now, where most of those found previously are usually dated to the Saxo-Norman period, including a significant number in Stamford ware (OXZ, *c.* 850–1150). A couple of heat-altered sherds in non-crucible fabrics (Brill?) may be from jugs used as accessory vessels in some industrial process. Besides these, there are parts of two Minety ware jars (fourteenth/fifteenth century?) with post-firing perforations which may have been used as industrial vessels (Phase 5; Fig. 12, no. 14/OXBB.1). All in all, there are several strong indicators in the ceramic assemblage that some sort of industrial/metallurgical activity took place on the site or in its vicinity during the fourteenth and possibly the early fifteenth century.

Documentary evidence also suggests the presence of a number of medieval goldsmiths operating in the area before the construction of Lincoln College in 1427. This is presented in the main publication and summarised here. It appears that in the thirteenth century there was a tenement to the north and east of the cemetery of All Saints Church belonging to the Hospital of St John (NE60) and which may have incorporated some or all of the present excavation area. A number of bakers are recorded in the area at this time. In the following century there is an interesting reference associated with the St John's Hospital tenement, which in 1388 and 1393 is recorded as held by Nicholas Goldsmith. The Aurifabers (Goldsmiths) were a leading family in Oxford in the thirteenth and fourteenth centuries, and held much property, including property on the west side of Turl Street. While the family may have originated as goldsmiths, it is unlikely that they all continued in the trade over this

period, although the surname endured. It is possible that Nicholas Goldsmith was a member of this family, though not necessarily a goldsmith, but the coincidence of this record with the excavated evidence for precious metal working nearby is notable.

Quantification and cataloguing

All the crucible fragments were catalogued in detail and extensively described in the comments field. Separate catalogues were constructed for sherds from the main 'hand-excavated' pottery assemblage and those retrieved subsequently from the sieved samples (full details in archive). However, the data from both catalogues is merged here to maximise the available evidence. A total of 30 sherds weighing 107g was recovered with an EVEs total of 2.34. This represents a minimum of 21 vessels. The hand-excavated assemblage produced only seven sherds (53g) with an average sherd weight of 8.8g. These represent six vessels including the most complete examples with complete profiles. The sieved assemblage produced 23 mostly fairly small sherds (54g) with an average sherd weight of 2.4g. These represent around 15 vessels. No definite cross-joins were noted between sherds from different contexts – only within contexts. Each crucible was recorded as a single record and assigned a number (in the comments field) based on the context number. In cases where more than one crucible occurs in the same context the number has been subdivided (e.g. Crucibles no. 2220/1, 2220/2 and so on).

Context and dating associations

A single sherd of crucible (2g) occurs in an occupation/levelling layer (2145) in Phase 3 (*c.* 1300–1375), stratified above hearth 2285. The crucible and seven other sherds recovered with it are all fairly small and from a sieved sample. The non-crucible pottery includes six sherds of plain, late medieval-looking Brill/Boarstall ware (OXAM/OXBX), tentatively spot-dated to *c.* 1400–1500, but these and the crucible itself might be intrusive here as the associated contexts definitely belong in Phase 3; alternatively, the pottery might be a little earlier than this. A very burnt/scorched body sherd from a large OXAW ?jug also came from 2145. This could simply have been burnt in a domestic fire, but it might also have been used for some industrial purpose. Most of the crucible sherds however are from Phase 4 (*c.* 1375–1525, or broadly fifteenth century). Within this phase the highest concentration of crucible sherds occurs in a sequence of thin layers – possibly occupation/slumped surfaces consolidating the soft spots created by underlying pits. All the pottery from these – including the crucibles – came from the sieved samples and, although fairly small, the sherds were quite fresh. Four layers (from top to bottom: 2249, 2248, 2296 and 2231) produced a concentration of ten crucible sherds (25g) representing a minimum of six vessels, including two illustrated items (Fig. 13, nos 3–4). Of these, context (2296, a charcoal-rich silt) produced a radiocarbon date of AD 1300–1430; it also produced sherds from two crucibles – one of them warped and clearly heat-altered – but no other pottery. Only four small sherds of non-crucible pottery were also present in these layers including two sherds from plain, late medieval-looking Brill/Boarstall ware jugs (OXAM/OXBX), tentatively spot-dated to *c.* 1400–1625, but potentially a little earlier than this. There were also two small burnt sherds of OXAQ (*c.* 1150–1350). These associations broadly support a fourteenth- to early fifteenth-century date for the use of the crucibles which, as the excavator has suggested, may be largely residual from the industrial activity on the site in Phase 3.

Vessel form, size and manufacture

The body of the crucibles is basically a hemispherical bowl with a curved outward-flaring wall and a rounded base – typical of medieval crucibles. A pulled lip (or spout) was then provided. Rims are mainly plain and tapering, occasionally slightly bevelled internally. Some rims have a slight groove or lip internally, probably caused by the potter's fingernail, and this may be a distinctive feature of this group. The rim apex is sometimes almost vertical, but not generally incurving, and the overall form is more bowl-shaped than globular – unlike most other (mainly earlier?) crucibles from Oxford. Some rim sherds are distorted – either during use or because they come from the area of the pulled lip – so only the most complete examples can be trusted to provide measurement data. The most complete example (Fig. 13, no. 1) has a bowl diameter of *c.* 50mm. A pouring lip was then pulled from the rim giving a diameter of *c.* 67mm along the long axis and the vessel has a height of *c.* 31mm. The other complete profile (Fig. 13, no. 2) also has a long axis of *c.* 65mm and a flatter base giving a height of *c.* 19mm. Slight finger impressions or dents are sometimes seen either side of the pulled lip or spout and the vessel wall in this area was considerably deformed. In plan the vessels are pear- or teardrop-shaped. Several other rims also have diameters in the *c.* 50–70mm range. One other vessel profile (from context 2298) is remarkably similar to the most complete illustrated example (Fig. 13, no. 1) but may have been up to *c.* 100mm along the long axis (and *c.* 23mm high). Wall thicknesses are in the 2–5mm range (excluding slaggy deposits). One sherd has an additional 4.5mm-thick external coating of black slaggy material giving a total thickness of 9mm (Fig. 13, no. 6).

Although individual rim sherds can appear wheel-thrown or turned, it seems more likely that the vessels are of composite manufacture – part hand-built and part wheel- or turntable-finished. Vessels probably started life as a pinch-pot formed from a lump of clay and worked by hand into a thinner-walled bowl-shaped vessel which was then finished off on a wheel or rapidly moving turntable. Evidence for this survives in the lower/basal part of several examples which is comparatively rough externally and shows traces of denting and handling acquired during manufacture whereas the rim has been tidied-up on a wheel. On some examples this neater wheel-finished area is confined to a distinct band of turning only 10–12mm deep. A pouring lip was then pulled from the rim while the clay was still soft.

Fabric and possible sources

Detailed fabric descriptions are provided for the six illustrated vessels (see illustration catalogue and Fig. 13) and a generalised description is given here. The crucibles have a fairly undistinctive and very sandy brown or grey fabric sometimes with sparse calcareous inclusions, and, although heat-altered and sometimes over-fired, they most closely resemble the coarse sandy fabric of early Brill/Boarstall ware which was frequently used for cooking vessels (OXAW, *c.* 1175–1400). Finer examples, however, can also resemble medieval Oxford ware (OXY, *c.* 1075–1300) which can be very similar to the latter. Several vessels are over-fired to a very hard dark-grey or grey-brown near-stoneware and some show evidence of warping or distortion acquired during use. Quartz is the most abundant inclusion, normally as rounded grains in the 0.25–0.5mm size range. Some coarse iron-rich clay pellets also occur. It is notable, and perhaps significant, that several examples have coarse sparse-moderate, calcined, calcareous inclusions (up to 2mm), although some examples have none. In this

respect the calcareous examples differ from the standard OXAW fabric. The calcareous inclusions seem too sparse to have been added deliberately and probably occurred naturally in the (?riverine) sand or clay used to make the crucibles – but their presence may have improved their refractory properties. The resemblance to OXAW (and OXY) suggests that the crucibles were fairly locally made – perhaps in the Brill/Boarstall area (west Buckinghamshire) or somewhere nearby in north-east Oxfordshire.

Evidence of use/residues

Out of the 21 individual crucibles identified only one appears unused, and this has an unaltered sandy brown fabric. Another rim sherd is similarly unaltered fabric apart from external sooting. All the remaining vessels show evidence of heat alteration; in most cases with a thin, or thick, vitreous grey 'bloom' or accidental ash glaze externally and sometimes internally. A few have thick (up to 4mm) dark grey/black slaggy deposits in the base of the vessel. Ten crucibles show evidence of metallic residues, though they are fairly slight traces. These are present as very small pellets or globules embedded in the slaggy deposits or vitreous bloom; some can be seen with the naked eye but are best seen under the microscope (x20). Of these, nine contain pellets of a dull grey or purplish-grey decayed sub-metallic material which may be a lead/silver residue. One basal sherd contains abundant very fine droplets of gold (up to 0.2mm) suspended in a dark purplish-brown glaze or slag (Fig. 13, no. 5). It is notable that none of the crucible residues or glazes showed obvious bright green or reddish discolouration typical of copper-alloys, even though scientific analysis detected a fairly strong copper reading in two of the samples.

The pXRF analysis was carried out using an Olympus Innovex handheld XRF, and the results are presented in Table 2.1. Six crucibles were sampled, along with the perforated Minety ware jar from context 2143 (Fig. 12, no. 14; see *Medieval and later pottery* above), and a medieval crucible from the nearby site at Jesus College First Quad.[36] The results support the visual analysis and the suggestion that most of the sampled crucibles were used for the working of precious metals. Samples 1, 3, 5, 9, 16 and 17 were almost certainly used for melting or processing silver. The peaks for silver were relatively strong, and the other elements present are fairly typical in archaeological silvers, although it cannot be ruled out that these crucibles were also used for melting bronzes or brasses. For sample 2, the presence of gold and absence of silver would seem to confirm that this crucible had been used for gold melting. Sample 7 produced peaks only for lead and zinc, and the use of this crucible remains unclear.

[36] A. Simmonds, R. Bashford and G. Thacker, 'A Further Sequence of Medieval and Early Post-Medieval Deposits at Jesus College, Oxford', *Oxoniensia* (forthcoming)

Table 2.1. Summary of the pXRF analysis. x = surface concentration of <1%; xx = surface concentration of 1–10%

Site	XRF sample no.	Context	Phase	Vessel type	Au	Ag	Cu	Sn	Zn	Pb	Sb
Lincoln College	1	2060	5	Crucible		xx	x	x	xx	xx	
Lincoln College	2	2220	5	Crucible	x		xx	x	x	xx	
Lincoln College	3	2272	4	Crucible		xx	xx			xx	
Lincoln College	5	2363	4	Crucible		xx		x		xx	
Lincoln College	7	2231	4	Crucible					x	xx	
Lincoln College	9	2248	4	Crucible		xx	x	x	x	xx	
Lincoln College	17	2143	5	Minety ware jar	x	xx				x	
Jesus College First Quad	16	72	-	Crucible	x	xx	xx	xx	xx	xx	x

Discussion: the crucibles in their wider context

Previously, the subject of medieval crucibles found in Oxford is not one that seems to have been paid much attention in the archaeological literature. Although it is not the intention here to produce a complete survey of crucibles in city – nor within the scope of the present excavation report – it nevertheless seems appropriate to summarise what can be gleaned from a trawl of the most obvious (and some less obvious) published sources. The aim of this is to place the Lincoln College crucibles within their wider historical context, to find the best parallels in terms of fabric and form and to consider where and when they were made and to touch on what they were used for. These factors are inextricably linked and, apart perhaps from function, the sourcing and dating of medieval crucibles is rather more ambiguous and problematical than when dealing with ordinary domestic pottery types.

The relative lack of information on local crucibles is probably due to a number of factors, perhaps principally because they turn up only very rarely under controlled excavation conditions, and the occasional references to them are widely scattered through a number of disparate reports. Several examples of baggy round-bottomed medieval-style crucibles are known from the city, but most of these unfortunately were recovered during salvage operations in advance of urban redevelopment in the late nineteenth and early twentieth centuries when the subject of medieval archaeology was in its infancy. Only a few of these have been published in any useful way – mainly by E. M. Jope in the 1950s (see below) – and they remain in storage in the Ashmolean Museum. There is a tendency to ascribe most of these vessels to the late Saxon or Saxo-Norman period and this, in fact, may well have some basis in truth. Many early crucibles in Oxford are in Stamford ware – a fine sandy (iron-free) whiteware from Lincolnshire prized for its refractory properties and widely traded as glazed pitchers, crucibles and others forms during the period *c.* 850–1250.[37] Many Stamford

[37] K. Kilmurry, 'The Pottery Industry of Stamford Lincs. c. AD 850-1250', *BAR,* 84 (1980).

crucibles are wheel-thrown or wheel-turned, and some are handmade. The latter can be simple baggy 'pinch-pots' fairly crudely formed from a lump of clay, or turntable-finished pinch-pots, which have a rounded base but appear to have a wheel-finished rim (as with the Lincoln College crucibles). The fine white (iron-free) fabric of Stamford crucibles (when unburnt) makes them fairly easy to identify. The coarser, sandier, iron-rich (grey-brown) fabric of the Lincoln College crucibles is much less distinctive and could come from almost anywhere, but they are certainly not Stamford ware. Crucibles in medieval Surrey/Hampshire whitewares are generally sandier/coarser than Stamford crucibles and mainly date to the high medieval period; this type has not yet been recognised from Oxford where medieval Surrey whitewares are never very common and not generally present until the late fourteenth century.[38] Many other medieval pottery industries with iron-rich clays seem to have produced a few crucibles as a sideline (e.g. London-type ware, perhaps Ashampstead-type ware?) but these do not seem to have been traded very far. The Lincoln College crucibles seem to fall within this last broad grouping, that is the side-line output of some fairly local pottery industry using a fairly iron-rich sandy fabric. No crucibles have previously been reported in the local Brill/Boarstall fabrics.[39] It is suggested that those here may be from this source, and probably in the coarser/earlier Brill fabric (OXAW, *c.* 1175–1400).

It is much harder to find information on later medieval crucibles (*c.* 1250–1500). Apart from those from Lincoln College hardly any of this date have been identified from the Oxford region and there seem to be comparatively few from other sites in southern England as well. This may be for technological reasons caused perhaps by changes in metallurgical or casting practises which may perhaps have relied less and less on the use of smallish purpose-made crucibles for melting and casting fairly small amounts of precious metals or copper-alloys. It may also be that without good associated dating evidence provided by archaeological contexts, we simply are unable to distinguish late Saxon crucibles from medieval ones. The form, after all, was basic, utilitarian and industrial and therefore little affected by changing fashions. The round-bottomed medieval-style crucible remained basically unchanged until the flat-based post-medieval style standing crucible replaced it in the late fifteenth century.[40] The associated dating at Lincoln College however strongly suggests that we are dealing with high or late medieval crucibles rather than residual late Anglo-Saxon pieces. As well as the longevity of the medieval form, there is also the problem that the intense heat which crucibles endure sometimes alters, scorches or even vitrifies the basic pottery fabric (usually sandy) making it difficult to assign sherds to known ceramic industries and so their geographic source is sometimes difficult to establish. It is often easier to deduce therefore what crucibles were used for than to say exactly where or when they were made.

E. M. Jope appears to be the first person locally to have discussed these with any scientific rigour when he found two pieces of crucible in the late Saxon pits he excavated under the mound of Oxford Castle in 1952.[41] These pits were sealed during the construction of the castle

[38] Pearce *et al*. 1988, fig. 101.396-400.
[39] Mellor, 'Oxfordshire Pottery'.
[40] J. Bayley, 'Metalworking Ceramics', *Medieval Ceramics,* 16 (1992), pp. 3-10.
[41] E.M. Jope, 'Late Saxon Pits under Oxford Castle Mound: Excavations in 1952', *Oxoniensia*, 17-18 (1952-3), pp. 96-7, fig. 37

mound *c.* 1071. The single (unused) crucible rim illustrated is from a small globular vessel of fairly standard form possibly with a trace of pulled lip surviving[42]. Both pieces are described as having a very hard close-textured brownish-grey/grey-brown fabric. The other castle sherd was cracked and bore blobs of bronze slag. It is impossible to tell from these descriptions whether they are made from local clay or in heat-altered Stamford ware. Very usefully, Jope also illustrates six other complete medieval crucibles from other earlier (salvage) sites in Oxford.[43] These are all of fairly similar form and provide the best illustrated parallels for the Lincoln College examples (see below for listing). His comments on these, based on years of digging in the city, are illuminating and worth repeating:

> *"Numbers of crucibles of this type have been found on sites in Oxford. No proof of their early date has previously been available, and some were found with material of twelfth- or thirteenth-century or later date, though the associations were in no case good. These Oxford Castle fragments show that this type of crucible was already in use in late Saxon times, and it probably remained so over a long period."*

The other crucibles he illustrates are listed below, but in order of geographical proximity to Lincoln College. Additional comments on these are appended where appropriate:

1. From the Radcliffe Camera steps (1912?).[44] Complete crucible in a harsh grey sandy fabric with a fairly open profile, slightly flattened or sagging base and a pulled lip. Badly twisted, perforated and covered with slag; it is said to have been used for bronze. "*Found at a depth of 16 feet close to the Radcliffe Camera (but stoneware was found as deep as 12 feet)*". Its museum accession number is also given (A.M. 1912.30). The vessel is *c.* 88mm long and *c.* 40mm high. In terms of its fairly open relatively shallow form and flaring rather than inturned wall, this appears to be the best local parallel for some of the more complete Lincoln College crucibles, and it is interesting to note that it was found just a few dozen metres east of the college. It might even be related to and contemporary with the industrial activity represented by the college crucibles. Whether this was in the general area or on the future college site itself is not known. There is some confusion as regards how many crucibles were found in this area and exactly when, because the Radcliffe Camera excavations took place over a few years. Mellor mentions an isolated crucible from the Radcliffe Camera excavations in 1909, which contained traces of copper and 'gold' adhering to the vessel.[45] It seems likely that this is the same as the one described by Jope. The Urban Archaeological Database states '*Excavations carried out during work beneath the Radcliffe Camera in 1910 (UAD 128) recorded several late Saxon pitchers, cooking pots and crucibles (Bruce-*

[42] ibid., fig. 37.58.
[43] ibid., fig. 37.59-64.
[44] ibid., fig. 37.60.
[45] Mellor, *Pots and People*, p. 24.

Mitford and Jope, 1940, 46)'.[46] However there is no mention of crucibles in the 1940 publication, only pots. The reference to traces copper and 'gold' on the same crucible are very relevant here as one of the College crucible sherds analysed by pXRF had traces of these elements too.

2. Three fairly different crucibles are illustrated from the site of the former Angel Inn, which were salvaged along with other late Saxon pottery during the construction of the Examination Schools (completed 1882) on the High Street.[47] No. 59 is the most unusual and is of open form, exceptionally thick-walled and made from a soft grass-tempered fabric similar to that used for Saxon loom-weights. It might perhaps be a lamp rather than a crucible. Grass/chaff-tempered crucibles are known from elsewhere (such as Winchester). No. 61 is of more normal type and very globular with a short upright rim; it has a harsh very brittle grey fabric and is said to have been used for bronze. No. 63 (unused) is of more open form, like Lincoln College, and with a bright orange harsh fabric. This suggests perhaps it was made from fairly coarse local clay (that is, probably not of Stamford ware).
3. 18–20 Cornmarket Street (Marks and Spencer site, 1935).[48] A smallish fairly globular crucible (similar to No. 61); described as having a grey brittle harsh fabric and used for bronze. This is almost certainly just one of a group of at least seven 'pinch-pot' or 'thumb-pot crucibles' in Stamford ware found at this site in 1935 and illustrated in a photograph by Mellor.[49] All but one of these had been used and several showed evidence of copper metallurgy. A larger vessel was found in association with the other thumb-pots. In these fairly short but useful few paragraphs Mellor goes on to describe how the late Saxon Stamford ware industry was responsible for the majority of crucibles found in Oxford[50] and the remarkable state of preservation of the Cornmarket vessels also receives some attention. Wheel-thrown bag-shaped and hemispherical pots of Stamford type are said to be more common from the St Ebbe's excavations in the south-west of the town, and may post-date those found in the commercial centre. The site of the late Saxon Oxford mints – where we might expect to find these sorts of vessels – has never been found.[51]
4. St Michael's Church, Cornmarket (1906).[52] Fairly large, very globular, unused, wheel-turned crucible in a hard fairly fine pale buff fabric, lightly gritty. Spots of pale yellow glaze on the outside. This is almost certainly a Stamford ware crucible and Jope

[46] R. Beckley and D. Radford,, 2011 'Oxford Archaeological Resource Assessment: Anglo-Saxon and Medieval. Version 28/1/2012l'. (2011, Oxford City Council), pp. 54, 78.
[47] Jope, 'Late Saxon Pits under Oxford Castle Mound', figs 37.59, 61 and 63.
[48] ibid., fig. 37.62.
[49] Mellor 'Oxfordshire Pottery', fig. 26.
[50] ibid., pp. 23-4.
[51] ibid.
[52] Jope, 'Late Saxon Pits under Oxford Castle Mound', fig. 37.64.

suggests a date in the eleventh century based on a parallel at York (also probably Stamford ware).

Other references to crucibles in Oxford

The list below is not exhaustive and only the most relevant or significant will be highlighted here. Other general references to local crucibles – including some already mentioned above – can be found in Dodd's publication.[53] Crucibles are not mentioned in Mellor's wide-ranging survey of medieval pottery produced in the Oxfordshire region.[54] There is still some debate however as to whether 'unused' medieval-style crucibles were used as lamps, or whether globular round-based lamps were ever deliberately produced with a lighting function in mind.[55] Some crucible-like forms may therefore be identified in reports as 'globular lamps'. A large 'spouted lamp' of this type in sandy oxidised Ashampstead-type ware (OXAG, from Berkshire) is illustrated by Mellor.[56] This is the only crucible-like form in her report and dates to the late twelfth or early thirteenth century. The latter is from the extensive St Ebbe's excavations in the south-west of the town and is also published in that report along with a similar but smaller 'lamp' rim in the same fabric.[57]

Other more definite crucibles are also published from St Ebbe's, which are also given fabric codes and descriptions. A very globular Stamford ware crucible and other more fragmentary examples in this ware are mentioned.[58] A small "pinch-spouted crucible or ovoid vessel" in medieval Oxford ware (OXY, *c.* 1075–1300) is of particular interest, though unstratified, as the only example in this fabric identified to date and also fairly similar in form (and fabric) to the Lincoln College vessels. More surprisingly, perhaps, the same excavations also produced the rims of "two unusually large and heavily overfired crucibles" in a fairly rare calcite/limestone-tempered fabric of unknown source (OXBS).[59] These were found in the same late twelfth- or early thirteenth-century pit and similar 'calcite'-tempered crucibles may have been used elsewhere on the site in the twelfth century.[60] Elsewhere, at Broad Street in the centre of town, a sherd of (late medieval?) limestone-tempered Minety ware (OXBB) may also have been used as an industrial vessel, possibly a crucible. This had a heavy carbon deposit externally and a cuprous deposit internally.[61] Mellor suggests that the coarse open texture and calcareous fabric of Minety ware "would be better suited to heating to higher temperatures than the contemporary dense sandy wares from the Brill/Boarstall region, which would be prone to shatter". In this respect it is worth mentioning the perforated and heavily scorched Minety ware jar from Lincoln College which also appears to have been used as some sort of industrial/accessory vessel (Fig. 12, no. 14; OXBB.1). It is also perhaps worth

[53] Dodd, *Oxford before the University*, pp. 43, 310, 338.
[54] Mellor, 'Oxfordshire Pottery'.
[55] Kilmurry, 'The Pottery Industry of Stamford Lincs. c. AD 850-1250'
[56] Mellor, 'Oxfordshire Pottery', fig. 26.17.
[57] Hassal *et al*., 'Excavations in St Ebbe's, Oxford 1967-76: Part 1', fig. 47.7; fabric (ibid., fig. 44.9, mid 11th century).
[58] ibid., fig. 45.4; p. 201.
[59] ibid., fig. 47.10-11.
[60] ibid., p. 208.
[61] Mellor in Dodd, *Oxford before the University*, p. 310.

mentioning here a dump of fourteenth-century 'alchemical' vessels from Christ Church. This remarkable assemblage comprised of local Brill/Boarstall bottles, cruets, skillets, pipkins and bowls (made from cut-down jars and jugs) showed evidence of intense heating and sometimes vitrification. No purpose-made crucibles were present in the assemblage but it seems very likely that the cut-down jugs and jar bases etc. had been used as heating or accessory vessels. It may be that the sort of 'alchemical' experiments going on here did not require purpose-made crucibles (e.g. for metal casting) and so any domestic pots close to hand could be adapted to purpose (as heating trays/parting dishes and so on). Alternatively, it might suggest that purpose-made crucibles were becoming increasingly difficult to acquire (or perhaps less necessary?) as the fourteenth century progressed.

Finally, another medieval crucible sherd, similar to those from Lincoln College, was found recently during alterations to Jesus College First Quad; it was residual in a sixteenth/seventeenth-century context.[62] This is a body sherd with a trace of rim surviving and with possible traces of decomposed ?lead/silver on the interior. Metallurgical use is confirmed by pXRF analysis (Table 2.1). Jesus College is located a short distance to the north of Lincoln College, also on Turl Street.

Illustration catalogue (Fig. 13)

1. (CRUC, possibly OXAW?). Early Brill/Boarstall ware? Crucible profile. Baggy round-bottomed medieval type with a pulled lip/spout. Plain upright rim slightly bevelled/flat-topped ext. Diameter *c.* 67mm (along long axis; *c.* 50mm short axis). Two fresh joining rim sherds comprising 52% of circumference. Probably handmade but rim finished on a wheel/turntable? Body area quite irregular/dented externally. Hard dark grey sandy fabric (similar to OXAW, see below). Heat altered/scorched with patches of thin vitreous grey-green 'bloom' externally. Interior has very obvious thick, dark greenish-grey, rough slaggy deposit – possibly zoned and ending in a horizontal 'tide mark' *c.* 10mm below the rim at the back of the vessel and extending right up to apex of pouring lip. Deposit thicker and rougher towards the base (3–4mm thick) and has small purplish-grey globules of sub-metallic ?lead/silver embedded within. Wall thickness 2mm (rim) to 5mm (base). Height *c.* 31mm. Fresh condition. Fabric description: Abundant medium-coarse quartz, mostly 0.25–0.5mm across (rarely to 0.75mm). Quartz grains clear and milky; mainly sub-rounded to sub-angular, rarer rounded and angular. Sparse very coarse, grey and red-brown (iron-rich) clay pellets to 2mm – the latter sometimes glassy/melted. Abundant fine linear voids aligned with contour of vessel wall. Rare organic voids (from rootlets etc) up to 7mm long. Context 2363 (pXRF sample 5). Phase 4. Rubble dump. Possibly fill of oven.

2. (CRUC, possibly OXAW?). Early Brill/Boarstall ware? Crucible profile. Baggy round-bottomed medieval type with a pulled lip/spout. Similar in fabric/form/manufacture to more complete example above (2363). Sandy mid-light grey fabric. Thick rough grey to purplish-black slaggy deposit interior with some bubble craters and small metallic ?lead/silver globules embedded. Purplish bloom ext under spout. Plain tapering/rounded rim with slight groove or

[62] Simmonds *et al*., 'Jesus College'

lip int. Overall dimensions probably very similar to 2363 but shallower (*c*. 19mm high). Fresh condition. Context 2272 (pXRF sample 3). Phase 4. Occupation deposit/pit slump?

3. (CRUC, possibly OXAW?). Early Brill/Boarstall ware? Crucible near-profile. Small globular or bowl-shaped with plain upright rim (diameter 50mm). Probably handmade but finished on a wheel/turntable: the interior surface looks wheel-turned; the external surface is fairly rough with fine irregular striations except for a 12mm-wide band below the rim which appears to be wheel-finished. Wall 2.5–4.0mm thick. Unaltered fine sandy light brown-buff fabric. Rounded clear and milky quartz mostly under 0.3mm across. Sparse coarse iron-rich clay pellets to 2mm. No visible calcareous inclusions. Fabric compares well with OXAW samples. No traces of use. Context 2248, crucible no. 2248/1. From sieved sample <16>. Phase 4. Occupation deposit/pit slump?

4. (CRUC, possibly OXAW?). Early Brill/Boarstall ware? Crucible. Small near-conical bowl-shaped form with plain external bevelled rim (diameter *c.* 55–60mm). Grey reduced fairly coarse sandy fabric with moderate calcined calcareous/limestone inclusions. Vitreous film on interior. Internal surface of rim has 8mm wide band of whitish discolouration – possibly a chemical reaction? Context 2231 (pXRF sample 7). From sieved sample <10>. Phase 4. Occupation deposit/pit slump?

5. (CRUC, possibly OXAW?). Early Brill/Boarstall ware? Crucible. Small thin-walled body/base sherd from small rounded medieval crucible form with slightly flattened base (diameter *c.* 20mm). Possibly wheel-turned/finished? Wall 2–3mm thick. Very sandy dark grey near-stoneware fabric. Sub-rounded quartz; mainly milky, some clear and pinkish, up to 0.75mm across. Sparse calcareous inclusions and voids. The lower *c.* 10mm internally contains a dark purplish-brown glassy deposit containing abundant very fine droplets of gold up to *c.* 0.2mm across. Max sherd length 30mm. Context 2220, crucible no. 2220/1 (pXRF sample 2). This had the highest reading for gold of any of the crucible sherds examined by pXRF. Phase 5. Demolition deposit.

6. (CRUC, possibly OXAW?). Early Brill/Boarstall ware? Crucible body sherd. Possibly from the right-hand side of globular vessel with some suggestion of pulled lip? Max length 47mm. Wall thickness 2.5–4.25mm. Coarse sandy, light grey, hard near-stoneware fabric with moderate calcareous inclusions to 2mm. On the exterior is a thick (4.5mm) glassy flattened patch of black slaggy material – possibly part of an original clay coating? Latter contains fine vesicles and abundant quartz and has a shiny glaze-like surface with small reddish and bluish patches. The interior also has a small glazed patch with several small globules of decayed ?lead/silver embedded. Context 2060 (pXRF sample 1). Phase 5. Levelling/occupation deposit.

3 FIRED CLAY *BY CYNTHIA POOLE*

Introduction and methodology

A small assemblage of fired clay amounting to 774 fragments (2,754g) was recovered from the excavation, of which only a quarter (20 fragments, 575g) was recovered by hand excavation, the remainder extracted from sieved samples. The *in situ* fired clay was sampled from two burnt structures (2152, 2333). The condition of the material is variable from a complete, well preserved item of furniture to small amorphous fragments. The overall mean fragment weight (MFW) was 14g. Sieved material had a MFW of 4g compared to 29g for the hand-excavated material.

The assemblage has been fully catalogued for the archive on an Excel spreadsheet, recording for each context, form, fabric, fragment count, weight, condition, size, impressions and a general description. None of the material could be assigned a spot date, and though the pedestal is distinctive no parallels have been traced. Phasing of the assemblage is therefore dependent on its stratigraphic location and the dating of associated artefacts. The assemblage is summarised by phase in Table 3.1.

Table 3.1. Summary and quantification of the fired clay

Phase	Data	Oven/hearth	Furnace structure	Pedestal	Industrial	Mould	Indet	Unused	Total	%
Phase 1	Nos	14	4				1	13	32	4
	Wt (g)	241	18				22	267	548	20
Phase 2	Nos	6							6	0.8
	Wt (g)	19							19	0.69
Phase 3	Nos	6	94			4	1		105	13.6
	Wt (g)	17	266			83	3		369	13.5
Phase 4	Nos		543						543	70.3
	Wt (g)		395						395	14.4
Phase 5	Nos	6	55	1	15	1	7		85	11
	Wt (g)	24	182	206	941	5	14		1372	50.1
Phase 6	Nos					1			1	0.13
	Wt (g)					33			33	1.2
Total Nos		32	696	1	15	6	9	13	772	772
Total Wt (g)		301	861	206	941	121	39	267	2736	2736

Provenance

The fired clay was found in features and general layers from Phases 1 to 6, dating from the eleventh to seventeenth centuries. Fired clay is not generally dateable in itself, except in the case of a small number of diagnostic forms, and is reliant on associated dateable artefacts for phasing. No diagnostically dateable material was recovered. In Phases 1 and 2 fired clay was found in pits in dumps of domestic waste. In Phases 3 to 5 material was found in primary fills of hearth or oven bases, as well as discarded in associated occupation deposits. The single fired clay object from Phase 6 was discarded in a pit fill.

Fabrics have been examined with a hand lens (x20) to characterise the main components. The fabric used for all pieces was a sandy micaceous clay, generally containing moderate to high densities of fine-medium quartz sand, rounded-subrounded and sometimes with small riverine grits c. 2–8mm of flint or hard fine-grained rock. Some pieces of raw clay were retained and these were a pale yellowish cream/buff in colour. The fired clay was generally oxidised predominantly red or reddish brown in colour. The clay is probably derived from clays of local alluvial origin. Sandy clay fabrics were identified in previous excavations at Lincoln College as well as elsewhere in Oxford at St Ebbe's and Cornmarket.[63] In a few cases this clay contained the addition of fine organic inclusions, either chaff or crushed straw.

Forms and function

Industrial refractory material – moulds: Items that can be assigned convincingly to metalworking activity are the piece moulds from contexts 2635 (Phase 3) and 2137 (Phase 6) and less certainly the possible mould fragment from 2385 (Phase 5). The mould from Phase 2 was found in a layer of charcoal (2635) possibly within a shallow hollow, slumped into an earlier pit indicating the location of a simple hearth on the surface of the natural. This included part of a hemispherical mould with a shallow flat internal recessed area with a wide flat contact surface at the margins and two flat slabs, which possibly formed the upper valve of the mould assembly. The mould fragment from deposit 2385 was within a drain or flue (2387), which contained some crucible fragments, large quantities of charcoal and charred cereal and legumes. This trench cut through one of the clay-lined hearths (2388) and this and associated activity may have been the source of the redeposited metalworking and burnt debris in the fill. The mould from Phase 6 was used to produce a decorative linear object with circular section, possibly a candlestick or handle.

Oven/hearth furniture: A single item of oven/hearth furniture survived virtually complete in layer 2173 (Phase 5). This was a pedestal in the form of an inverted funnel standing 82mm high and measuring 64mm at the base tapering to 35mm at the top. The surface around the top was lightly vitrified, but the top surface itself appeared to have been protected from vitrification by an object resting on it – perhaps a crucible. It is an unusual item and no

[63] K. Brown, 'The Fired Clay', in Kamash *et al*., 'Lincoln College, Oxford 1997-2000', pp. 240-42; J. Munby, 'Daub', in T.G. Hassall, C.E. Halpin, and M. Mellor 'Excavations in St Ebbe's, Oxford 1967-76: Part 1: Late Saxon and Medieval Domestic Occupation and Tenements and the Medieval Greyfriars' *Oxoniensia*, 54 (1989), p. 247; D. Sturdy and J. Munby 'Early Domestic Sites in Oxford: Excavations in Cornmarket and Queen St 1959-62' *Oxoniensia,* 50 (1985), pp. 47-94.

parallels are known to the author. It was most probably used in a metalworking context based on the evidence of vitrification and other evidence for metalworking from the site.

Oven, hearth or furnace structure: The remaining fired clay comprises structural pieces that can be assigned to oven, hearth or furnace structures on the basis of form, general characteristics or association with *in situ* structures. Fragments of vitrified hearth lining had been initially identified as part of the slag assessment, where an association with copper-alloy working was recognised.

Nearly two thirds of the fragments had only a single moulded surface that cannot be assigned to a function with any certainty, but characteristics of moulding, wattle impressions and organic tempering suggest they are likely to derive from elements of oven or hearth structure. A significant quantity of heavily vitrified hearth or furnace lining was also present indicating some industrial activities were undertaken on the site. Fragments identified as oven or hearth lining were found in Phases 1, 2, 3 and 5. The material from Phases 1 and 2 came from secondary deposits of tips of occupation debris in pits. In Phase 1 this included one piece from fill 2567 of pit 2569, which had part of a perforation over 36mm wide, which may have been a small vent, tuyère hole or inspection hole. From the fill of pit 2477 a fragment with a wattle impression 15mm diameter is probably from an oven wall or superstructure and fragments of vitrified hearth or furnace lining are indicative of industrial activity. In Phase 2 a few fragments of oven lining were found in tips of charcoal (2082, 2517) discarded in pits 2075 and 2525.

All the material from Phase 3 is associated with *in situ* structures. A large quantity of fragments 14–25mm thick from hearth 2152 had areas of blackened vitrified surface with a reddish purple metallic sheen indicative of copper-alloy working. This structure was constructed in a shallow cut (2289) with a stone kerb (2285) and a floor of clay, gravel and sand (2152). The vitrified hearth lining recovered may have formed the surface of the floor or fallen from surrounding walls of a semi-enclosed or enclosed structure. This was covered by a thin lens of charcoal and ash (2145), which contained another similar fragment of vitrified hearth lining, also with a dark red veneer. The vitrification on the surface of the fragments is indicative of higher temperature industrial activity.

Fragments of floor or wall lining from group 2412 (deposits 2397, 2409, 2429) are associated with the oven base 2398 or 2426. These were all small thin fragments 6–15mm thick, some of which had evidence of a flat moulded surface and all had monocot impressions, probably straw/grass stems and leaves either on the surfaces or within the clay fabric.

Phase 3 hearths/furnaces and ovens (early to mid-fourteenth century)

Oven/hearth 2426: Within the earliest structure recognised on site was a rectangular hearth 2426, measuring 1 by 1.6m in size, and constructed with a kerb of rough limestone blocks bedded in a brownish orange sandy clay. It is likely the stone structure would have originally been lined with clay, though no evidence of this is recorded. A small fragment of fired clay with organic impressions found in an associated layer of charcoal 2429, and a further similar scrap from charcoal layer 2409, are both likely to be pieces of such lining. The flot from this structure produced large quantities of charred cereals and legumes and charcoal.

Oven 2398: This structure was a circular oven base 2.4m in diameter, constructed with a stone floor and stone walls set in a sandy mortar and apparently cutting 2426. Covering the base was a layer of charcoal and ash, which produced thin fragments of fired clay oven wall lining with organic impressions. Bread ovens were generally circular, but metalworking structures could also be this shape, so the form is not definitive in identifying use. However, an associated layer of burnt debris (2409) produced over 3,000 cereal grains, plus chaff and weed seeds, which might be taken to show an association with baking, malting or crop processing (see samples 34, 35 and 40).

Hearth/furnace 2152/2285: A third structure (2152) was inset into a shallow cut (2289) measuring 1m by 0.92m, lined with a kerb of small stones (2285) and surfaced with a layer of pale greyish red silty clay (2152) mixed with some gravel and charcoal. From this surface were recovered fragments of fired clay, some of which had a heavily burnt and blackened semi-vitrified surface. The flot from this feature produced moderate quantities of charcoal and cereals. In addition, a substantial quantity of vitrified hearth/furnace lining was also recovered suggesting a high-temperature activity and with evidence of copper residue.

Hearth? 2635: A lens of charcoal 0.9 m wide and 0.16 m deep lay in a shallow hollow in the top of the natural and layer 2604. This was possibly the site of a simple hearth. The layer contained several pieces of mould assembly probably used for the casting of copper-alloy objects. The charcoal included oak heartwood and beech roundwood.

The function of these structures cannot be determined with any certainty from their form alone. It is not possible to say whether these were open or enclosed structures, as later truncation has removed evidence for any superstructure, though it is likely that both 2398 and 2426 had a superstructure. The rectangular structure 2426 set against the wall may have been an open fireplace within a room, but from the evidence of the vitrified fired clay it is more likely to have been an enclosed or semi-enclosed structure, probably a furnace for metalworking. The circular structure 2398 is typical of the bases of bread baking ovens, though other functions cannot automatically be ruled out.

Agricola in *De Re Metallica* illustrates in the accompanying woodcuts rectangular smelting furnaces set against walls, as well as freestanding rectangular and circular structures for other metallurgical processes. Agricola also records that the smelting furnaces were stone structures luted on the interior with a mix of charcoal dust and earth, whilst many of the furnace structures used for other processes that he describes have some element of lute to seal surfaces. However, there is no industrial waste from structures 2398 and 2426 to suggest they were used for metalworking. The quantity of charred cereal grain as well as charcoal recovered from the fill is strong evidence to suggest 2426 was associated with baking and the massive quantity of cereal grain from the circular oven 2398 certainly suggests its function was a bread oven or activity associated with crop processing, rather than metalworking.

In contrast the vitrified hearth lining from 2152 is indicative of a high temperature activity and in the overlying layer 2145 a further fragment of vitrified fired clay, was clearly indicative of copper-alloy working. The charred grain mixed with the charcoal in this case may be tinder or fuel.

Phase 5 hearths and furnaces (mid-sixteenth to early seventeenth century)

Hearth 2051: In Phase 5 a rectangular hearth or fireplace 2051 was identified set into the corner of building 2230. It measured 1m by 1.5m and was constructed on a bed of clay (2343), with a kerb or wall of rectangular limestone blocks surrounding a stone floor surface (2345) made of shaped stone cobbles set into mortar (2344) burnt pink. Both the clay and stone structures had been heat discoloured with several stones heavily calcined and cracked. The heavy burning suggests this structure served as a furnace rather than a domestic fireplace, though there is no other evidence from fired clay or slag to relate this structure directly to an industrial function. A layer of reddened burnt sand and gravel (2211) may represent a re-flooring or collapsed superstructure. In addition to the ash and charcoal layer (2200) within the hearth, extensive layers of similar burnt debris (2207-8) surrounded this structure. No fired clay was recovered from the *in situ* structure, but some small fragments of fired clay lining were recovered from bulk samples of the charcoal deposits. Fired clay from layer 2263, which is associated with building 2230, may also derive from hearth 2051.

Small bowl hearths group: Broadly contemporary with structure 2051 was a group of small bowl-shaped features (2165, 2332, 2334, 2338, 2340, 2384, 2388 assigned to Phase 5 and 2372 assigned to Phase 4) ranging in size from *c.* 0.2 to 0.6m diameter and up to 0.16m deep, lined with yellow clay, which had some evidence of superficial burning and filled with charcoal fragments. The clay lining (2333) was only recovered for further analysis from one of these (2332). It is largely raw unfired clay, except for some slight heat discolouration on the flat rim that encircled the dished hollow. From the site photos it is clear that some others were more extensively burnt, though not to any great depth into the clay nor to the periphery of the clay. It is uncertain what function these features had (though certainly not as postholes as interpreted on site). They bear some similarity to the forehearths and dipping pots associated with smelting furnaces illustrated in Agricola's *De Re Metallica*, although it is unlikely they served such a function. In other illustrations moulds are shown set into the ground for creating ingots and it is possible that these clay-lined hollows served a similar purpose. Fired clay fragments from the charcoal fill (2382) of feature 2384 included a piece pierced by a perforation *c.* 35mm diameter. Another had an intensely reddened surface, indicative of the presence of copper chemically bound into the fired clay. Agricola shows circular vents or air holes in furnaces used for parting or assaying of metals. Copper residues may result from the parting of precious metals, as gold and silver contain sufficient traces to cause this colouration. It is possible such a process is represented from these pieces.

Table 3.2. Comparison of small bowl-shaped features (possible hearths or ingot moulds)

Feature	Fill	Length	Width	Depth	Sample	Charcoal	CPR	Ceramic
2165	Irregular area of yellowish cream clay with a central circular hollow, burnt *in situ* to a maroon colour, possibly lined	0.4	0.3	0.2	2	Beech, oak, *Prunus*, *Corylus*	Sparse seeds, chaff	OXBX bowl shaped lid diam 140mm

	with pot and infilled by a fill of charcoal.							
2332	Hexagonal feature lined with light brownish white clay 40mm thick (2333) overlain by dark grey charcoal and ash (2337).	0.24	0.2	0.06	22	Beech, hazel, field maple	None	Clay lining: lightly burnt around encircling lip
2334	Polygonal feature, lined with light brownish white clay 100mm thick forming bowl 0.22m diameter (2335); overlain by black charcoal deposit (2336)	0.55	0.5	0.15	~	Not sampled	Not sampled	None
2338	Small hexagonal hollow lined with brownish yellow clayey sand (2339).	0.2	0.2	0.04	~	Not sampled	Not sampled	None
2340	Small circular hollow lined with light brownish white sandy clay (2341) and filled with fine black charcoal (2342) 20mm thick. Heavily truncated.	0.1	0.1	0.02	~	Not sampled	Not sampled	None
2372	Sub-circular feature lined with yellowish brown silty clay (2375) forming a D-shaped hollow 0.23m diameter and 90mm deep, heavily burnt and reddened to a depth of 20–30mm, overlain by layers 2373 and 2374 consisting of a black charcoal lens on the base and ash and burnt debris above.	0.6	0.45	0.19	26, 27	Very sparse	Very sparse weed seeds	Fired clay vitrified furnace/ hearth lining (2373, 2374)
2384	Circular hollow lined with brownish yellow	0.62	0.62	0.16	30	Charcoal rich: oak,	Sparse cereals	Fired clay mould

	clay with stones 60–100mm along the east edge (2383) overlain by a dark grey layer of burnt material and occupation debris (2382)					beech, hazel and field maple	and legume	and furnace structure with Cu residue (2382); pottery: unusual OXAM ?jug
2388	Circular/ovoid hollow cut through by drain 2387, lined with scorched brownish red clayey silt overlain by a thin lens of ash and a further layer of red burnt silt (2386).	0.6	0.52	0.06	32	Charcoal rich: oak, beech, birch, hazel, *Prunus*, Pomoideae	Sparse cereal grains incl. rye	Crucible (with ?Pb/Ag residues); pottery: sherds of ?early OXAM with green speckled glaze

Conclusions

Documentary evidence has suggested that the buildings on the site could be associated with both a bakery and metalworking workshop. Both trades use burnt structures in the form of ovens, hearths or furnaces. The forms of such structures may overlap in size, shape, materials and construction techniques, and where superstructure has been truncated may be difficult to differentiate on form alone. Evidence for intensity of firing, fuels and associated objects and residues can provide some supporting evidence of function.

The evidence for a bakery is strongest in Phase 3, when the circular oven 2398, typical of bread ovens, was in use. However, the rectangular structure 2426 has produced a similar suite of ecofactual material as 2398, which suggests both these served as bread ovens or in the processing of cereal crops. Ovens for baking are most commonly circular and medieval manuscripts generally show this as the normal form, though often set above ground level and built into a structure. Two bread ovens with a rectangular flue projecting in front of each were found at the Ashmolean Museum dating to the late fourteenth to fifteenth centuries.[64] They are of similar construction to ovens 2398 and 2426, built of limestone blocks bedded in and lined with clay and measuring 3–3.5m long by 1.5m wide. They were heavily burnt and concreted internally and the burnt layer on the base contained large quantities of cereals, especially bread wheat.[65] The form of the ovens at the Ashmolean suggests 2398 and 2426

[64] Andrews and Mepham, 'Ashmolean Museum Forecourt, Beaumont Street, Oxford', pp. 179-223.
[65] P. Hinton, 'The Charred Plant Remains from Ovens 166 and 167' in Andrews and Mepham, 'Ashmolean Museum Forecourt', pp. 216-7.

should be seen as a single structure forming the oven and flue respectively. This relationship was not evident in excavation as the structures had been truncated by drain 2387.

The fired clay indicative of metalworking is not large in quantity, but it occurs consistently in contexts from Phases 1 to 6 suggesting this activity may have been undertaken on the site from the thirteenth to the seventeenth centuries, though the mould fragment (the only item from the latest phase) is arguably residual. The assemblage suggests there was continuous use of the site for the small-scale production of metal artefacts intensifying from Phase 3 to Phase 5.

Though the rectangular structures set against walls could be domestic fireplaces inset into the wall of the building, the intensity of burning and the extent of associated charcoal spreads suggests they are more likely to be situated in workshops than in a domestic setting. The rectangular hearth 2152 on the basis of the associated fired clay represents a high-temperature activity probably associated with copper working. A sample of the lining was subjected to pXRF analysis and produced evidence of iron, lead, copper, tin, arsenic and silver. The fairly high iron and aluminium readings may reflect these being a natural component of the clay. The other elements detected may reflect the type of metalworking undertaken on the structure: arsenic commonly occurs in conjunction with copper, which with the tin supports the production of bronze objects. The high lead and trace of silver may also indicate lead or pewter production.

Hearth 2051 cannot be positively identified with a specific activity. However, the lack of charred cereals and dominance of charcoal in the associated spreads of fuel debris suggest it was not associated with the bakery. The contemporary small clay-lined bowl-shaped structures found in Phase 5 are enigmatic, but the presence of crucible and furnace lining in some suggests that a use related to metalworking is the most probable function. The spatial and temporal association of these features and hearth/furnace 2051 suggest they relate to a single activity or series of inter-related processes. The small clay-lined features exhibit various degrees of heating, some being virtually unfired, which initially suggested some may have been used for the casting of ingots, but others have distinct *in situ* firing of their internal surface. The consistent presence of charcoal infilling these features and the similarity of form suggests they all had the same function, which was most probably as small metalworking hearths or furnaces, rather than as ingot moulds. The low temperature suggested by the degree of firing of the clay suggests they may have served to melt lead, which needs only to reach 300°C. A clay sample from one of these hearths (2372) was tested by pXRF and produced the strongest evidence for lead, together with traces of arsenic and merest hint of tin.

Catalogue of fired clay from hearth, oven or furnace structures and refractory items

1. Mould lower valve: Two refitted fragments form part of a hemispherical/oval block with a shallow flat recessed area forming the mould surface with straight edge and angled projection surrounded by a wide flat contact surface 20mm wide. At one end of the contact surface there appears to be an area of sloping surface that may be part of the mould gate. The mould

surface is fired grey and the contact surface and exterior reddish pink. The mould is likely to have produced a flat bladed or sheet object.

Mould upper valve: A separate flat slab has a smooth flat surface on both sides and appears to have formed the covering valve: one side is fired grey with a pinkish grey margin representing the contact surface and the other light red. A small section of vertical edge survives, but it is insufficient to indicate shape of the slab. Part of a narrow concave groove across the edge may relate to the secure attachment of the two valves.

Mould: Another thinner slightly curving fragment is likely to be from a separate mould: it has a gently convex outer surface and gently concave inner surface. It possibly formed a shallow dished mould.

Nos: 4; weight: 83g; thickness: 27/29mm (lower valve), 14mm (upper valve); width: >50mm; length: >70mm. Fabric: frequent fine quartz sand and common voids from very fine organic inclusions, probably crushed chaff or straw. Phase 3: early-mid fourteenth century; layer 2635, sample 49.

2. Hearth/furnace 2289 (2152). Hearth floor: some pieces with flat even moulded surface, but most largely amorphous broken fragments. These were recovered from a bulk sample taken from the hearth for CPR, and no deliberate sampling of the clay surface of the hearth floor was undertaken at the time of excavation. The hearth was constructed with a kerb of stone blocks infilled with gravel and clay and finished with a clay surface. Three pieces are heavily burnt and partly cindered below the surface having a vesicular and semi-vitrified character. The degree of firing suggests this structure may have been used for industrial higher temperature activity. The fired clay was originally interpreted as oven lining and it is possible the rim of stones in fact represents the base of a wall and that the feature was in fact an enclosed or semi-enclosed structure. In addition, a further 200g of vitrified hearth lining (not seen by this specialist) was assessed with the slag indicating the fired clay formed part of a heavily fired industrial structure.

Nos: 18; weight: 40g; thickness: 15mm. Fabric: red - reddish/purplish brown sandy micaceous clay; containing some cream calcareous grits SR up to 5mm. Phase 3: early-mid fourteenth century; Hearth 2289 (2152), sample 17.

3. Oven 2398 (2397). Oven/hearth structure – wall or floor lining: these consist of small thin fragments. One piece fired dark grey has a flat smooth surface and two have a rough flat surfaces on both sides with organic impressions (monocot: probably straw/grass). Another has a smooth concave surface, which is possibly a wattle impression 14mm in diameter. This material is probably oven wall or lining from oven 2398.

Nos: 5; weight: 13g; thickness: 6–15mm. Fabric: reddish brown, dark grey sandy micaceous clay containing some rounded grits up to 5mm. Phase 3: early-mid fourteenth century; oven 2398(2397), sample 34.

4. Oven 2426 (2409). Indeterminate: amorphous fragment with straw/grass stem/leaf impressions. This is from a deposit associated with oven 2398 and is probably part of the wall lining scraped out when raking out the cinders.

Nos: 1; weight: 3g; thickness: 12mm. Fabric: brownish red coarse sandy clay containing a high density of medium and occasionally coarse rounded quartz sand. Phase 3: early-mid fourteenth century; charcoal layer (2409), sample 35.

5. Oven 2426 (2429). Oven wall: small fragment with flat even moulded surface and bonded over organic material represented by coarse stem impressions on underside. These are small monocot stem/leaf impressions or straw or grass 2–6mm wide. This is probably oven lining raked out with cinders from oven 2426.

Nos: 1; weight: 4g; thickness: 13mm. Fabric: light orange-brown coarse sandy clay containing sparse fine mica and a high density of medium quartz sand. Phase 3: early-mid fourteenth century; charcoal layer (2409), sample 41.

6. Mould? Wedge shaped fragment with two flat or slightly convex surfaces diverging from a rounded rim. Possibly the rim of a mould gate.

Nos: 1; weight: 5g; thickness: 16 mm. Fabric: black–buff sandy clay. Phase 5: mid-sixteenth – early seventeenth century; drain 2387 (2385), sample 33.

7. Furnace or mould? The fragments have a smooth flat moulded surface, which in one piece is pierced by a circular perforation *c.* 40mm diameter. This has a white residue or vitrification around its surface. It most resembles a hole for tuyère or inspection hole in oven wall, though if for a tuyère a much greater degree of burning and vitrification would be expected. The perforation could conceivably be the gate of mould, though these are normally funnel shaped. Two further pieces have two surfaces forming part of a flat slab. The better preserved piece of these appears to have a narrow groove across one side, which may be a locating mark to ensure the correct assembly of the mould valves.

Nos: 7; weight: 39g; thickness: 16, 21mm. Fabric: light orange; pale pinkish brown; sandy clay containing frequent medium-coarse quartz sand and frequent fine organic temper: small fine chopped/crushed straw/chaff impressions. Phase 5: mid-sixteenth – early seventeenth century drain/flue 2387 (2385), sample 33.

8. Conical pedestal, 95% complete, has slight damage to one side of base angle. Tronconic form with flat circular base and sides sloping in to narrow cylindrical flat top surface. The sides have a concave profile and surfaces are hand moulded and fairly regular with rounded angles. Vitrification occurs around the top on the upper sides and the top angle. It appears to have had something resting on the top surface protecting most of it from vitrification – possibly a crucible.

Nos: 1; weight: 206g; height: 82mm; diameter: 64mm (base), 35mm (top). Fabric: medium-coarse sandy clay with frequent quartz sand and scattered flint grits *c.* 3–8mm and possibly fine organic inclusions. Phase 5: mid sixteenth – early seventeenth century; context: 2173 layer.

9. Hearth 2332 (2333). Hearth base: These fragments all formed a single structure as recorded in the site records and photographs: the clay pieces have a shallow bowl-shaped form with a wide flat rim and flat base. The clay is unfired and has only been lightly discoloured by burning around parts of the upper flat rim. There are two sections of the rim that have been more intensely burnt to a purplish grey colour and from the site photos these appear to be on

opposite sides of the structure. The remaining structure is raw pale creamish yellow clay. The surface of the clay has clearly been scraped by the excavator's trowel so it is not possible to judge how the original surface was finished. The rim round the edge is 20–23mm wide.

A comparison to the site record (especially the photos) show this clay formed part of a shallow feature in the form of a bowl-shaped hollow lined with this clay. The clay-lined hollow was filled with a charcoal rich ash deposit (2337). There is charcoal adhering to the outer surface of the sides of the clay, though there is no record of a lens of charcoal around the outside of the clay. The base surface of the clay has only remnants of the underlying sandy gravel layer (2347) adhering to it.

Nos: 15; weight: 941g; thickness: 11–35mm, diameter: *c.* 250mm. Fabric: pale yellowish cream sandy clay; moderate-frequent well-sorted sand, mostly quartz plus dark grains possibly glauconite. Phase 5: mid sixteenth – early seventeenth century; context: Hearth 2332 (2333), sample 23.

10. Hearth 2384 (2382). The fired clay fragments have a flat moulded surface with a smooth and regular finish. The back is a flat rough bonding face or a sheared broken surface. On one piece the surface and underlying clay has an unusual bright dark red shade, which is indicative of copper residue. Towards one edge of this piece, there is a sharp boundary between this reddened area and the more typical light pinkish brown suggesting some luting or object had protected this latter area. There is also a curved edge *c.* 35mm diameter through the more reddened area, possibly a tuyère hole and that the colouring is due to the increased heat in this area. One other piece has a rounded edge and a small area of a second edge roughly at right angles, which appear to form the corner of a structure.

Nos: 47; weight: 142g; thickness: 15–22mm; fabric: light orange-brown, fine sandy micaceous clay containing scattered rounded medium quartz sand and frequent organic inclusions, preserved as fine chaff/straw impressions. Phase 5: mid sixteenth – early seventeenth century; context: charcoal fill 2382 of hearth 2384, sample 56. pXRF: high Fe and moderate peak in Al probably reflect natural components of the clay fabric.

11. Occupation spread associated with hearth 2051 (2207). Indeterminate form: small scraps of fired clay, of which one or two have an even moulded flat surface, others amorphous.

Nos: 7; weight: 14g; thickness: 10mm; fabric: orange-brown coarse sandy clay. Phase 5: mid sixteenth – early seventeenth century; context: ash and charcoal layer (2207) from hearth 2051, sample 56.

12. Occupation spread associated with hearth 2051 (2208). Oven structure wall/lining: flat smooth moulded surface, partly burnt/fired grey. Impressions of gravel on back bonding face. Two small abraded amorphous fragments. This could be part of the hearth surface of 2051.

Nos: 4; weight: 15g; thickness: 18mm. Fabric: brown, orange coarse sandy clay with organic inclusions of broken/chopped straw stem impressions. Phase 5: mid sixteenth – early seventeenth century; context: ash and charcoal layer (2208) from hearth 2051, sample 6.

13. Occupation spread associated with hearth 2051 (2263). Oven wall lining: one dark red piece has a slightly concave moulded surface – possibly the surface of a perforation such as

tuyère hole, but the area of surface is too small to differentiate from undulations in a flat moulded surface. The second piece is amorphous.

Nos: 2; weight: 9g; thickness: 16 mm. Fabric: red, light pinkish brown clay containing high density of medium quartz sand SR-SA plus occasional grit-gravel 2–7mm. Phase 5: mid sixteenth – early seventeenth century; context: 2263 occupation layer associated with hearth 2051, sample 14.

14. Pit 2048 (2137). Mould: linear object with flat outer surface with possible luting or wrap attached and straight vertical edge and part of straight flat end. Internal mould surface has a flat contact edge 7–10mm wide and the mould for a linear object with concentric ridge pattern around its circumference. This object would have measured *c.* 14–15mm at its narrowest up to 23mm diameter at its widest. Possibly a decorative handle or candlestick.

Nos: 1; weight: 33g; thickness: 20–24mm, width: 37mm; length: >57mm. Fabric: Mould: brownish red to dark grey clay containing a high density of well-sorted subangular to subrounded medium quartz sand, white ?shell sand of same size and some dark sand grains. Wrap: dark grey clay containing a moderate density of more poorly sorted sand, mainly quartz and some white sand, plus frequent fine organic voids <5mm, which have the appearance of crushed straw stem, but may include other elements of chaff. Phase 6: mid – late seventeenth century; context: pit 2048 (2137), sample 17.

4 SLAG AND RELATED HIGH-TEMPERATURE DEBRIS *BY LYNNE KEYS*

Introduction and methodology

A very small quantity of material (793g), initially identified as slag, was recovered by hand on site and from soil samples processed after excavation. For this report it was examined by eye and categorised on the basis of morphology; a magnet was used to test for iron-rich material and to detect any smithing microslags in the soil adhering to slags. Slag or other material type in each context was weighed, and the quantification data and details are given in Table 4.1.

Table 4.1. Quantification of slag and related high-temperature debris

Context	Sample no.	Identification	Weight (g)	Comment
2145	1	vitrified hearth lining	8.0	from copper-alloy working
2152	17	vitrified hearth lining	18.0	and cinder
2152	17	vitrified hearth lining	200.0	
2181	3	cinder	2.0	
2181	3	copper alloy	0.5	
2181	3	undiagnostic	0.5	could be natural
2220	9	cinder	9.5	traces of copper-alloy
2220	9	fired clay	0.5	
2220	9	heat-magnetised residue	20.0	grit, very occasional smithing spheres (including one large sphere)
2248	16	copper alloy	18.0	waste (leaded)
2248	16	fired clay	8.0	
2248	16	vitrified hearth lining	2.0	or crucible fragment
2249	15	heat-magnetised residue	22.0	grit, sand, clay
2249	15	heat-magnetised residue	29.0	fired clay, fuel ash slag, iron pin fragments
2270	13	fuel ash slag	0.5	
2270	13	heat-magnetised residue	4.0	grit with one hammerscale flake
2270	13	undiagnostic	1.0	
2356	24	glassy run	0.5	
2356	24	vitrified hearth lining	3.0	
2373	26	sample residue	74.0	cinder, fuel ash slag, fired clay
2373	26	vitrified hearth lining	65.0	and possible crucible fragments
2374	27	sample residue	246.0	vitrified hearth lining, cinder
2385	33	cinder	1.0	
2385	33	fuel ash slag	0.5	
2397	34	fuel ash slag	31.0	
2472		vitrified hearth lining	18.0	
2499	45	cinder	0.5	
2502	44	hammerscale	0.0	sphere
2502	44	iron-rich undiagnostic	3.0	
2502	44	undiagnostic	3.0	
2517	46	cess	4.0	
Total			**793**	

Discussion

Most of the material was not iron slag but that present took the form of small fragments, probably broken during disturbance and re-deposition; some smithing micro-slags (hammerscale flakes and tiny spheres) were found in samples but the quantity was minute.

Small amounts of waste from copper-alloy working were present in the slag assemblage; this material was passed to the relevant specialist for examination. Other debris in the assemblage included vitrified hearth lining, cinder and fuel ash slag. Vitrified hearth lining can vary from highly vitrified, nearest the tuyère region (the region of highest temperature), to burnt clay on the side furthest from heat. It is not diagnostic of industrial activity unless associated with other diagnostic material, which is not the case here. Cinder is a porous, highly vitrified material formed at the interface between the alkali fuel ashes and siliceous material of a hearth lining. Fuel ash slag is an extremely lightweight, highly porous, light coloured (whitish-grey to grey-brown) residue produced by a high-temperature reaction between alkaline fuel ash and siliceous material such as a clay lining or surface. It can be produced by any high temperature activity where these two constituents are present including domestic hearths, accidental fires (burning down of huts), and even cremations. On its own (as here) it does not represent metalworking activity.

In Phase 1, pit 2477 contained some vitrified hearth lining, cinder, a tiny quantity (6g) of undiagnostic iron slag and one hammerscale sphere. This material is certainly re-deposited from somewhere off-site.

Phase 4, layer 2248 contained leaded copper alloy waste and a possible crucible fragment, while fill 2374 of 2372 produced some possible crucible fragments.

Phase 5, layer 2181 contained tiny pieces of copper alloy; fill 2220 contained cinder which had traces of copper-alloy embedded in it and some iron smithing spheres from high-temperature welding.

The assemblage is of no significance or importance other than it hints at copper-alloy working possibly taking place somewhere in the vicinity in Phases 4 and, possibly, 5. The evidence for ironworking is more scarce.

5 CERAMIC BUILDING MATERIAL *BY JOHN COTTER*

Introduction and methodology

A total of 506 pieces of ceramic building material (CBM) weighing 56.051kg were recovered from all the excavation areas. The assemblage mainly comprises fragments of medieval roof tile (peg tile) with smaller quantities of other types of CBM including plain and decorated medieval and post-medieval floor tile, medieval ridge tile, post-medieval brick and a few other minor categories of CBM including modern drain pipe.

The CBM was catalogued at an intermediate level of detail (or 'scan-catalogue') – somewhere between a basic catalogue (i.e. recording just sherd counts and weight per context) and a detailed catalogue. By this system broad functional categories of CBM were recorded by sherd count per context (i.e. roof tile, ridge tile etc.) but in general categories were not individually weighed. Overall weight per context was however recorded. Exceptions to this include floor tile and brick, which were individually counted and weighed. These are usually a fairly minor element of Oxford assemblages and tend to receive more attention than roof tile because of their dating value or intrinsic interest. This approach gives a reasonably detailed snapshot of the composition of the assemblage. Measurable dimensions were recorded (in the comments field) for many of the more complete pieces and an approximate spot-date was assigned to the latest material in each context. Full catalogue details remain in the site archive and are summarised in the assessment report here.

Date and nature of the assemblage

The CBM assemblage is generally in a fragmentary condition but consists of a mixture of some complete pieces (e.g. bricks), a fair number of fairly complete or large/fresh pieces (most categories) and many additional smaller/abraded pieces. The assemblage breaks down into two main components, the predominant class of which comprises flat roofing tile (338 pieces) and other types of CBM (168 pieces). The other types comprise ridge tile (107 pieces), floor tile (32 pieces), brick (26 pieces) and miscellaneous (3 pieces). Some of the roof tile appears to be quite early: probably thirteenth- to fourteenth-century, although some roof and ridge tile could in theory be as early as the late twelfth century. A fair bit of the roof and ridge tile here appears to be in late medieval and/or early post-medieval fabrics and is probably contemporary with Lincoln College (*c*. 1400+). Most of the bricks are early post-medieval but a few brick fragments and other scraps of CBM are as late as the twentieth century. No Roman material was noted.

Flat roof tile: 338 pieces

Also known as peg tile. These are of typical rectangular shape and fairly crude manufacture with a pair of circular nail holes at one end. There are no complete examples but one very fresh thirteenth- to fourteenth-century tile preserves a complete length of 278mm (2044). Other fresh and worn pieces of tile are associated with a number of pit groups containing thirteenth- to fourteenth-century pottery. Much of the roof tile is in a coarse red late medieval fabric which probably dates to the fifteenth to sixteenth centuries and has been noted at other Oxford sites such as the St Giles Classics Centre. Two of these tiles are fairly complete including one with a length of 265mm and width of 160mm (2161, 2156). A few

pieces may be seventeenth-century or later and one small fragment of twentieth-century ?roof tile has traces of a stamped maker's mark probably from Spain or Italy (2534).

Ridge tile: 107 pieces

These mostly occur in similar orange-red fabrics to the roof tiles but show evidence of curvature and usually fairly extensive glaze coverage. Mainly corner, edge and body fragments were recovered but also a few sherds from the apexes of ridge tiles with applied pyramidal crests – mostly damaged. There is one complete profile and side panel from a plain late medieval ridge tile of inverted V-shaped form which probably dates to the late fifteenth or sixteenth century (1061). This is a very rare and late medieval/early post-medieval ridge tiles in Oxford are often difficult to recognise and are less-well understood than medieval examples. A few other fragments of this type are also quite substantial. Several mostly worn and probably residual pieces occur in a distinctive thirteenth- to early fourteenth-century brown fabric tempered with oolitic limestone (Fabric IB) probably from north-west Oxfordshire. These usually have a thin cloudy greenish glaze and often have attached crests. Red sandy fabrics are much more typical however. A few of these also have decorative crests including a fairly large fourteenth-fifteenth century fragment (2036).

Floor tile: 32 pieces

The majority of these are fragmentary and sometimes worn from lifetime usage. None is complete although several preserve complete or partially measurable dimensions. All of them are likely to be residual to varying extents in their contexts. No *in situ* tiled floors were discovered. Around 13 decorated medieval floor tiles are present, although the decorative scheme on most is worn and obscure.

Eleven medieval decorated floor tiles are in the regional 'stabbed Wessex' tradition with 'inlaid' white slip decoration, dating to *c.* 1280–1330. Three or four have recognisable designs. These include a largely complete tile with an imperial eagle design (2298) and others with geometrical or floral designs including *fleur de lys*. One reused Wessex floor tile fragment (2093) unusually has a large hole bored through the centre and may perhaps have been used as a stop or pivot for an iron door bolt, or perhaps as a weight. Two decorated tiles are in the Penn/Chiltern tradition dating to *c.* 1330–1380/1400 including an over-fired 'second' (2231). The other floor tiles are plain late medieval or early post-medieval 'quarry' tiles resembling imported Flemish tiles of the period. These are typically thick (*c*. 34mm) and have a plain white slip under a clear glaze, or are too worn to tell. Several of these are much thicker (to *c.* 55mm) and are burnt on the upper surface suggesting they were used as hearth tiles. Three of these came from a pit with a good group of pottery of *c.* 1700-1730 (fill 2301 of well construction cut 2300) but the others are probably earlier than this.

Brick: 26 pieces

These include several fairly large fragments of late medieval or Tudor brick with a distinctive grey ash-glaze (2127). Two complete red bricks from the same context may be specialised architectural bricks of the late seventeenth to eighteenth centuries (2044). Similar examples were noted in other contexts. A few pieces as late as the twentieth century also occur – probably from pipe trenches etc.

Other: three pieces
Pieces of brown stoneware nineteenth-century drainpipe and machine-made twentieth-century drain or electric cable pipe.

Summary

The CBM assemblage is fairly typical of many such assemblages from central Oxford. There is a strong thirteenth-fourteenth century and fourteenth-fifteenth century element here represented by the large, though fragmentary, collection of roof tile and ridge tile fragments. The medieval floor tile count is also fairly high for a secular domestic site. Much of this material is fragmentary and therefore to some extent residual in its contexts. Some of it probably derives from medieval buildings on or near the site but some may derive from dumped material brought from outside the site. Nevertheless, it does contain some items and trends of interest as well as informing about the likely appearance of the medieval buildings that once stood here.

6 STONE *BY RUTH SHAFFREY*

Stone roofing

A total of 33 fragments of stone roofing were recovered, weighing 12.3kg. Most of these are fragments, but those with identifiable dimensions are 95–120mm wide x 204mm long x 22mm thick with an offset perforation; 105mm wide x 190mm long x 17mm thick with a slightly offset perforation and 104mm wide x 270mm long x 28mm thick with a centrally placed perforation. All are typical of medieval roofing. There is some variation in the lithology of stone roofing with various shelly, oolitic and sandy limestones being exploited but most of these can be identified as being from the middle Jurassic Corallian beds.[66] Precise sources are not known, though they could have come from an old quarry near Buckland to the south-west of Oxford.[67]

Roof stones were recovered from a range of features. Two fragments from Phase 1 deposits are not diagnostic and may have served another purpose but there are definite examples from thirteenth century features (Phase 2). Most significant is the clear increase in the discard of stone roofing from the early fourteenth century.

The discard patterns generally mirror those seen elsewhere in Oxford. Stone roofing is found in small numbers on the majority of excavations of the medieval town suggesting that its use was widespread. Numbers are generally small however, suggesting it was not used to the exclusion of other types of roofing and was probably not the preferred material. Although thatched roofing continued in use during the medieval period, stone roofing occurred from the twelfth century or early thirteenth century in Oxford.[68] As with the finds from Lincoln College, many of the pre-thirteenth-century examples are small fragments and not definitely from roofing (for example Oxford Castle). However, a definite example with a perforation hole was found at Brewer Street in a context of late eleventh- to mid-thirteenth-century date, and another at Corpus Christi College from a context of thirteenth-century date.[69]

Soapstone tool

A soapstone tool was recovered from the backfill of stone-lined well 2162 (Phase 8). One face has a crudely incised hatched pattern and the object has flat faces and a rounded terminus. It has the overall appearance of a whetstone, but since soapstone is too soft to have been used for sharpening, must have served some other purpose, perhaps as a rubber or polisher. Use of soapstone for objects other than weights, spindle whorls and vessels is not common, though a perforated example from Kaupang in Norway was interpreted as a pendant.[70]

[66] W.J. Arkell, *Oxford Stone* (London, 1947), p. 86.
[67] Ibid., p.150.
[68] E.M. Jope, and W.A. Pantin, 'The Clarendon Hotel, Oxford. Part 1: The Site', *Oxoniensia*, 23 (1958), p. 78.
[69] R. Shaffrey, Worked Stone, in S. Teague and B.M. Ford, 'Excavations in Oxford's South Suburb at Brewer Street, Littlegate Street and Rose Place', unpublished OA report (2019); R. Shaffrey, 'Worked Stone', in 'Medieval and Post-Medieval Remains from Excavations on the Site of the New Auditorium, Corpus Christi College, Oxford, 2008', *Oxoniensia*, 79 (2014), pp. 200-1
[70] I. Baug, 'Soapstone Finds', in D. Skre (ed.), *Things from the Town. Artefacts and Inhabitants in Viking-age Kaupang*, Kaupang Excavation Project Publication Series 3, Norsk Oldfunn, 26 (2011), p. 329.

Assuming a Norwegian source for the stone, it is difficult to determine a date for the object. Soapstone was worked in Norway from at least 1500 BC but production increased significantly during the Middle Ages when it began to be used architecturally.[71] Exploitation continued into the twentieth century but a medieval date seems most likely.

[71] P. Storemyr and T. Heldal, 'Soapstone Production Through Norwegian History: Geology, Properties, Quarrying and Use', in J.J. Herrman, N. Herz, and R. Newman (eds.), *Asmosia 5—Interdisciplinary studies on ancient stone. Proceedings of the Fifth International Conference of the Association for the Study of Marble and Other Stones in Antiquity, Museum of Fine Arts, June 1998, Boston* (2002, London), pp. 359-69.

7 METALWORK AND WORKED BONE *BY LEIGH ALLEN*

Introduction

A total of 349 metal objects and two items of worked bone were recovered from the excavation and assessed by the author. The majority were iron nails (228), with a further 66 examples of very common copper-alloy lace tags, pins and loop fasteners, and 32 unidentifiable miscellaneous fragments. Although large, the assemblage is in very poor condition and has been x-rayed to aid identification. The majority of the artefacts are late medieval or post-medieval in date and relatively utilitarian in nature, with the possible exception of the decorated hooked tag and possible casket fitting dating from the seventh to the eleventh century. The present report concentrates on the notable objects in the assemblage; full details can be found in the assessment report in the project archive.

Phase 1: late eleventh to early thirteenth century

The upper half of a copper-alloy hooked tag was recovered from context 2499 (fill of rubbish pit 2477). The body of the tag is triangular in shape with two circular holes for attachment, and the upper surface is incised with ring-and-dot decoration with some of the rings overlapping. Tags such as these would have been used to secure light clothing. They have a long span of use from the seventh to the eleventh century.[72]

Phase 3: early to mid fourteenth century

A short length of copper-alloy chain with s-shaped links came from context 2413 (charcoal spread). Chains have a wide variety of domestic uses from holding open doors to supporting cooking vessels over a fire.[73]

Phase 5: mid-sixteenth to early seventeenth century

A copper-alloy buckle frame (SF 15) was recovered from context 2208 (occupation deposit). It has a double-oval frame and an iron pin. There are four decorative knops on the outside of the frame and the central bar extends beyond the edge of the frame. An almost identical buckle was recovered from excavations at Lincoln College Kitchen and dates to the late sixteenth to the early seventeenth century. A copper-alloy pin with a large globular head (SF 16) came from 2216 (occupation layer); the head appears to be plain and is formed from two hollow hemispheres joined together and filled with a hard white substance.[74]

A strip of copper-alloy came from context 2274 (occupation deposit), decorated with a zigzag pattern of incised circles. It could be part of a mount from a casket; there are traces of holes for attachment in the broken edges. Similar fragments recovered from Winchester came from contexts dating to the eleventh century.[75]

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[72] D. Hinton, 'Hooked Tags', in M. Biddle (ed.), *Objects and Economy in Medieval Winchester*, Winchester Studies, 7ii. Artefacts from Medieval Winchester (Oxford, 1990), pp. 548-52.
[73] I.H. Goodall, 'Chains, Links, Chain Fittings, Rings and Washers', in Biddle, *Objects and Economy in Medieval Winchester*, pp. 821-28, fig 245: no. 2574.
[74] Biddle, *Objects and Economy in Medieval Winchester*, pp. 555-9, fig. 151: no 1458.
[75] Hinton, in Biddle, *Objects and Economy in Medieval Winchester*, pp. 770-1, fig. 219: nos 2332-35.

A small flat-headed copper-alloy tack, probably an upholstery tack, came from context 2263 (occupation deposit) and a robust slightly curved fragment of pewter recovered from context 2143 (fill of robber cut 2144) is possibly from a large vessel.

The iron objects include the corroded arm from a horseshoe from context 2147 (fill of pit 2146) and a large iron bar looped over at both ends, possibly a staple or timber dog, from context 2293 (surfaces/repairs).

Phase 6: mid- to late seventeenth century

Notable finds from this phase include two copper-alloy buckles both with double-oval frames. SF 4 from context 2056 (fill of pit 2048) has decorative knops on the outside edge and expanded pin rests; iron corrosion around the central bar indicates the pin was of iron. There are traces of a decoration on the upper face of the frame in the form of incised dots/grooves. The second buckle, SF 11 from 2110 (fill of posthole 2111), has expanded pin rests and a central bar that extends beyond the frame. There is no trace of the pin. An identical example was recovered from Norwich from a post-medieval context.[76]

Fragments from a copper-alloy thimble, in very poor condition, were recovered from context 2161 (fill of construction cut 2160). One fragment appears to have hand-applied (rather than machine-applied) indentations.

Iron finds include a hinge-pivot from a door or large cupboard from 2138 (fill of pit 2048), two staples, one looped and the other rectangular, from contexts 2116 (fill of posthole 2115) and 2329 (occupation deposit), and a fragment from a horseshoe from context 2056 (fill of pit 2048).

Phase 7: late seventeenth to eighteenth century

A kidney-shaped drop handle (SF 8) from a cupboard or drawer and a circular curtain loop (SF 10) came from context 2094 (levelling/occupation), and a straight-sided machine-made thimble came from 2301 (fill of well construction cut 2300).

Iron finds include a buckle frame and two whittle tang knives. The buckle frame from context 2229 (fill of pit 2228) has a trapezoidal frame and a sheet metal roller. It would have been used on horse harness to secure straps of differing thicknesses. The first knife from context 2301 has a triangular shaped blade and a centrally placed tang. The second (SF 24) from context 2591 (fill of pit 2394) has a bolster or thickening of the blade at the shoulder and therefore probably dates to the seventeenth century or later.

Phase 8: nineteenth century

A large iron knife with a whittle tang is the only metal object recovered from this phase. It came from context 1074 (fill of linear feature 1073) and it is very corroded. The blade appears to run straight and then curves at the end, the very tip is missing, and there is a moulded bolster at the shoulder.

[76] M. Margeson, *Norwich Households: The Medieval and Post Medieval Finds from Norwich Survey Excavations 1971-1978*, East Anglian Archaeology Report, 58 (1993), pp. 28-30, fig. 16: no. 172.

A handle for a whittle tang implement came from context 1074 (fill of linear feature 1073). The tang is still *in situ* but the implement end has broken off. The handle is plain with an eliptical section concave at the butt end; it tapers inwards towards the shoulder. The object is slightly polished and stained light green, a common form of decorative colouration.[77]

Phase 9: 1900+

A fragment from a large mammal rib bone that has had V-shaped notches cut into it along one edge was recovered from context 2533 (fill of pit 2531). Neither the edge nor the base of the notches show any indication of wear.

[77] A. MacGregor *Bone, Antler, Ivory and Horn: The Technology of Skeletal Materials since the Roman Period* (London, 1985), pp. 67-70.

8 COINS AND JETONS *BY IAN R. SCOTT*

Introduction

There are two silver coins and six copper alloy jetons. The assemblage has been recorded fully onto a spreadsheet and the individual pieces have been identified. Six of the coins and jetons are from phased contexts and two jetons are unstratified.

Phase 5: mid-sixteenth to early seventeenth century

Context 2163 produced a Tudor silver half groat, possibly of Edward VI (Cat. No. 2). Context 2189 produced an English medieval jeton (Cat. No. 3) and a silver long cross penny (Cat. No. 1). Finally, there is a Tournai jeton (Cat. No. 4) from context 2202.

Phase 6: mid to late seventeenth century

Two anonymous Nuremberg 'rose and orb' jetons (Cat. Nos. 5–6) come from context 2061.

Unstratified

A jeton of Hans Krauwinckel I with the winged lion of St Mark (Cat. No. 7) and a 'rose and orb' jeton of his nephew Hans Krauwinckel II (Cat. No. 8) were unstratified.

Catalogue

Coins

1. Long cross penny, worn and clipped. *Obv:* bust scored or scratched through and inscription is partly clipped away. *Rev:* Long cross with pellets, inscription: 'CIVI | TAS | LON | DON' for London Mint. First issued from 1279 under Edward I, but similar coinage issued in subsequent reigns. Not closely datable. D: 17.5mm x 18mm. Context 2189, SF 12

2. Half groat, Tudor, possibly Edward VI [first issue April 1547–Jan 1549?], Canterbury mint. *Obv:* very worn; *Rev:* Worn, shield with royal arms and cross fourchée, inscription: 'C . . . | TAS | CAN | TO . | for Canterbury mint (Civitas Cantor). D: 19mm x 20mm. Context 2163, SF 13

Jetons

3. English jeton, Edward II (1284–1327). Pierced in centre, no inscriptions. *Obv*: bust of king in circle with border of pellets; *Rev*: three-armed cross, with faces between pellets in each angle, border of strokes. D: 20.5mm. Context 2189, SF 7.[78]

4. Tournai jeton, late fifteenth to first half sixteenth century. Worn. *Obv*: Chatel Tournai design within circle, illiterate inscription. *Rev*: Cross patty in circle with a *fleur de lys* or a letter 'S' in the alternate angles of the cross, illiterate inscription. D: 27.5mm x 28mm. Context 2202, SF 14. Date *c.* 1475–1550.

5. Nuremberg 'rose and orb' jeton, anonymous. *Obv*: Annulated crowns alternating with *fleurs de lys* around a five petal rose, fictitious inscription, Gothic letters. *Rev*: Imperial orb

[78] Compare P. Mernick and D. Algar, 'Jetons or Casting Counters', in P. Saunders (ed.), *Salisbury Museum Medieval Catalogue Part 3*, (Salisbury and South Wiltshire Museum, 2001), pp. 211-60, 220, fig. 81: no 21; see also M. Mitchiner, *Jetons, Medalets and Tokens. Vol. 1. The Medieval Period and Nuremberg, Seaby* (London, 1988), p.101, no 129 (falls within Class XI, 1310-14).

surmounted by cross patty, tressure with three arches, flanked by annulets, fictitious inscription, Gothic letters. D: 24mm x 25mm. Context 2061, SF 6.[79] Date *c.* 1500–1550.

6. Nuremberg 'rose and orb' jeton, anonymous. *Obv*: Annulated crowns alternating with *fleurs de lys* around a five petal rose, fictitious inscription, Gothic letters. *Rev*: Imperial orb surmounted by cross patty, tressure with three arches, flanked by annulets, fictitious inscription, Gothic letters. D: 24.5mm x 25mm. Context 2061, SF 8. Similar but not identical to Cat. No. 5 (SF 6). Dated *c.* 1500–1550.

7. Nuremberg jeton, Hans Krauwinckel I (1562–1586). *Obv*: winged Lion of St Mark, inscription: '*S + MARCVS + EVANGELIST + GOTT*'; *Rev*: Imperial orb surmounted by cross patty, ornate tressure, inscription: '*HANS * KRAUWINCKEL * NVRENBER'. D: 27mm x 29mm. Unstratified, SF 19.[80]

8. Nuremberg 'rose and orb' jeton. Hans Krauwinckel II (1586–1635). *Obv*: Three crowns alternating with *fleur de lys* around a six petal rose. Quatrefoils between the *fleurs de lys* and crowns. Inscription: '*HANS + KRAUWINCKEL + GOTESS'. *Rev*: Imperial orb surmounted by cross patty, tressure with three arches, surrounded by quatrefoils; inscription: '*RECHEN * PFENNIG * NVRENBER'. D: 24mm x 25mm. Unstratified, SF 20.[81]

[79] Cf Mitchiner, *Jetons, Medalets and Tokens*, p. 381, nos 1229-31 with well-defined cross patty on orb.
[80] ibid., pp. 430-1, compare nos 1475-76 and 1477-79, probably latter die.
[81] ibid., p. 432, compare nos 1486-91.

9 GLASS BY IAN R. SCOTT

Introduction

The excavations produced 80 fragments of glass including 51 pieces of vessel glass, 24 pieces of window glass, 4 beads and a single small intaglio (Table 9.1). Most contexts produced no more than one or two pieces of glass. Contexts 1024 (5 sherds vessel glass), 2156 (5 sherds vessel and 3 window), 2184 (4 sherds window), 2216 (3 sherds vessel and 1 bead), 2303 (6 sherds vessel) and 2301 (16 sherds vessel, 1 window) produced more pieces of glass (Table 9.2).

The majority of the datable glass is post-medieval, although there is a piece of painted medieval window glass from context 2061 (Phase 6), a context which produced two Nuremberg jetons dated to the first half of the sixteenth century. There is little or no modern glass.

Table 9.1 Summary quantification of the glass by phase

Phase	Type				
	vessel	window	bead	intaglio	Totals
1	1				**1**
3	1				**1**
4			1		**1**
5	5	13	3	1	**22**
6	9	6			**15**
7	26	5			**31**
8	5				**5**
unph	4				**4**
Totals	**51**	**24**	**4**	**1**	**80**

Table 9.2. Summary quantification of the glass by phase, context and glass type (fragment count)

Phase	Feature type	No.	Context	Type				
				vessel	window	bead	intaglio	Totals
1	pit	2031	2433	1				**1**
3	stone lined pit	2466	2597	1				**1**
4	layer		2356			1		**1**

	depression	2273	2274		2			**2**
			2270				1	**1**
	occupation deposits		2207			1		**1**
			2208		1			**1**
5			2216	3		1		**4**
			2263		1	1		**2**
	pits	2057	2058	1				**1**
		2072	2150		2			**2**
		2183	2184		4			**4**
		2209	2164	1	1			**2**
	robber cut	2243	2174		2			**2**
	pits	1101	1102	1				**1**
		2141	2156	5	3			**8**
			2536	1				**1**
6	postholes	2102	2100	1	1			**2**
		2111	2110		1			**1**
	wall	part of 2047	2028	1				**1**
	deposit		2061		1			**1**
	pits	2300	2301	16	1			**17**
		2302	2303	6				**6**
	cesspit	1080	1084	1				**1**
	well	2305	2306		1			**1**
	construction cuts	2119	2126	1				**1**
7		2304	2588	1				**1**
	wall/structure		2308	1				**1**
	demolition deposit		1122		1			**1**
	deposits		2094		1			**1**
			2132		1			**1**
8	linear?	1023	1024	5				**5**
unph	finds ref		1045	1				**1**

			2045	1				**1**
			u/s	2				**2**
			Totals	**51**	**24**	**4**	**1**	**80**

Phase 1: late eleventh to early thirteenth century

The only glass from Phase 1 is a tiny colourless body sherd with an optic blown rib, probably from a beaker (context 2433, pit 2031).

Phase 3: early to mid fourteenth century

A single small weathered sherd from the base of vessel, possibly a urinal or flask (context 2597, stone-lined pit 2466). The sherd has a slight indent and a pontil mark.

Phase 4: late fourteenth to early sixteenth century

The only glass is a tiny hemispherical fragment in cobalt blue, which is possibly part of a bead (layer 2356).

Phase 5: mid-sixteenth to early seventeenth century

The glass from Phase 5 contexts comprises 13 pieces of window glass and just five pieces of vessel glass. There is also a possible intaglio (Cat. No. 8) from depression 2273, and three beads (Cat. Nos 9–11) from occupation layers. Just two contexts of Phase 5 produced more than two sherds of glass. Context 2184 produced four pieces of post-medieval window glass, and context 2216 produced an incomplete opaque green bead and three small sherds of weathered and undiagnostic vessel glass.

Most of the window glass looks post-medieval, although two rather more weathered pieces from context 2274 might be medieval in date. There is a small sherd of green window glass from context 2262, which looks modern and is probably therefore intrusive.

There is sherd probably from the folded rim of a shallow dish of seventeenth-century date (Cat. No. 4) from pit 2209 (context 2164). Otherwise the vessel glass includes three small undiagnostic sherds (context 2216), and a body sherd from a wine bottle (context 2058, pit 2057).

The three beads comprise a small barrel-shaped bead, in opaque grey glass, very probably weathered (context 2207; Cat. No. 9), a small incomplete annular bead in opaque green glass (context 2216; Cat. No. 10), and a larger elongated barrel-shaped bead in opaque black glass (context 2263; Cat. No. 11). These beads are not closely datable. A small plain oval domed intaglio in a pink/mauve glass came from Phase 5 context 2270 (Cat. No. 8).

Phase 6: mid- to late seventeenth century

There are eight sherds of vessel glass and six sherds of window glass. Only one context of Phase 6 produced more than two sherds of glass. Fill 2156 of pit 2141 produced eight sherds of including part of the foot of a stemmed glass possibly of late sixteenth-century or later date and four tiny refitting sherds from the fire polished rim perhaps of a small dish or bowl. There

were also three sherds of post-medieval window glass including part of a lozenge-shape quarry from pit 2141. A thin-walled body sherd possibly from a cylindrical pharmaceutical bottle came from context 2536 in pit 2141. The pharmaceutical bottle most probably dates to the seventeenth century.

Other vessel glass comprises a thin-walled body sherd in colourless metal from pit 1101 (context 1102) and an undiagnostic body sherd from a wine bottle (context 2028). There is a rim sherd from a beaker with optic blown wrythen ribs (Cat. No. 3) from posthole 2102 (context 2100). This sherd dates to the second half of the sixteenth or the first half of the seventeenth century. There was a piece of post-medieval window glass from the same feature. Another piece of post-medieval window glass came from posthole 2111. The painted medieval window glass (Cat. No. 1) mentioned above is from Phase 6 context 2061.

Phase 7: late seventeenth to eighteenth centuries

There are 26 pieces of vessel glass and five pieces of window glass from Phase 7 contexts. Much of the glass comes from context 2301, which produced 16 fragments. These include 12 sherds from early wine bottles, some dated to the mid to late seventeenth century. The latter include an almost complete small 'globe and shaft' bottle (Cat. No. 2) and part of two late seventeenth-century bottles with small push-ups and shoulders wider than the base. Other glass from context 2301 includes a body sherd from a vessel of uncertain form with optic blown ribs (Cat. No. 6), and the neck of a probable pharmaceutical bottle. The glass from context 2301 seems to form a good late seventeenth-century or early eighteenth-century assemblage. Context 2126 produced the neck and finish of a probable case bottle. Context 2303 produced five sherds from late seventeenth- to early eighteenth-century wine bottles and a single rim sherd in dark olive green glass with marvered trails of white glass (Cat. No. 7), probably of sixteenth- or seventeenth-century date. The vessel form is not identifiable. The window glass all appears to be of post-medieval date.

Phase 8: nineteenth century

Phase 8 has glass from just one context (1024) and comprises exclusively three bases from late eighteenth- or early nineteenth-century wine bottles, and two smaller body sherds also from wine bottles.

Unphased

In addition to the glass from stratified contexts there is a moulded lion mask baluster (Cat. No. 5) of sixteenth- or seventeenth-century date from unphased context 2045 (Fig. 14).

Catalogue of selected glass

Window glass

1. Painted window glass. Sherd with three grozed edges. Apart from a broad strip parallel to its longest straight edge the glass is painted with red-brown paint. A pattern of lozenges has been scratched into the paint and each lozenge has a small circle or oval in its centre. The glass is largely devitrified and opaque and the colour of the metal is uncertain. 39mm x 34mm; Th: 3mm. Context 2061, deposit. Phase 6. Medieval grisaille glass.

Vessel glass

2. 'Globe and shaft' bottle, small example almost complete. Three sherds, including tapered neck with cracked-off rim and applied horizontal string rim. Green metal. Context 2301, feature 2300. Phase 7. Dating late seventeenth century.

3. Beaker with optic blown wrythen ribs. Rim sherd, slightly inturned. Probably from a pedestal beaker. Weathered with opaque luminescent surfaces, colour of metal uncertain. Vessel D: *c.* 60mm; sherd L: 20mm; Ht: 28mm. Context 2100, posthole 2102. Phase 6. Dating: second half of the sixteenth century or first half of the seventeenth century.[82]

4. Dish, sherd with folded under rim probably from a dish. Opaque weathering, colour of metal uncertain. D: *c.* 160mm. Context 2164, pit 2209. Phase 5. Dating: seventeenth century.[83]

5. Lion mask baluster (Fig. 14), Mould blown with lion masks and gadroons. Distorted and possibly a waster. Colourless metal. Façon de Venise. Ht extant: 50mm. Context 2045, unphased. Dating: sixteenth or seventeenth century.[84]

6. Vessel with optic blown ribs. Body sherd possibly from a cylindrical jar although the diameter may be too small. Very pale blue green metal. Context 2301, feature 2300. Phase 7. Dating: Late sixteenth or early seventeenth century?[85]

7. Rim sherd with inturned and folded finish. Dark olive green glass with marvered trails of white glass on outer face forming horizontal bands. The original form of the vessel is uncertain. Rim D: *c.* 90mm. Context 2303, feature 2302, Phase 7. Dating: probably sixteenth or seventeenth century.

Other items

8. Small intaglio? Domed oval with a flat back in dark pink or mauve metal. 5.4mm x 4mm; Ht: 2mm. Context 2270, depression 2273. Phase 5

9. Small barrel-shaped bead. Opaque grey metal. L: 4mm; D: 4.4mm. Occupation layer 2207.

10. Small annular bead, incomplete. Opaque green metal. D: 4.5mm. Occupation layer 2216.

11. Elongated barrel-shaped bead of circular section. Opaque black metal. L: 20mm; D: 12mm. Occupation layer 2263.

[82] cf. J. Haslam, in Hassall *et al*., 'Excavations in St. Ebbe's, Oxford, 1967-1976: Part 2', p. 240, fig. 44, no. 5; H. Willmott, *Post-Medieval Glass in England, c.1500-1670*, CBA Research Report, 132 (York, 2002), p. 38.
[83] ibid., 96, fig. 128.
[84] See H. Willmott, *The Classification and Mould Grouping of Lion Mask Stems from London, Annales du 14 Congrès de L´Association Internationale pour l´Histoire du Verre, Italia Venezia-Milano 1998* (2000) pp. 389-95 and Willmott *Post-Medieval Glass in England, c.1500-1670*, pp. 63-4, fig. 64.
[85] Cf jars with optic blown decoration from St Ebbe's, Oxford (Haslam, in Hassall *et al*., 'Excavations in St. Ebbe's, Oxford, 1967-1976: Part 2', p. 240, fig. 43, nos 22-27), and generally Willmott, *Post-Medieval Glass in England, c.1500-1670*, pp. 98-9, figs 132-4.

10 CLAY TOBACCO PIPES *BY JOHN COTTER AND DAVID A. HIGGINS*

Introduction and methodology

A total of 102 pieces of clay pipe weighing 1,065g were recovered from 30 contexts. These have been catalogued and recorded on an Excel spreadsheet. The catalogue records (per context) the spot-date, the quantity of bowl, stem, and mouthpiece fragments, the overall fragment count, weight, and comments on condition and any makers' marks or decoration present. The minimum number of bowls per context was also recorded. Most of the pipe bowls and some of the marks can be paralleled with those published from excavations in St Ebbe's, Oxford[86] and to a slightly lesser extent with those published in Oswald's simplified national typology.[87] The St Ebbe's pipe dates have been used in preference to the more general national dating and the Oxford Type bowl forms A–D refer to this report. Other (mainly later) bowls are identified in the catalogue according to a series of codes based on Atkinson and Oswald's London pipes typology with bowl types assigned to an abbreviated code (e.g. AO22).[88]

Summary of the assemblage

The pipes are mostly in good condition with a high proportion of complete bowls present and many quite long pieces of stem, up to 140mm long. Only a moderate degree of residuality was noted in a few contexts. In total there are 49 pieces of pipe bowl from a minimum of 47 bowls (31 complete), 51 stem fragments and 2 mouthpieces. The small numbers of stems and mouthpieces retained means that stem marks may have been missed and it is not possible to reconstruct any complete pipes. The highest number of pieces from a single context is the 26 pieces from context 2301 (fill of well construction cut 2300) which includes 15 mostly complete bowls of *c.* 1690–1720, *c.* 1680–1710 (one example) and *c.* 1650–90/1730. The same context also produced a well-preserved assemblage of pottery including a tin-glazed dish of *c.* 1680–1720. A summary of the pipe bowl assemblage from the site is shown in Table 10.1.

Table 10.1. Number of pipe bowls by type and date

Bowl type	Date	No. bowls
National	1610–1640	2
Oxford: A	1630–1655	5
Oxford: B	1650–1690/1730?	22
National	1660–1680	2
London: AO19–20	1680–1710	1

[86] A. Oswald, 'Clay pipes', in Hassall *et al*., 'Excavations in St. Ebbe's, Oxford, 1967-1976: Part 2', pp. 251-62.
[87] A. Oswald, 'Clay Pipes for the Archaeologist', *BAR, Brit. Ser. 14* (1975).
[88] D. Atkinson, and A. Oswald, 'London Clay Tobacco Pipes', *Journal of the British Archaeological Association,* 32 (1969), pp. 171-227.

Oxford: C	1690–1720	8
R Gadney Special	1690–1720	1
Export style (AO24)	1690–1720?	1
Oxford: D	1750–1790	2
London: AO27	1780–1830	2
London: AO28	1820–1860	1
Total bowls		**47**

The two earliest pipe bowls are *c.* 1610–40 (contexts 2140 and 2587) and include an example with what is probably intended as a 'crossed keys' mark on the base of a narrow circular heel (Fig. 15, no. 1, see illustration catalogue for details). There are also five smallish Oxford Type A bowls of *c.* 1630–55 with large circular or heart-shaped heels. Larger, slightly 'hipped', bowls of Oxford Type B (with a stubby spur) are clearly the most frequent type here with no less than 22 examples present. These are usually the commonest seventeenth-century type present from excavations in the city and were initially dated by Oswald to *c.* 1650–90.[89] More recent work, however, suggests that a slightly more 'chinned' development of this type may have remained in production as late as *c.* 1730.[90] Type C (*c.* 1690–1720) is also fairly common here and, taken together, Types B and C, plus a few rarer contemporary types, underscore the later seventeenth- to early eighteenth-century dating emphasis of the site assemblage as a whole. This fact may be related to the upsurge in domestic and collegiate building in this part of the city during the seventeenth century. A remarkable and extremely rare bowl of *c.* 1690–1720 by the maker Robert Gadney of Oxford is illustrated in Fig. 15, no. 2 and described in some detail by David Higgins (see below). A flaring trumpet-shaped bowl, also from context 2301, seems to be a hybrid of two London-style bowls (AO19 and AO20, *c.* 1680–1710). Other non-standard types of broadly similar date include an unusual spur-less bowl of perhaps *c.* 1690–1720 which appears to be an export style, a bowl type only rarely found in this country and then almost always at the ports from which they were exported (Fig. 15, no. 3). Only two bowls of Type D (*c.* 1750–90) were found, both from the same context (2028). The fall-off in bowl numbers deposited after *c.* 1720 is notable and suggests that rubbish disposal decreased in the area of the site after this date. The latest bowl is a single example of *c.* 1820–60 from context 1084 (possible demolition debris) but a few other contexts are also dated late by the presence of late eighteenth/nineteenth-century pipe stems. One 75mm-long stem fragment of this date has a (damaged) mouthpiece tipped with pink-red paint or sealing wax to protect the smoker's lips (2148). It seems likely that most of the pipes from the excavations here are local Oxford products. A few might be from other Oxfordshire towns, or possibly beyond.

[89] Oswald, in Hassall *et al.*, 'Excavations in St. Ebbe's, Oxford, 1967-1976: Part 2', fig. 51B.

[90] D.A Higgins, 'Clay Tobacco Pipes', in K. Brady, A, Smith, and G. Laws, 'Excavations at Abingdon West Central Redevelopment: Iron Age, Roman, Medieval, and Post-medieval activity in Abingdon', *Oxoniensia*, 72, pp. 157-76; J. Cotter, 'Assessment of the Clay Tobacco Pipes from 33-34 George Street, Oxford (OXGEGE 12 WB)', OA unpublished client report (2012).

Only five pieces have makers' marks – two of which have already been mentioned above (Fig. 15, nos 1–2) and which are fully described and discussed in the illustration catalogue below. The other three marked pieces (not illustrated) are described here:

Context 2301. Bowl of Oxford Type C (1690–1720) but, unusually, with a 'GR' maker's mark in relief on either side of the heel. Oswald illustrates an almost identical marked bowl from St Ebbe's[91] and suggests, most likely, the mark is a reversed 'RG' for Robert Gadney senior or junior, perhaps *c.* 1720. Two marked pipes by the latter maker(s) are shown alongside it.[92] The bowl here, which is unburnished, is the only marked pipe definitely from fill 2301 which produced the largest assemblage of pipes from the site (see above). The 'special' Robert Gadney pipe (Fig. 15, no. 2) might also be from this context (see below).

Context 1084. Bowl profile as AO27 *c.* 1780–1830, front missing. Relief maker's mark 'TW' on square heel. Oswald illustrates two identical marked bowl-types of *c.* 1820 from St Ebbe's but his are marked 'WT' and of uncertain maker.[93] The initials may perhaps be a reversed 'WT' for William Tuckwell of Wallingford *c.* 1796, also listed by Oswald.[94]

Unstratified. Broken bowl base with late squared heel as AO27 *c.* 1780–1830. Relief maker's mark 'SP' in large serif letters on sides of heel. Maker unidentified, possibly not Oxfordshire – perhaps London.

Illustration catalogue and discussion of the key pieces (Fig. 15)

1. Context 2140, SF17. Complete, fresh, small early bowl as AO7 (closest)[95], *c.* 1610–30. Bottered and fully milled rim with a small circular heel (5mm diameter) and a relief stamped mark that is probably intended to represent a pair of crossed keys. Very slight evidence of smoking. Bowl of ivory-yellow coloured clay with slight spall on left face, possibly caused during manufacture. This is a high quality product with a finely burnished surface, 52mm of surviving stem and a stem bore of 8/64". This pipe belongs to an early group where symbol marks were used to identify the maker. Although the device represented in this particular example is a little ambiguous, it is likely to represent a pair of crossed keys, a popular device at the time and one that is known to have been used on early pipes.[96] This specific version of the mark, however, has not been recorded from London but is known from another example from Oxford[97] and three examples from Chester in the Grosvenor Museum.[98] There is also a possible example from the Jordan-Farrar site in Prince George County, Virginia.[99] These marks are all very similar in form and appearance (although more than one actual die is represented)

[91] Oswald, in Hassall *et al.*, 'Excavations in St. Ebbe's, Oxford, 1967-1976: Part 2', fig. 52.11c.
[92] ibid., fig. 52. 11a-b.
[93] ibid., fig. 52. 29a-b.
[94] ibid., p. 262.
[95] or Oswald, 'Clay Pipes for the Archaeologist', fig. 3G.4 (approx.).
[96] cf. a more clearly defined example of c. 1600-40 from London; Atkinson and Oswald, 'London Clay Tobacco Pipes', fig. 7.48.
[97] D.A. Higgins, 'The Interpretation and Regional Study of Clay Tobacco Pipes: A Case Study of the Broseley District', doctoral thesis submitted to the University of Liverpool (1987), fig. 79.3.
[98] Pepper Street 1941; Hamilton Place (CHE 12 HP 92 1945) and 25 Bridge Street (CHE 25 BS 01 456 <9118>).
[99] National Clay Tobacco Pipe Stamp Catalogue; Cast 408.9.

and all occur on pipes ranging *c.* 1610–40, with some marks having been impressed 'upside down' to the example illustrated here. The bowl form and finish is very similar to that found on contemporary Dutch pipes but colleagues there have never seen this mark and so it clearly appears to be an early English product.[100] This pipe must have been produced in a well-established and prolific workshop producing high-quality pipes, the exact location of which remains unclear given the distribution of known examples.

2. Context 1121. SF23. An almost complete bowl made of a fine off-white fabric, without any visible inclusions, and with a stem bore of 7/64". This pipe was clearly intended to be a good quality product since it has a bottered and fully milled rim and a finely burnished surface. There is a circular stamp with relief lettering reading 'ROB/GADNEY/OXON' on the base, which identifies the maker as one of the Robert Gadneys of Oxford. The lettering is arranged in three slightly curved lines above a device that is perhaps intended to represent a roll of tobacco. This particular mark has previously been recorded as a stem stamp applied between Oxford style scalloped stem borders on a spur pipes of *c.* 1660–90[101] and in isolation on the stem a West Country style spur pipe of *c.* 1690–1720 from Keble Road, Oxford.[102] There is also an example used as a heel stamp on a fragmentary bowl from Aylesbury that came from the site of a pipe kiln operating *c.* 1670–90.[103] The full form of the Aylesbury example was previously unknown but it can now be recognised as the only other known example of a tall cylindrical bowl like the Lincoln College example. The context for the Lincoln College example is a little uncertain: 1121 is a finds reference number from the pumping station area and site records describe this as "artefacts recovered from either 1096 (=2303) or 1094 (=2301)". If it were from 2301, as seems likely (see above), then it comes from the same fill as produced the largest assemblage of pipe bowls from the site including a bowl of *c.* 1690–1720 with a reversed 'RG' mark, which can also be attributed to one of the Gadneys. Robert Gadney (I) was assessed for Hearth Tax during 1667–77, when working in St Giles, Oxford, and both father and son were still alive in 1722 when they were defendants in a legal case.[104] At least three different styles of name stamp are known to have been used by this family and they are the most frequently encountered Oxford marks of this period, having been recovered from various sites in the town as well as from Cowley, Abingdon, Aylesbury and Salisbury.[105] The prominence of this family as pipemakers is also shown by a petition of 1697 against a recent tax on pipes, which was submitted by "Robert Gadney, of Oxford, Tobacco-pipemaker, in behalf of himself, and divers others of the same Trade".[106] The documentary, artefactual and stratigraphic evidence would all fit with this pipe bowl dating from somewhere between *c.* 1660 and *c.* 1720, during the period when the Gadneys were one of the most important

[100] Bert van der Lingen and Jan Oostveen, in litt (2 June 2015).
[101] A. Oswald, 'Pipe Stamp Index (4 Vols)' unpublished research notes and sketches of pipe bowl forms and marks, a copy of which is held at the National Pipe Archive at the University of Liverpool (LIVNP 1997.8), at least two examples, (1991).
[102] Higgins, 'The Interpretation and Regional Study of Clay Tobacco Pipes', fig. 79.13.
[103] J. Moore, 'The Remains of a Seventeenth Century Clay Pipe Kiln at 13 Castle Street, Aylesbury, and the Pipes from a Probable Kiln Site at Whitehall Street', *Records of Buckinghamshire*, 21 (1979), fig. 5.9.
[104] Oswald, 'Clay pipes', in Hassall *et al*., 'Excavations in St. Ebbe's, Oxford, 1967-1976: Part 2', pp. 253-5.
[105] D. Higgins, 'Clay tobacco pipes', 168.
[106] P. Taylor, 'Excise Taxation and the Early English Tobacco Pipe Industry', *Clay Pipe Research, 4* (1979).

pipemaking families in Oxford. What makes this pipe of regional and national significance is the fact that the bowl form is quite unparalleled by anything known to have been made by any other maker, either in this country or abroad. The tall, slender bowl has a clean, cylindrical form with a clearly defined junction where the cylindrical stem joins it. Despite this, the pipe was clearly made using standard production techniques in a specially cast mould of this shape. Pipe moulds of this period would have been made of metal and relatively expensive to produce, but they could then be used to make large numbers of identical pipes and so this design was clearly intended to be produced in some numbers. At the same time, the quality of the finish shows that this was not a cheap product, and so it looks as if the Gadneys were innovating and offering novel high-quality designs aimed at the social elite of Oxford. This particular style does not appear to have caught on in the long term, but other examples must exist and this particular example was clearly appreciated by its owner, having been heavily smoked before being discarded.

3. Context 2180. Complete early bowl of unusual form, since it has been made with a rounded base, lacking either a heel or spur. This style of pipe was made from at least the mid-seventeenth century onwards as an export type, particularly for the Atlantic trade to the Caribbean and North America. Although common in those areas, this form is very rarely seen in England before *c.* 1850 and, when it does occur, it is invariably from the major ports where they were being produced specifically for export. No examples have previously been recorded from inland locations and so this is an extremely unusual find. Furthermore, these export style pipes were typically cheaply made and finished and were usually the least expensive products being made at any given workshop. In contrast, this pipe has been neatly finished and given a good quality burnish, which would have enhanced its value (and cost). In terms of dating, the underlying bowl form is basically the same size and shape as AO19 of *c.* 1690–1710. The rim has been bottered and one quarter milled; finishing techniques that were not used after the first few decades of the eighteenth century. The context does not help with dating, since it was recovered from machined garden soil to north of the demolished part of the Garden Building, basement area. However, the underlying bowl form, the rim finish and the general range of other pipes from the site all suggest that this piece was made around 1690–1720, which is consistent with its stem bore of just over 7/64”. In terms of where it was produced, the pipe is made of a distinctive fabric with very fine sandy inclusions visible under a 10x lens. This particular fabric is characteristic of pipes produced in the Oxford area and so it seems certain that this was made locally rather than being a stray piece brought from one of the major ports, such as London. The very unusual nature of this piece reflects that of the Gadney bowl discussed above (Fig. 15, no. 2), and reinforces the suggestion that innovative and experimental pipe designs were being produced in Oxford during this period.

11 ANIMAL BONE *BY LENA STRID*

Introduction

The animal bone assemblage comprised an estimated total of *c*. 2,400 fragments from deposits dating from the late eleventh century to the late seventeenth century (Phases 1 to 6). This number includes 308 fragments (13%) from sieved soil samples, from which several bones from birds and mice were recovered. Material from Phases 7 to 9 has not been included in the analysis.

The bones were generally in a good to fair condition, regardless of phase. Gnawed bones were slightly more frequent in the post-medieval phases (7.8%–9.8%) than in the medieval phases (3.4%–5.3%), suggesting that scavengers had less access to the deposited butchery and kitchen waste in the medieval period. Burnt bones were rare throughout the assemblage. The analysis followed standard OA procedure, details of which are included in the site archive. Fish bone is separately reported on by Nicholson below.

Table 11.1. Number of fragments per taxon and phase. MNI within parenthesis.

	Phase 1	**Phase 2**	**Phase 3**	**Phase 4**	**Phase 5**	**Phase 6**
	11th-E13th C	**M-L13th C**	**E-M14th C**	**L14-E16th C**	**M16-E17th C**	**M-L17th C**
Cattle	90 (4)	14 (2)	37 (2)	10 (1)	120 (4)	48 (2)
Sheep/goat	172 (11)	22 (3)	30 (3)	15 (3)	187 (15)	42 (5)
Sheep	19	2	1		8	2
Pig	60 (3)	8 (1)	31 (3)	3 (1)	36 (3)	20 (2)
Horse	1 (1)				2 (1)	
Dog	1 (1)		1 (1)	1 (1)	3 (1)	1 (1)
Cat	7 (2)	1 (1)	1 (1)		1 (1)	1 (1)
Dog/cat					1	
Rabbit				1 (1)	13 (3)	1 (1)
Hare	1 (1)	2 (1)			1 (1)	
Red deer	1 (1)					
Fallow deer		3 (1)				
Roe deer	1 (1)					
Domestic fowl	16 (3)	10 (3)	18 (3)	7 (3)	31 (6)	21 (5)
Goose	6 (2)	2 (1)	6 (1)	2 (1)	10 (1)	2 (1)
Duck	1 (1)			1 (1)	2 (1)	2 (1)
Teal	1 (1)					
?Pheasant	1 (1)					
Woodcock			1 (1)			
Raven	1 (1)					
Passerine	1	4				
Indet. bird	28	10	30	5	38	5
Rat sp.				1 (1)	1 (1)	1 (1)
House mouse	2 (2)				4 (2)	
Mouse sp.		1 (1)				
Micromammal	11	2	1	2	18	
Frog/toad	1				5	
Small mammal			1		3	
Medium mammal	109	13	21	19	174	53
Large mammal	88	23	24	16	159	40

Indeterminate	180	16	29	12	66	26
TOTAL	800	133	232	95	880	265
Weight (g)	7,725	1,390	3,743	961	12,462	4,572

The assemblage

The assemblage is dominated by domestic livestock (Table 11.1), a common pattern in most medieval and early post-medieval urban assemblages.[107] No bones could be identified as goat, whereas sheep bones occurred in almost all phases, suggesting that the majority or all of the sheep/goat bones come from sheep. Other animals probably representing butchery and kitchen waste include rabbit, hare, red deer, fallow deer, roe deer, domestic fowl, goose, duck, teal, ?pheasant, woodcock and small perching birds (passerines). Of these, domestic fowl was the most commonly represented animal.

Domestic goose and duck are difficult to distinguish morphologically from their wild counterparts, greylag goose and mallard. However, it is clear from medieval documents that domestic geese and ducks were commonly kept animals, suggesting that the majority, if not all, of the geese and ducks from the assemblage are domestic.

Other animals in the assemblage include pets and working animals such as cat, dog and horse, as well as wild fauna, represented by raven, brown/black rat, house mouse and frog/toad. It is unclear whether the passerine bones represent wild fauna or kitchen waste, as medieval records show that small birds such as thrushes were sold for consumption.[108]

Livestock

The majority of the meat eaten in medieval towns came from cattle, sheep/goat and pig. Pigs could be kept in sties in backyards, but cattle and sheep came from the surrounding countryside and were driven to urban butchers for slaughter, butchery and sale.

In order to carry out an analysis of the frequency of the three major domesticates, cattle, sheep/goat and pig, these species should comprise a combined minimum of 300 fragments or a minimum of 30 individuals (MNI).[109] Only the assemblages from Phase 1 and Phase 5 are of sufficient size with regards to fragment count, and none are of a suitable size to use MNI (Table 11.1).

When comparing the inter-species frequency for the three major meat-providing animals, the assemblages from Phase 1 and Phase 5 are quite similar. Cattle are more common in the later phase whereas pigs are less common. This may reflect a greater consumption of pork in the eleventh century or reflect differences in butchery, i.e. that during the sixteenth and

[107] N. Sykes, 'From *Cu* and *Sceap* to *Beffe* and *Motton*: The Management, Distribution and Consumption of Cattle and Sheep, AD 410-1550', in C.M. Woolgar, D. Serjeantson and T. Waldron (eds), *Food in Medieval England: Diet and Nutrition* (Oxford, 2006), pp. 56-71.

[108] D. Serjeantson 'A Dainty Dish: Consumption of Small Birds in Late Medieval England', in H. Buitenhuis and W. Prummel (eds), *Animals and Man in the Past. Essays in Honour of Dr. A.T. Clason, Emeritus Professor of Archaeozoology Rijksuniversiteit Groningen, the Netherlands,* ARC-Publicatie, 41 (2001), pp. 263-73.

[109] E. Hambleton, *Animal Husbandry Regimes in Iron Age Britain. A Comparative Study of Faunal Assemblages from British Iron Age Sites*, BAR, Brit Ser, 282 (Oxford, 1999), pp. 39-40.

seventeenth centuries more pork was sold with the bone already removed. It is unclear whether the variety in inter-species frequency between eleventh-century Oxford assemblages reflects actual dietary preferences. The cattle assemblage from the High Street is dominated by elements from the head and feet, suggesting that they represent butchers' waste from the known butchers' shops in that area.[110] There is a great inter-site variation in abundance of pig throughout Oxford regardless of time period,[111] suggesting socio-economic differences in diet, whether from the amount of consumed pork and/or amount of pork bought on the bone.

The limited dental ageing data shows that cattle and sheep/goat were slaughtered at a range of ages, from juvenile to elderly, whereas all the pig teeth came from animals younger than two years old. A larger dataset derived from the state of limb bone epiphyseal fusion indicates that most cattle and sheep/goat were subadult or adult when slaughtered, whereas pigs were sub-adult or younger. This is consistent with most urban assemblages, indicating the importance of secondary products such as milk, wool and traction. Pigs were exclusively raised for meat and only breeding animals were kept after they had reached their full growth. An exception to this pattern is the relative abundancy of juvenile cattle bones from Phase 5 and 6 which reflect the consumption of veal. The slaughter of calves may reflect the increasing importance of dairy products. Rennet (made from a suckling calf's stomach lining) was a crucial ingredient for cheese making and a killed calf could free milk for human use. Records from the mid seventeenth century indicate that most butchers that held land around Oxford ran dairies on their lands rather than using them for fattening cattle.[112] Measureable bones were scarce, but all fall within the size ranges of livestock from contemporary Oxford sites.

Butchery marks occurred on bones from all livestock, most frequently on cattle and sheep/goat. Similar basic butchery patterns seem to have been used for all three species. Cut marks from skinning of cattle and sheep/goat were noted on skulls, metapodials and phalanges. Horn cores from sheep were often chopped off at the skull, whether during skinning or later at the tanner/tawyer. The carcasses were suspended and divided axially along the spine using a heavy cleaver. The vertebral column was then portioned in transversal sections. Ribs were portioned into two or more sections. Portioning of the limbs was carried out with cleavers, with exception of the elbow and hock joints, where knives were used. The cut marks at the hock joint may represent disarticulation during the skinning process, as illustrated in the fourteenth-century Holkham bible.[113] Knives were also used for filleting of meat at limb bones, pelves and mandible.

A small number of bones from cattle, sheep/goat and pig were affected by disease, muscle strain or trauma. They are more prevalent in Phase 1 and 5, probably an effect of the greater size of these assemblages rather than any indication of a change in animal keeping.

[110]M. Maltby, 'Animal Bones', in G. Walker and R. King, 'Early Medieval and Later Tenements at 113-119 High Street, Oxford: Excavations in 1993-5', *Oxoniensia*, 65 (2000), p. 433.
[111]L. Strid, 'Animal Bone', in S. Teague and B.M. Ford, 'Excavations in Oxford's South Suburb at Brewer Street, Littlegate Street and Rose Place', unpublished OA report (2019).
[112]*VCH Oxon*., 4, pp. 113-4.
[113]M.P. Brown, *The Holkham Bible Picture Book. A Facsimile* (London, 2007).

Pathologies on cattle bones include initial stages of degenerative joint disorder on three first phalanges, which may have been caused by muscle strain from hard work or by increasing age. Two sheep/goat humeri have exostoses laterally at the distal end, probably caused by repeated impact trauma, which may occur, for example, when animals are penned in small enclosures.[114] Indications of gum infection were noticed on two sheep/goat mandibles with bone absorption, widened alveoles and swelling at the cheek tooth row. Such infections are quite common on sheep/goat in the archaeological record and may have been caused by food being lodged between the gum and the bone. Pathologies visible on pig bones included porous new bone growth suggesting infection on a metatarsal, bone absorption on a metacarpal and smooth bone growth possibly associated with healed fracture or inactive infection on another metacarpal. As the latter fragment was very small and heavily affected by gnaw marks, it was not possible to identify the cause of the pathology further. Three ribs from large mammals and one rib from a medium-sized mammal showed evidence of healed or healing rib fractures.

Other domestic mammals

A small number of bones from horse, dog and cat were found in almost all phases. Horse is the least abundant, which is unsurprising as in medieval and later society horses were kept as work animals or for riding and were consequently less numerous than the livestock that were brought into the towns each week. All the bones from horse, dog and cat came from adult animals, with the exception of a sub-adult cat in Phase 3 and in Phase 6 and a scapula from a neonatal dog or cat in Phase 5. A cut mark on a cat radius in Phase 3 suggests the skinning of cats for fur.

Domestic birds

Chicken is the most numerous of the domestic birds in all phases, which is typical for urban assemblages throughout Britain.[115] Most chickens were skeletally mature, i.e. over *c*. 3–3.5 months, consistent with their primary use as a source of eggs and feathers, with meat as a by-product. Male fowl were also used for cockfighting but archaeological evidence of this practice is scarce.[116] The number of sexed fowl bones was too small to provide any useful information on the sex ratio of the local fowl population (Table 11.1). Geese were a seasonal fare in medieval England; only a small number of skeletally immature 'green geese' were slaughtered in summer, the majority of the goose slaughter taking place in autumn and winter.[117] This pattern is consistent with the Lincoln College assemblage, where all goose and duck bones were fused.

A small number of bird bones from Phase 2–6 showed signs of butchery. Most of these were cut marks and chop marks from filleting and disarticulation on leg and wing bones of domestic

[114]J.R. Baker and D.R. Brothwell, *Animal Diseases in Archaeology* (London, 1980), p. 127.
[115]D. Serjeantson, 'Birds: Food and a Mark of Status', in Woolgar *et al*., *Food in Medieval England: Diet and Nutrition*, pp. 134-6.
[116]Cf. S. Doherty, 'New Perspectives on Cock-fighting in Roman Britain' (Nottingham, unpublished BA dissertation, 2013).
[117]D. Stone, 'The Consumption and Supply of Birds in Late Medieval England,' in Woolgar *et al*., *Food in Medieval England: Diet and Nutrition*, p. 152.

fowl, goose, duck and unidentified bird. A sternum from a goose-sized bird from Phase 4 had been chopped through transversally

Pathologies were only found on bones from Phase 5. These comprise an ossified muscle attachment (enthesophyte) on a fowl-sized tibiotarsus and minor bone growths at the joints of a duck radius and a fowl tarsometatarsus. The latter may be indicative of muscle strain, possibly caused by heavy body weight or intense muscle activity, but may also be age related.

Game

Wild mammals are rare, reflecting the restriction of hunting to the elite.[118] However, venison was sometimes given as tithes and gifts, and this, in addition to poaching, made venison accessible to the urban population.

The red deer and fallow deer remains come from the meat-poor lower limbs, suggesting that they may represent waste from hide processing, as the metapodials and feet were often left attached to the skin when they were delivered to tanners and/or tawyers.[119] This is further indicated by cut marks on the distal shaft of a red deer metacarpal. A roe deer humerus from Phase 1 and hare remains from Phases 1, 2 and 5 represent kitchen waste.

Rabbit bones only occurred in the later periods and may reflect the sinking price of these animals after the mid fourteenth century.[120] The scarcity of rabbit in Oxford, excluding college deposits,[121] suggests that they might have been viewed as occasional treats.

Wild birds comprise a small part of the assemblage. Most are passerines, waders and water birds, which is consistent with other Oxford assemblages.[122] The urban landscape with its middens would have formed a good habitat for scavenging birds like ravens, which are represented by a single bone from Phase 1.

Commensal fauna

Animals which formed part of the natural background at the site include black/brown rat, house mouse, frog/toad, and blackbird- and robin-sized birds. Rats and house mouse would have scavenged from midden heaps and grain stores, whereas frogs and toads may have inhabited damp areas in and around the town.

Summary

The assemblage is in many ways typical for a medieval and early post-medieval urban site. The faunal remains are dominated by domestic animals, mainly cattle and sheep/goat, and

[118] Sykes, 'From *Cu* and *Sceap* to *Beffe* and *Motton'*, pp. 77.
[119] cf U. Albarella, 'Tawyers, Tanners, Horn Trade and the Mystery of the Missing Goat', in P. Murphy and P.E.J. Wiltshire (eds), *The Environmental Archaeology of Industry. Symposia of the Association for Environmental Archaeology,* 20 (Oxford, 2003), pp. 71-86.
[120] M. Bailey, 'The Rabbit and the Medieval East Anglian Economy', *The Agricultural History Review*, 36:1 (1988), p.12-3; E.M. Veale, 'The Rabbit in England', *The Agricultural History Review,* 5:2 (1957), p. 89.
[121] L. Strid 'Animal bone', in A. Norton and J. Mumford, 'Anglo-Saxon Pits and a Medieval Kitchen at The Queen's College, Oxford', *Oxoniensia*, 75 (2010), pp. 203-10; F. Worley and E.J. Evans, 'Animal Bone', in Poore *et al*., 'Excavations at No. 4A Merton St., Merton College, Oxford', pp. 311-42.
[122] cf. L. Strid, 'Animal Bone', in S. Teague and B.M. Ford, 'Excavations in Oxford's South Suburb at Brewer Street, Littlegate Street and Rose Place', unpublished OA report (2019).

the bones are a mixture of butchery waste and kitchen waste. In addition, there are also small deposits of industrial waste from tanning/tawying. Age estimation for cattle and sheep/goat show a great variety of slaughter ages, ranging from very young to old, reflecting calves and lambs slaughtered for dairy production, sub-adult animals raised for meat and adult animals past their prime as breeding animals, draught oxen, milk and wool producers. Pigs were generally slaughtered as juveniles and sub-adults. There is an increase in juvenile cattle in the early post-medieval phases, which may relate to an increased dairy production in the Oxford region.

12 FISH BONE *BY REBECCA NICHOLSON*

Introduction

A small assemblage of identifiable and generally well-preserved fish remains was recovered, the great majority of which came from the sorted residues of bulk (flotation) soil samples. Most of the assemblage came from pit fills, charcoal spreads and occupation deposits from Phases 1 (late eleventh to early thirteenth century), 3 (early to mid-fourteenth century), 4 (late fourteenth to early sixteenth century) and 5 (mid sixteenth to early seventeenth century), broadly reflecting the nature of the archaeology on the site. Most samples contained relatively small numbers of fish bones, which is likely to reflect the general mixing of material within features across the site. Bones and scales were identified to species and anatomical element where possible, using the author's fish reference collection. Where identifications were uncertain the bones have been identified either to family level or have been classified as unidentified. Spines, ribs, rays, cranial fragments and branchial bones were only identified when particularly diagnostic to species or genus.

Results

The remains comprised only 459 identified bones, but considering the relatively small assemblage size a diverse range of fish was identified with relatively little variation evident between phases (Table 12.1). Herring bones consistently comprised around 50% of the identifiable bones and eel around 15%. All of the fish bone from Phase 1 came from pits, with the exception of a small number of bones from a possible posthole in the base of Phase 1 pit 2636. Fish identified in the Phase 1 samples included several freshwater fish (cyprinid, pike, perch and trout) as well as the catadromous eel (probably also caught locally) and a relatively restricted range of sea fish (rays, small shark/dogfish, haddock, flatfish and possible grey mullet). Fill 2623 of pit 2617 contained vertebrae from what is likely to be a single fairly large ray. As is typically the case for sites in Oxford, none of the pike bones come from large fish and most are from fish of under 300mm. Pike of this size were referred to as 'pickerel'.[123]

Very little fish remains came from Phase 2 (thirteenth-century) deposits, from herring, eel and mackerel. A greater diversity of seafish was present in the fourteenth-century samples (Phase 3), including several species of gadid (cod, whiting, haddock and ling), gurnards, sea bream and mackerel, although the greater range of fish is likely to be partly a reflection of the greater number of recovered bones. Freshwater fish (cyprinids including chub, perch, ruffe, pike and even three-spined stickleback) were consistently present in the medieval and post-medieval samples and were probably caught locally; small cyprinids comprised almost 20% of the identified remains from Phase 3. Salmon (or possibly sea trout), identified from a single large caudal vertebra from charcoal spread 2413, is much less likely to have been a local catch and may have come from a preserved fish. A single caudal vertebra may be from a pilchard or sardine, a fish typically found off the coast of Devon and Cornwall and rarely found in

[123]From the sixteenth century accounts of Prior Moore's fishpond in Worcester, pike under full size (roughly 1.5kg) were termed 'pickerel' (Hickling 1971) and the term is commonly used in medieval documents.

archaeological deposits outside this region.[124] Other evidence for fish typically found in the south-west has come from Oxford Castle[125] and Eynsham Abbey.[126] Fish remains are less frequent in Phase 4 and 5 but the assemblages continue to be numerically dominated by bones from herring and, to a lesser extent, eel. Fish not identified from earlier deposits include sea bream, conger eel and three-spined stickleback.

Discussion

Generally, the fish remains recovered from the Garden Building excavations were similar, although around half as numerous as, those reported by Ingrem from pits and the kitchen floor excavated between 1997 and 2000,[127] where the remains came from deposits dated from the late Saxon (eleventh century) to the post-medieval periods. In that report, Ingrem speculated that the absence of herring cranial elements in the earlier eleventh-century deposits possibly indicated that the fish were arriving at the site in a decapitated form. Although not numerous, the herring remains from the Garden Building Phase 1 assemblage includes cranial elements as well as vertebrae, and it may be that the absence of cranial elements from the small Phase 1 assemblage discussed by Ingrem is a result of taphonomic bias against the survival of fragile herring head bones.

The regular occurrence of bones from both herring and eel is typical for medieval and post-medieval sites in Oxford as indeed for most urban sites. These fish were evidently generally available and regularly eaten, as indicated by their relatively cheap price.[128] Herring transported into Oxford in the earlier medieval period are likely to have been preserved by pickling in brine, but fresh fish may also have been available. In 1276 fresh herrings were purchased by Bicester Priory,[129] so it is clear that even by this date all sea fish could be transported as far inland as Oxford quickly enough to remain fresh. They would have been carried in baskets or panniers and usually carried in panniers or baskets soaked in brine by pack-horse using specialist carriers 'rippiers', and eaten within a relatively short time of purchase.

For such a small assemblage the range of fish, which includes both sea fish and freshwater fish in all periods, is perhaps surprising, but this is typical for many sites in Oxford[130] and indicates that a variety of fish was available in the marketplace. By the fourteenth century

[124] K. Ayres, C. Ingrem, J. Light, A. Locker, J. Mulville and D. Serjeantson, 'Mammal, Bird and Fish Remains and Oysters', in *Aelfric's Abbey. Excavations at Eynsham Abbey, Oxfordshire 1989-92*, (Oxford, 2003), p. 380-1.
[125] R.A. Nicholson, 'Fish Remains', in J. Munby, A. Norton, D. Poore and A. Dodd *Excavations at Oxford Castle 1999–2009*, Thames Valley Landscapes Monograph 44 (Oxford, 2019).
[126] Ayres, 'Mammal, Bird and Fish Remains and Oysters', 380-1.
[127] C. Ingrem, 'The Bird, Fish and Small Mammals', in Kamesh et. al. 'Late Saxon and Medieval Occupation from Excavations at Lincoln College, Oxford 1997-2000', pp. 255-60.
[128] See C. Dyer, 'The Consumption of Freshwater Fish in Medieval England', in M. Aston (ed.), *Medieval Fish, Fisheries and Fishponds in England*, BAR, Brit Ser 182, (Oxford, 1988), p. 31.
[129] See C.J. Bond, 'Monastic Fisheries', in M. Aston, *Medieval Fish, Fisheries and Fishponds in England*, p. 77.
[130] For example, R.A. Nicholson, 'Fish Bones', in Norton and Mumford, 'Anglo-Saxon Pits and a Medieval Kitchen at The Queen's College, Oxford', pp. 210-4; R.A. Nicholson, 'Fish Remains', in Norton and Cockin, 'Excavations at the Classics Centre', pp. 192-3; R.A. Nicholson, 'Fish Remains', in Poore *et al*., 'Excavations at No. 4A Merton St., Merton College, Oxford', pp. 306–11.

(and probably from the mid-twelfth century) Oxford had a busy fish market in the stalls below the Guildhall in St Aldate's (then Fish Street).[131]

It is perhaps surprising that larger gadids (codfishes) are not common in the medieval and later assemblages, although stockfish and similar products (salted and/or dried fish of the cod family) were medieval staples.[132] Notwithstanding the absence of stockfish, the diversity of fish in the fourteenth-century assemblage from the Garden Building excavations is likely to reflect the purchasing power of a reasonably wealthy household, which is in keeping with the excavated evidence for the working of precious metals nearby. A similar increased diversity of fish by the fifteenth century has also been noted by Ingrem,[133] although here, too, herring continued to be the most frequent fish.

Although less numerous, the similarity of the assemblage from Phase 5 with that from preceding periods is a little surprising, since by the seventeenth century the area appears to have been heavily built up with crowded cottages. Some redeposition of material appears likely.

Table 12.1. Number of identified fish bones by phase

PHASE	**1**	**2**	**3**	**4**	**5**	**TOTAL**
Shark/ray (Elasmobranchii)	1		1		1	**3**
Shark (Selachii)			1			**1**
Ray (Rajidae)	11				1	**12**
Thornback (*Raja clavata*)	1					**1**
Eel (*Anguilla anguilla*)	14	4	28	14	11	**71**
Conger eel (*Conger conger*)					1	**1**
Salmon (*Salmo salar*)			1			**1**
Trout (*Salmo trutta*)	2				1	**3**
Herring/sprat (Clupeidae)					1	**1**
Herring (*Clupea harengus*)	44	5	100	49	31	**229**
cf. Pilchard (*Sardina pilchardus*)			1			**1**
Cyprinid (Cyprinidae)	1		30	4	9	**44**
Chub (*Leuciscus cephalus*)			1			**1**

[131] Chance *et al*., 'Medieval Oxford', pp. 3-73, http://www.british-history.ac.uk/vch/oxon/vol4/pp3-73 (accessed 6 February 2015).
[132] See, for example the accounts of John de Vere, Earl of Oxford in 1431-2; discussed by Woolgar *et al*., *Food in Medieval England: Diet and Nutrition*.
[133] See Ingrem, 'The Bird, Fish and Small Mammals', in Kamash *et al*., 'Lincoln College, Oxford 1997-2000'.

Pike (*Esox lucius*)	5		3	2	3	**13**
Gadid (Gadidae)			5	7	8	**20**
Cod (*Gadus morhua*)			2	1	1	**4**
Cod/pollack (*Gadus/Pollachius*)			1			**1**
Haddock (*Melanogrammus aeglefinus*)	3		3	2		**8**
Ling (*Molva molva*)			1			**1**
Whiting (*Merlangius merlangus*)			1	2	1	**4**
3-spined Stickleback (*Gasterosteus aculeatus*)				2		**2**
Gurnard (Triglidae)			1		4	**5**
Red gurnard (*Chelidonichthys cuculus*)					1	**1**
Tub gurnard (*Chelidonichthys lucerna*)			1			**1**
cf. Grey mullet (Mugilidae)	1					**1**
Perch (*Perca fluviatilis*)	1			1	2	**4**
Perch/ruffe (Percidae)			1	1		**2**
Ruffe (*Gymnocephalus cernua*)			1			**1**
Sea bream (Sparidae)				1		**1**
Mackerel (*Scomber scombrus*)		1	1			**2**
Flatfish	1		2	1	3	**7**
Plaice/flounder/dab (Pleuronectidae)	4		6	1	1	**12**
Total	**90**	**10**	**192**	**88**	**80**	**459**

13 CHARRED AND MINERALISED PLANT REMAINS *BY SHEILA BOARDMAN*

Introduction

Forty-nine soil samples (20–50 litres in volume) were assessed for charred, mineralised and waterlogged plant remains, and wood.[134] Of these, 14 samples were selected for investigation of the charred plant remains, and one also for mineral-replaced plant remains (Table 13.1). In the latter, plant tissues have been replaced by calcium phosphate. This typically occurs in environments with high concentrations of phosphate and calcium ions in solution such as in cess pits (as here) and other sewage-rich deposits.[135] Mineral-replaced remains (hereafter called mineralised plant remains) can provide useful information on diet and plant resources not normally seen in charred plant assemblages. Five of the 14 samples were rapidly analysed, where some of the plant material was recorded 'in the flot' without full sorting. Typically, these were flots with only moderate numbers of plant remains. For sample 47, a combination of rapid analysis (of charred plant remains) and full analysis (of mineralised plant remains) took place.

The charred and mineralised plant investigations were undertaken in order to shed light on the following:

- The crops and other plant species present and how these compare to the late Saxon plant assemblage from the site,[136] and to other medieval sites in Oxford.
- Any evidence for how different crops and other plants were used, and the possible functions of different deposits, features or areas.
- Whether there was a continuation of crop storage, for baking and possibly malting, and other plant-related activities, following the major conflagration in the early to mid-eleventh century at the site of Lincoln College.[137]
- Whether rural activities, such as cereal processing, were taking place, or possibly specialised activities involving plants, for example textile production.
- The changing status of the Garden Building area from the late eleventh to early seventeenth century.

Methods

The bulk samples were processed by flotation using a modified Siraf tank, with mesh sizes of 250µm and 500µm, for the collection of the flots and residues respectively. Once dried, large or rich flots were divided using a riffle sample splitter, and sometimes they were dry-sieved at 4mm, 2mm and 1mm to aid sorting. For five rapidly analysed samples, some or all of the plant material was recorded 'in the flot' (see above). For the fully analysed samples, sorting

[134] S. Boardman, 'Charred Mineralised and Waterlogged Plant Remains and Wood Charcoal – Assessment Report', in S. Teague, 'Lincoln College 2012 Post-excavation Assessment and Project Design', unpublished OA client report (2013).
[135] L.M.E. McCobb, D.E.G. Briggs, W.J. Carruthers and R.P. Evershed, 'Phosphatisation of Seeds and Roots in a Late Bronze Age Deposit at Potterne, Wiltshire, UK', *Journal of Archaeological Science*, 30 (2003), pp. 1269-81.
[136] R. Pelling, 'The Charred Plant Remains', in. Kamash *et al.*, 'Lincoln College, Oxford 1997-2000', pp. 261-71.
[137] Ibid.

and identification of plant material was from entire flots, or measured flot fractions. Residue finds were examined in their entirety. Identifications took place using modern seed reference material and standard reference manuals.[138] Low-power Leica and Brunel binocular microscopes with magnifications of x10–x45 were used. Nomenclature follows Stace, and Zohary and Hopf for the cultivated species.[139] For the textile fragments, a Brunel SP400 metallurgical microscope with brightfield/darkfield illumination and magnifications of x50–x400 was used, together with keys in Caitling and Grayson.[140]

Results

The charred and mineralised plant remains are listed in Table 13.3. The following remains were counted as one: cereal grains, seeds, fruits, nutlets, cereal rachis internodes, rachises with internodes, floret bases, lemma bases, cereal (straw) or grass culm and nodes, and cereal/grass culm bases. In the case of broken cereals, embryo ends were counted. Fragments for a wide variety of plant remains are also included in Table 13.3, suffixed with 'F'. Simple abundance scores were used for charred and silicified cereal awns and fragments, and for some non-plant remains (mineralised 'cists', possible coprolite fragments, animal bones, seaweed fly pupae, other insect/fly remains, worm egg capsules, etc.). The plant remains are first discussed by material type below.

Table 13.1. Summary of samples analysed by phase

Phase	Period	Sample no.	Context	Feature	Feature type	Sample vol. (L.)	Material type	Full (FA) or Rapid (RA) analysis
1	L11th-E13thC	50	2640		Pit fill	50	CPR	FA
1	L11th-E13thC	18	2260	2259	Pit fill	38	CPR	RA
1	L11th-E13thC	44	2502	2477	Pit fill (inc. backfill)	39	CPR	RA
1	L11th-E13thC	45	2499	2477	Pit fill	40	CPR	RA
1	L11th-E13thC	46	2517	2525	Slumping pit fill	20	CPR	RA
2	E-L13thC	31	2082	2075	Pit fill	20	CPR	FA
3	E-M14thC	34	2397	2398	Oven fill	40	CPR	FA

[138] W. Beijerinck, 'Zaden Atlas der Nederlandsche Flora. Wageningen', *Biol. Stat Wijster*, 30 (1947); G. Berggren, *Atlas of Seeds and Small Fruits of Northwest-European Plant Species with Morphological Descriptions. Part 3*, (Salicaceae- Cruciferae; Berlings, 1981); S. Jacomet, *Identification of Cereal Remains from Archaeological Sites* (2nd edn trans. by James Greig), (Basel Unviersity, 2006); R.T.J. Cappers, R.M. Bekker and J.E.A Jans, *Digital Seed Atlas of the Netherlands*, Groningen Archaeological Studies, Vol. 4 (Groningen University Library, 2006).

[139] C. Stace, *New Flora of the British Isles*, 3rd edn (Cambridge, 2010); D. Zohary and M. Hopf, *Domestication of Plants in the Old World: The Origin and Spread of Cultivated Plants in West Asia, Europe and the Nile Valley*, 3rd edn, (Oxford, 2000).

[140] D.M. Catling, and J.E. Grayson, *Identification of Vegetable Fibres* (London, 1998).

3	E-M14thC	35	2409	2398	Oven fill	35	CPR	FA
3	E-M14thC	47	2573	2572	Pit fill	18	CPR	RA
3	E-M14thC	47	2573	2572	Pit fill	18	MPR	FA
3	E-M14thC	39	2413		Charcoal spread	30	CPR	FA
3	E-M14thC	41	2429	Below oven 2426	Charcoal spread	40	CPR	FA
4	L14th-E16th C	19	2296		Occupation/ consolidation	30	CPR	FA
5	M16th-E17thC	33	2385	2387	Drain fill	30	CPR	FA
5	M16th-E17thC	4	2200	2051	Ashy hearth fill	40	CPR	FA

Discussion

Cereals

Most numerous overall were wheat (*Triticum* sp.) grains, which were largely of the broad, rounded free-threshing type. Some more slender or poorly preserved grains were identified as wheat (*Triticum* sp.) or probable wheat (cf. *Triticum* sp.). However, no glume wheat chaff was present so the wheat grains are presumed to be of free-threshing type. Cereal chaff, found in quantity in four Phase 3 samples (34, 35, 41, 39) and one Phase 5 sample (4) indicate that hexaploid wheat, either bread wheat or club wheat (*Triticum aestivum/T. compactum*), was the main free-threshing wheat in both phases. Small amounts of tetraploid wheat, rivet or durum wheat (*Triticum turgidum/T. durum*), were also present in two Phase 3 samples (34, 35), both from oven fills. The most likely species represented by the hexaploid and tetraploid wheat rachises are bread wheat type (*T. aestivum* s.l.) and rivet wheat (*T. turgidum type*) respectively. Hence, these names are used (with caution) throughout this report. Bread wheat was the main grain used for bread in the medieval period, so it had greatest economic value.[141] Rivet wheat was used for bread (with a different texture to that of bread wheat), and the straw for thatching. Rivet wheat was once thought rare outside of East Anglia but it has now been widely found across central England/the Midlands, albeit in much smaller quantities than bread wheat.[142]

Hulled barley (*Hordeum vulgare*) was the second most numerous species in terms of grain, but there were far fewer grains of barley than those of wheat. The presence of the outer, twisted grains indicates that the six-row variety of *Hordeum vulgare* was present. The ratio of twisted to straight grains in six-row barley is 2:1. Two-row barley has straight (medial) grains only. A few well-preserved barley rachises of the six-row (and probable lax-eared) type were

[141] P.W. Hammond, *Food and Feast in Medieval England* (Stroud, 1995).

[142] J. Greig, 'The British Isles', in W. van Zeist, K. Wasylikowa, K-E. Behre (eds), *Progress in Old World Palaeoethnobotany* (Rotterdam, 1991), pp 229-334; L. Moffett, 'The Archaeology of Medieval Plant Food', in Woolgar *et al.*, *Food in Medieval England: Diet and Nutrition*, pp. 41-55.

recovered from sample 35, with a barley lemma base, but with so few chaff remains across the site and phases, it was not possible to say whether both two- and six-row barley were present. Barley was used in bread, for brewing ale and sometimes as animal fodder. Occasional germinated grains were recovered from the samples, but very few of these were barley, so there is no evidence for the malting of barley at the site.

The importance of the two other cereals, rye (*Secale cereale*) and oats (*Avena* sp.) is less easy to assess. In samples from the 1997–9 excavations at Lincoln College, rye and oat grains were only very minor components, except in some mixed secondary deposits, which presumably had more crop processing waste and other refuse (Pelling 2002). Oat grains were present in 12 of the Phase 1–5 samples here, generally in low numbers. There were no chaff remains (floret bases) which could be identified to species. It is possible that largely wild species (*Avena fatua/ludovicana*) were present and most oat grains came from plants which grew as weeds of other cereals. However, one moderately grain-rich Phase 2 sample (31) was dominated by oats. The dominance of oat grains and absence of oat chaff (suggesting it was at least partially cleaned) make it more likely that this is the cultivated species (*Avena sativa*). During the medieval period, oats were mostly grown for fodder, and sometimes oats and barley were cultivated together in a spring-sown, stock-feed crop or 'dredge', although there is no evidence of this here.[143]

Rye was present in at least eight samples. It was the dominant species in one Phase 3 grain-rich sample (35), and the second dominant cereal (as grain) in three of the four remaining samples from Phase 3 (34, 35 and 41). These samples came from bread oven fills and a charcoal spread, thought to relate to another bread oven. In general, rye seems to have been a minor crop in medieval Oxford, so the large numbers of grains (and rachises) in these types of feature are of note. However, it is unlikely that a whole rye crop, as seems to be present in sample 35, was being dried in a bread oven, not at least without the removal of some of the chaff and straw. Thus, rather than an increased economic importance of rye, the large amount of grain, rachises and possible straw may point to its relatively low value as a grain crop. The whole crop seems to have been destroyed. The Phase 3 samples are discussed further below. Rye may have been used at the site primarily for animal fodder, bedding, thatch and other purposes. Rye straw was highly valued for thatching in the past, and it was sometimes used on roofs with the spikelets and grain still attached.[144]

Approximately 3–6% of wheat grains from the Phase 1 samples showed signs of germination. The figures were lower for the other cereals. There were occasional (<2%) germinated grains in the cereal-rich Phase 3 samples, and in the one rich Phase 5 sample (4). There were also some detached (non-sprouted) cereal embryos in samples 35 and 4, from Phases 3 and 5 respectively. While none of this provides evidence for malting, some cereals may have become charred while being parched to halt germination (after a wet harvest), or prior to milling. Damp grains do not mill well. Some processed grain also may have been deliberately discarded because it became spoiled. Evidence for the latter may come from sample 34. Here,

[143] B.H. Slicher van Bath, *The Agrarian History of Western Europe 500-1850* (London, 1963).
[144] J.B. Letts, *Smoke Blackened Thatch. A Unique Sources of Late Medieval Plant Remains from Southern England* (London and Reading, 1999).

several wheat grains and fragments were swollen and distorted in a manner that indicated infestation by the earcockle nematode, *Anguina tritici*. This pest is found in medieval wheat crops in Britain. Infestations are associated with cool, wet conditions, but the nematodes can lie dormant in the soil for many years. Infestation causes gross distortion, and stunting, and the wheat grains are eventually lost.[145] Earcockle infestation remains a problem in the third world, but seems to have been largely eradicated from Britain and Europe through careful seed selection, crop rotation and fallowing.[146]

Legumes and forage crops

Pea (*Pisum sativum*) or probable pea was present in low numbers in samples from all phases (1–5), so this was presumably cultivated locally during the periods under study. The other large legume was horse bean, mostly in small form, so this probably represents small horse or field beans (*Vicia faba* var *minor*). Noticeably larger, elongated beans (9–11mm in length) in sample 41 (Phase 3) may indicate a different variety, but the dimensions still fall within the size range for small horse beans, so they may simply reflect natural variation in seed size and shape.[147] There were also many grains and fragments of bean/vetch/pea/wild vetch (*Vicia/Pisum/Lathyrus* – also called Vicieae below), particularly in samples 41, 39, 35 and 34 (Phase 3). These may include additional peas and horse beans, plus other legume species. Documentary evidence shows that legume crops were grown in gardens in towns as well as in fields.[148] A large eleventh-century deposit of charred beans was found at Folly Bridge in Oxford.[149]

In addition to the Vicieae seeds/fragments, many Phase 2, 3 and 5 samples were rich in smaller vetches/vetchlings/tares (*Vicia/Lathyrus*). The latter seeds may include important forage crops. Fodder vetch (*Vicia sativa* var. *sativa*) was tentatively identified in Anglo-Saxon period samples from Oxford Castle.[150] Small horse beans and vetches were used mostly for animal fodder, although they were consumed by humans after failed harvests.[151] Archaeobotanical and historical evidence point to an increase in the cultivation of vetches from *c.* 1300,[152] so it would not be surprising if indeterminate *Vicia/Lathyrus* seeds from Lincoln College included species such as fodder vetch. Alternatively, if the smaller *Vicia/Lathyrus* seeds came to the site largely with cereals, as weeds of cultivation, their

[145] W. Carruthers, 'The Plant Remains', in C. Harding, E. Marlow-Mann and S. Wrathmell, *Wharram: A Study of Settlement on the Yorkshire Wolds*, XII, The Post-Medieval Farm and Vicarage Sites (York, 2010); K.L. Hunter, 'Illustration of Wheat Gall', in Harding *et al*, *Wharram: A Study of Settlement on the Yorkshire Wolds*; K.L. Hunter (pers. comm.).
[146] R.H. Brown and B.R. Kerry, *Principles and Practice of Nematode Control in Crops* (Orlando, Florida, 1987).
[147] Zohary and Hopf, *Domestication of Plants in the Old World*, p. 112.
[148] F.J. Green, 'The Archaeological and Documentary Evidence for Plants from the Medieval Period in England, in W. van Zeist and W.A. Casparie (eds), *Plants and Ancient Man: Studies in Palaeoethnobotany*, Proceedings of the 6th Symposium of the IWGP, (Rotterdam, 1984), pp. 99-144.
[149] M. Robinson, 'Agricultural Debris against the Norman Bridge', in B. Durham, 'The Thames Crossing at Oxford: Archaeological Studies 1979-82', *Oxoniensia*, 49 (1984), pp. 57-100.
[150] R. Pelling, in J. Munby, A. Norton, D. Poore and A. Dodd *Excavations at Oxford Castle 1999–2009*, Thames Valley Landscapes Monograph 44 (Oxford, 2019).
[151] Hammond, *Food and Feast in Medieval England*.
[152] Greig 'The British Isles', pp 229-334.

numbers might suggest declining soil fertility in the thirteenth and fourteenth centuries (Phases 2 and 3). It is also possible that some of the *Vicia/Lathyrus* seeds were collected along with grassy material and brought to the site with animal fodder and bedding, the remnants of which were later cleared out of animal stalls and burnt. Black medick (*Medicago lupulina*) and the clover type plants (*Melilotus/Medicago/Trifolium*) may have arrived via similar routes.

Fibre and oil crops

Single flax (*Linum usitatissimum*) and possible flax seeds were present in two Phase 1 samples (18, 45). These may be remnants of previous harvests or reflect local activities with flax plants. Flax seeds in low numbers have been recovered from many Anglo-Saxon and medieval samples from Oxford sites, and flax retting seems to have taken place in the St Aldate's area of southern Oxford.[153] There is no evidence for flax retting here, and the scattered seeds may have had a primarily culinary use. Some mineralised fragments of bast fibre textile, which appears to include flax fibres, were recovered from the Phase 3 cessy pit fill sample, 47.

A single seed of possible black mustard *(Brassica* cf. *nigra*) may point to an oil crop. Black mustard seeds were also recovered from a medieval deposit at 4a Merton Street[154], the second site of the Dominican Priory, Oxford[155] and at Corpus Christi College.[156] Additional *Brassica/Sinapis* seeds in several Phase 3 samples may include other mustard seeds, cultivated brassicas (cabbage, turnip, etc.), and/or weeds of cultivation.

Fruits, nuts and culinary plants

The range of charred fruits and nuts was quite narrow as compared to other medieval sites in Oxford.[157] Charred grape (*Vitis vinifera*) pips, and a probable grape and separate pedicel (stalk) were identified in sample 4 (Phase 5). A single charred grape pip was also seen in another Phase 5 sample (sample 5, context 2207) during the sample assessment.[158] Two apple/pear (*Malus/Pyrus*) pips – both most like to be apple (*Malus domestica/sylvestris*) – were identified in a Phase 3 sample (47), and Phase 5 sample (4). Hazel (*Corylus avellana*) nut shell fragments in low numbers were recovered from nine samples, and charred hawthorn

[153] M. Robinson, 'Environmental Evidence from All Saints Church', in Dodd, *Oxford before the University*, pp. 388-9; M. Robinson and D.R.P. Wilkinson, 'The 'Oxenford': Detailed Studies of the Thames Crossing in St Aldates', in Dodd, *Oxford before the University*, pp. 65-134.
[154] R. Pelling, 'The Charred and Waterlogged Plant Remains' in Poore et. al., 'Excavations at No. 4A Merton St., Merton College, Oxford', pp. 211-339.
[155] M. Robinson, 'Plant and Invertebrate Remains', in: G. Lambrick, 'Further excavations on the Second Site of the Dominican Priory, Oxford', *Oxoniensia*, 50 *(*1985), pp. 196-201, fiche D14, F1.
[156] W. Smith, 'Charred and Waterlogged Plant Remains', in R. Bashford, A. Dodd and D. Poore, 'Medieval and Post-Medieval Remains from Excavations on the Site of the New Auditorium, Corpus Christi College, Oxford, 2008', *Oxoniensia*, 79 (2014), pp. 206-7.
[157] cf. Robinson, 'Plant and Invertebrate Remains', in Lambrick, 'Further excavations on the Second Site of the Dominican Priory, Oxford', pp. 196-201; Pelling, 'The Charred and Waterlogged Plant Remains', in Poore *et al*., 'Excavations at No. 4A Merton St., Merton College, Oxford', pp. 211-339; Smith, 'Charred and Waterlogged Plant Remains', Corpus Christi College, Oxford, 2008', pp. 206-7.
[158] Boardman 'Charred Mineralised and Waterlogged Plant Remains and Wood Charcoal, in Teague, 'Lincoln College 2012. Post-excavation Assessment and Project Design'.

(*Crataegus monogyna*) fruits and stones/fragments were present in the Phase 3 and 5 samples, 47 and 4 (see above). Remains of these two species point to gathered wild foods.

The mineralised plant remains from sample 47 incorporate additional fruits and culinary plants. Fruits include grape and strawberry (*Fragaria* sp.), with some intermediate strawberry/cinquefoil (*Fragaria/Potentilla*) seeds. Strawberry seeds preserved through phosphate mineralisation are very characteristic of sewage-rich deposits. Other fruits which were apparently consumed were apple/pear and a small *Prunus* species, in the form of mineralised kernels/fragments. The latter are of sloe (*P. spinosa*) or cherry (*P. avium,* etc.) size, and there were many fragments which also may have come from either sloe, cherry, apple or pear (*Prunus/Malus/Pyrus*). Some of these remains had a covering of bran adhering to their surface. The presence of mineralised probable flax and fennel (*Foeniculum vulgare*) seeds in this cess-rich deposit suggest both were used as culinary plants.

Wild species

A moderate range of annual weeds of arable fields and disturbed places in the samples includes corncockle (*Agrostemma githago*), stinking mayweed (*Anthemis cotula*), narrow-fruited cornsalad (*Valerianella denata*), field gromwell (*Lithospermum arvense*), cornflower (*Centaurea cyanus*) and cleavers (*Galium aparine*), most of which have large seeds or seed heads that are not easily removed by sieving. They tend to persist in fully processed crops and have to be removed by hand, especially if they are noxious, as is corncockle, or silica rich and liable to give bread a gritty texture, as is field gromwell. Many weeds may have been re-sown year after year, contributing to their persistence and the similarities in weed floras among the medieval crop assemblages rom the region. Weeds associated with autumn sown crops include corncockle, stinking mayweed, field gromwell, cornflower and cleavers. Of these, narrow fruited cornsalad and cornflower are found on lighter soils; both thrive in neutral to acidic sandy soils where rye is often grown. Cornflower may be associated with rye cultivation. In contrast, stinking mayweed, field gromwell and cleavers are typical weeds of the heavier, calcareous clays close to Oxford, suited to bread wheat cultivation.

Another group of wild species includes the very catholic weeds which grow on disturbed or nitrogen rich ground, around settlements, in garden type cultivation, and with spring sown crops. Here, these include black bindweed (*Fallopia convolvulus*), docks (*Rumex* spp.), other Polygonaceae (*Polygonum*, *Persicaria*), goosefoots/oraches (*Chenopodium/Atriplex*) and chickweed type (*Stellaria/Cerastium*). Greater celandine (*Chelidonium majas*) is a perennial which also near habitations and on banks, walls and in hedgerows. Seeds of mallows (*Malva* spp.) were very numerous in the Phase 2 sample, 31, and while these may include annual weeds, only common mallow (*Malva sylvestris*), a perennial, ruderal plant, was identified to species. Interestingly, common mallow was identified at Oxford Castle, where it may have been amongst vegetation that was cleared by fire.

In addition to the small legumes (*Vicia/Lathyrus*, *Medicago lupulina*, *Melilotus/ Medicago/Trifolium*) as discussed above, plants from grasslands may include grasses (Poaceae), ribwort plantain (*Plantago lanceolata*) and buttercup (*Ranunculus* sp.), while the sedges (*Carex* spp.) and spike rush (*Eleocharis palustris*) may have grown in damp grassland or in ditches around (and sometimes invading) cultivated fields. Sheep's sorrel (*Rumex acetosella*) is found on light, neutral to acidic, sandy soils, in grassland, heaths and cultivated

land. Bracken (*Pteridum aquilinum*), possibly brought to site for floor coverings or bedding, grows in wood and heaths, on light acid soils, so this was probably collected some distance from Oxford.

In summary, the wild plant remains, particularly from Phase 3, appear to reflect a wide variety of different habitats and there seem to be very many routes by which the plant material may have arrived on site, even in individual samples. The very mixed nature of these deposits makes for only tentative interpretations of the plant material and the use of the deposits and features from which they were recovered, some of which are discussed further below.

The plant remains by phase

Phase 1: late eleventh to early thirteenth centuries (samples 15, 18, 44, 45, 46)
The five Phase 1 samples were all from pit fills They were moderately grain rich and most were dominated by free threshing wheat grains, of bread wheat (*Triticum aestivum* s.l) or rivet wheat (*Triticum turgidum*) type. There were no identifiable chaff remains in the Phase 1 samples to confirm any cereal identifications. Other cereals are represented by cultivated or wild oats (*Avena* sp.), hulled barley (*Hordeum vulgare*) and occasional rye (*Secale cereale*) grains. The presence of twisted barley grains indicates the six-row variety of *Hordeum vulgare*, but it is possible that both six- and two-row barley were present. A few cereal grains had germinated but the numbers were low (see above) and given that the samples had virtually no chaff and very few wild plant remains, it is possible that a little largely clean, spoiled grain was intentionally burnt.

Other crops are represented by legume seeds and fragments, including probable horse bean (*Vicia faba*) and pea (*Pisum sativum*), and one or two flax (*Linum usitatissimum*) or possible flax seeds. Legume crops tend to be underrepresented in charred assemblages, as they do not generally come into contact with fire during processing. The few wild species were largely from the catholic weed/ruderal/spring sown crop weed group (e.g. *Chenopodium/Atriplex*, *Polygonum aviculare*, *Fallopia convolvulus*), or possibly grassland (e.g. *Vicia/Lathyrus*, *Melilotus/Medicago/Trifolium*). Wild edible species are represented by a few hazel (*Corylus avellana*) nut shell fragments.

In summary, the plant remains in the Phase 1 samples probably represent a mixture of small-scale accidents, involving grain parching or drying, with some deliberately destroyed material including a little crop-cleaning debris. The wild plant remains may indicate that some recycled fodder/bedding material, stabling-type waste, was also burnt and the remains dumped in the pits.

Phase 2: early to late thirteenth century (sample 31)
Sample 31 was the only Phase 2 sample assessed and analysed, and it also came from a pit fill (2082). Here, the cereals were dominated by oats, with some rye, hulled barley and free-threshing wheat. There was little identifiable cereal chaff so the full range of cereal species again remains unclear. It is not certain even whether the oat grains which dominated the sample were from cultivated oats (*Avena sativa*) or the wild species (*Avena fatua/ ludovicana*). Cereal chaff included rachis internodes of rye (*Secale cereale*), barley or rye (*Hordeum/Secale*) and indeterminate wheat (*Triticum* sp.), and there were two cereal straw (culm) nodes. Possible pea and horse bean, together with some large Vicieae (*Vicia/Pisum/*

Lathyrus) seeds and fragments may include additional cultivated species. Gathered wild, edible plants were represented by hazel nut shell fragments.

Wild species were well represented in sample 31. These fall into several groups. As noted above, common mallow (*Malva sylvestris*), a perennial ruderal species, is likely to have grown nearby. It seems to have grown in other parts of Oxford.[159] Other species are likely to have grown on site, in gardens, or with spring-sown cereals (e.g. *Chenopodium* spp., *Chenopodium/Atriplex*, *Polygonum aviculare*, *Persicaria* sp., *Fallopia convolvulus*, *Rumex* spp.). Field weeds, probably associated with autumn-sown crops, were fairly well represented (e.g. *Valarianella dentata*, *Anthemis cotula*, cf. *Centaurea* sp., Asteraceae), as were plants associated with dry and damp grassland or cultivated fields (*Vicia/Lathyrus*, *Melilotus/Medicago/Trifolium*, Fabaceae, *Ranunculus* sp., *Plantago lanceolata*, *Eleocharis palustris*, *Carex* spp. and Poaceae). Many grass type culm nodes were also present. The other wild species (Table 13.3) may have grown several of the broad groups above.

Phase 3: early to middle fourteenth century (samples 34, 35, 41, 39, 47)
Samples with a wide variety of crops and wild species continue into Phase 3, with activities focused around two ovens and some possibly related charcoal spreads. Two samples (34, 35) came from fills (2397, 2409) of one oven, feature 2398. One sample (41) came from a charcoal spread (2429), below oven 2426. Sample 39 came from another charcoal spread (2413), and a fifth sample (47), came from a cessy pit fill (2573), but this had few charred plant remains. Sample 47 was also investigated for mineralised plant remains, which are discussed separately below.

The rye-rich nature of these samples and some of the wild plant remains were also discussed above. One sample (35) was dominated by rye grains, and rye was the second most dominant cereal in the three other main Phase 3 samples (34, 41 and 39). The dominant cereal (as grains) in the latter samples was wheat. The numbers of grain and chaff remains of the four main cereal types (wheat, barley, rye and oats), plus the ratios of grain to chaff for these cereals in each sample, are summarised in Table 13.2. The samples included in Table 13.2 are 34, 35, 41 and 39 from Phase 3, and sample 4 from Phase 5. From these summaries, it is clear that while large numbers of chaff remains were present, there were always more cereal grains for each cereal type, than there were quantifiable chaff fragments. The nearest to a grain: rachis ratio of 1: 1, roughly equivalent to living cereal plants, was 1.3: 1, for rye grain to rachis in sample 35, then 1.65: 1, for rye grain to rachis in sample 41, and 3: 1, for barley grain to rachis in sample 35. Bearing in mind the direction of differential preservation, where chaff is much less likely to survive charring than are cereal grains, any sample with 10% of more cereal chaff might be considered to have been at most, partly processed.[160] More cereal chaff may have been present in these deposits prior to charring and, if so, burning, the three samples for which grain to chaff ratios were quoted above, may originally have had more chaff than grains.

[159] ibid.
[160] S. Boardman and G. Jones, 'Experiments on the Effects of Charring on Cereal Plant Components', *Journal of Archaeological Science*, 17 (1990), pp. 1-11.

Several observations can be made on the basis on Tables 13.2 and 13.3. Rye grains were more likely overall to be accompanied by large amounts of rachises, but the most chaff-rich cereal type varied from sample to sample. In sample 34, there appear to be too many straw/ grass culm nodes for the number of rachises present for any one cereal, so straw from different species may be included or material from another source. This was also the sample with wheat grains that were infected by the earcockle nematode, *Anguina tritici*, which might explain why such large deposit of grain (and associated wheat chaff) was burnt in the oven.

Table 13.2. Main cereal types

Phase		**3**	**3**	**3**	**3**	**5**
Sample no.		**34**	**35**	**41**	**39**	**4**
Context		**2397**	**2409**	**2429**	**2413**	**2200**
Feature		**2398**	**2398**	**Below 2426**		**2051**
Cereal species						
Hordeum vulgare	Grain: rachis - number	339: 4	69: 22	13: 0	24: 0	92: 0
	Grain: rachis - approx. ratios	85: 1	3: 1	-	-	-
Triticum sp.	Grain: rachis* - number	2036: 110	199: 13	109: 12	186: 41	125: 6
	Grain: rachis* - approx. ratios	18.5: 1	15: 1	9: 1	4.5: 1	21: 1
	*NB. Rachises incl. *Triticum aestivum* & *T. turgidum*	+	+			
Secale cereale	Grain: rachis - number	885: 89	357: 273	33: 20	24: 4	51: 14
	Grain: rachis - approx. ratios	10: 1	1.3: 1	1.65: 1	6: 1	3.6: 1
Avena sp.	Grain: floret bases - no.	30: 2	13: 0	10: 0	12: 0	29: 0
	Grain: floret bases - ratios	15: 1	-	-	-	-
Sample totals	Cereal straw nodes	105	36	8	1	2
	Cereal/grass nodes	47	-	-	4	4
	Grass culm nodes	7	36	19	-	12

Other crops in the Phase 3 samples were pea and small horse beans. There were large amounts of these, and of the intermediate Vicieae (*Vicia/Pisum/Lathyrus)* seeds and fragments, in sample 14. A single possible black mustard seed (*Brassica* cf. *nigra*) came from sample 34. The only charred fruit remains came from sample 47, from the pit fill, and they included some pips and fruits of apple/pear (*Malus/Pyrus*) and hawthorn (*Crataegus monogyna*). Sample 47 also had small amounts of charred barley, oats and wheat grains. The mineralised plant remains from this sample are discussed below.

Large seeded or headed weeds of arable fields and disturbed places were common in these samples (e.g. *Agrostemma githago*, *Centaurea cyanus*, *Centaurea* sp., *Anthemis cotula*, Asteraceae, *Lithospemum arvense*, *Galium aparine*). Plants that are most likely to be found in grasslands were confined largely to the small legumes (e.g. *Vicia/Lathyrus*, *Medicago lupulina*, *Melilotus/Medicago/Trifolium*, Fabaceae). Black medick (*Medicago lupulina*), an annual or short-lived perennial of dry grassland and disturbed places, is found on relatively infertile, neutral to calcareous soils.[161] Catholic weeds associated with nitrogen-rich ground, garden type cultivation, and spring sown crops, were represented by very few remains (largely *Rumex* spp. and other Polygonaceae).

Mineralised plant remains: sample 47, context 2573

The presence of mineralised plant remains and cess type concretions was noted during the sample assessment.[162] Small, mineralised seeds of species such as strawberry (*Fragaria* spp.), are typical of cess deposits, as are numerous pupae of seaweed fly (*Thoracocaeta zosterae*).[163] Several hundred individuals of the latter may be represented. Despite the highly mineralised nature of the sample, much of the plant material was very fragmentary and difficult to identify. I am greatly indebted to Kath Hunter at OA for help with this.

In addition to the strawberry seeds, the mineralised plant remains included some intermediate strawberry/cinquefoil (*Fragaria/Potentilla*) seeds, a grape (*Vitis vinifera*) pip, apple/pear (*Malus/Pyrus*) pip fragments, and kernels and fragments of a small *Prunus* species, possibly sloe (*P. spinosa*) or cherry (*P. avium*). There were also fragments which could have come from sloe, cherry, apple or pear (*Prunus/Malus/Pyrus*). Some remains had a covering of bran adhering to their surface. Culinary plants include fennel (*Foeniculum vulgare*) and possible fennel seeds, and perhaps the flax fragments. The latter, plus other edible remains, such as the cereal grains (including hulled barley and oats) and the probably horse bean (*Vicia faba*), are also likely to have entered the pit with dumped material.

Other remains which may have come from crop processing refuse, or grassy material possibly collected from meadows, include culm nodes and seeds of grasses (Poaceae), and seeds or fruits of clover type legumes (*Melilotus/ Medicago/Trifolium*), cinquefoil (*Potentilla* sp.), mallow (*Malva* sp.), cabbage/mustard (*Brassica/Sinapis*), dock (*Rumex* sp.), knotweed (Polygonaceae), cf. pink family (cf. Caryophyllaceae), bedstraw (*Galium* sp.), ribwort/hoary plantain (*Plantago lanceolata/media*), cf. dead-nettle family (cf. Lamiaceae), yellow rattle (*Rhinanthus* sp.), marshwort (*Apium* sp.) and carrot family (Apiaceae). This material was presumably dumped in the pit to soak up liquid and keep down the bad odours.

One final plant species is worth special mention in this context. The berries of the shrub buckthorn (*Rhamnus cathartica*), also called purging buckthorn, have very strong laxative qualities, and the seeds turn up in cess deposits elsewhere. Grigson has graphically described

[161] J.P. Grime, J.G. Hodgson and R. Hunt, *Comparative Plant Ecology* (London, 1988).
[162] Boardman 'Charred Mineralised and Waterlogged Plant Remains and Wood Charcoal, in Teague, 'Lincoln College 2012. Post-excavation Assessment and Project Design'.
[163] S.C. Webb, R.E.M. Hedges and M. Robinson, 'The Seaweed Fly Thoracochaeta zosterae (Hal.) (Diptera: Sphaerocidae) in Inland Archaeological Contexts: δ13C and δ15N Solves the Puzzle', *Journal of Archaeological Science*, 25(12) (1998), pp. 1253-7.

the latrine pits associated with the Benedictine monks at St Albans, excavated in the 1920s. These revealed large numbers of buckthorn seeds, together with fragments of old cloth which served as lavatory paper.[164]

Textile fragments: Sample 47, Context 2573

There were six fragments in total and these were also mineralised. They were first examined at low magnifications (x10–x40), using a binocular microscope. They all appear to be tabby weave, although the weave and fibres were obscured on one fragment. Several fragments appeared to be hemmed or from edging pieces. They appear to have been folded over and sewn.

The fibres were observed at magnifications of x50–x500 using a Brunel SP400 metallurgical microscope (see above), and compared to modern reference material for flax (*Linum usitiatissimum*) and hemp (*Cannabis sativa*), and to images and keys for a range of other species, in Caitling and Grayson (1998).[165] The surface details of the fibres have survived and these had the distinctive cross hatchings and dislocations of bast fibres. The central lumen within the fibres was only occasionally visible. Where seen, this was narrow and the fibre walls appeared thick. This is a feature of flax fibres. However, it is possible that the textiles were made of mixed fibres. For now, these are described as bast fibres, including possible flax (cf. *Linum usitastissimium*). One explanation for the presence of these fragments in a cess deposit is provided by Grigson above,[166] but it is also possible that some material or a garment was accidentally dropped in the pit.

Phase 4: late fourteenth to early sixteenth centuries (sample 19)

None of the samples from Phase 4 were promising.[167] One sample, from an occupation/consolidation deposit (very characteristic of this phase) had mostly wheat grains, a few barley grains, a horse bean and a narrow range of wild species (*Potentilla* sp., *Plantago lanceolata, Plantago* sp., *Carex* sp. and Poaceae). From these remains and the other assessed samples[168] it is clear that the plant-related activities that were seen in Phases 2 and 3 had moved away from this area by the late fourteenth century.

Phase 5: Mid-sixteenth to early seventeenth centuries (Samples 33, 4)

Two samples were analysed from this phase. Sample 33 came from the fill of a drain/flue, which cut through some of the Phase 3 deposits. All four of the main cereals were present but in low numbers. There was virtually no cereal chaff. One horse bean was recovered and there were a few wild species (*Vicia/Lathyrus*, *Melilotus/Medicago/Trifolium*, Fabaceae, *Rumex* spp., Caryophyllaceae, *Galium aparine* and Poaceae). In retrospect, it seems likely that some if not all of the plant material here was derived from Phase 3 deposits, so this is not discussed in great detail here.

[164] G. Grigson, *The Englishman's Flora* (St Albans, 1975).
[165] Caitling and Grayson, *Identification of Vegetable Fibres*.
[166] Grigson, *The Englishman's Flora*.
[167] Boardman, 'Charred Mineralised and Waterlogged Plant Remains and Wood Charcoal, in Teague, 'Lincoln College 2012. Post-excavation Assessment and Project Design'.
[168] ibid.

The other Phase 5 sample was sample 4, from an ashy hearth fill (2200). Again, all four main cereals were present, mostly as moderate amounts of grain. Free-threshing wheat and hulled barley were the most frequent. Cereal chaff included rye, bread wheat type and indeterminate wheat rachis internodes (Tables 13.2 and 13.3), and there were a few cereal and cereal/grass culm nodes. A single pea and a seed of bean/vetch/pea/wild vetch (*Vicia*/*Pisum/Lathyrus*) were present. Charred fruit and nut remains included various grape and probable grape remains (pips, fruit, pedicle), an apple/pear pip, a possible hawthorn stone fragment and hazel nut shell fragments. The largest group of remains among the wild species were the leaf buds. These suggest that young brushwood of oak (*Quercus*), in bud, plus possibly that of other tree/shrub species, was burnt in the hearth. Bracken (*Pteridium aquifolium*) fragments were also present here and in sample 33 (above). There were seeds of a now familiar range of wild legumes (*Vicia/Lathyrus*, *Melilotus/Medicago/Trifolium*, Fabaceae), plus sedges (*Carex* sp.) and various grass (Poaceae) remains. The remainder of the wild taxa were ruderals and catholic weeds that may have grown on site, in gardens or possibly with some of the crops (e.g. *Euphorbia helipscopia* and the Polygonaceae). While this sample had fewer remains than the Phase 3 samples, the small assemblage provides a hint that local agriculture did not change between the fourteenth and sixteenth or seventeenth centuries.

Conclusions

The charred plant evidence has shown that several cereal species were cultivated during the various phases, including bread wheat and rivet wheat, hulled six-row barley and rye. Cultivated oat is also presumed to be present as this has been widely recovered elsewhere in Oxford during these periods. While most cereal crops probably reached towns in processed or part-processed form in the medieval period, the evidence from the Phase 3 samples here shows that whole cereal crops (in particular rye) and significant quantities of other early crop-processing waste (cereal rachises, awns, straw), were reaching the town in the early to mid-fourteenth century. This material is normally removed from the grain early on in processing, through threshing and winnowing, which generally take place close to cultivated fields as whole cereal crops are bulky and difficult to transport. The by-products of winnowing (straw, chaff, wild plants) may be traded, as they provide valuable fodder, bedding, thatching materials and so on, and this may account for some chaff and straw in the samples. However, the possibility that some rural crop processing activities were taking place in this part of the town in the fourteenth century remains possible. Parallel work on the wood charcoal for this period (see Boardman below) does not point to a shortage of suitable wood fuels for the ovens or kilns.

The samples produced a range of other cultivated plants including peas, small horse beans, flax and possible black mustard, plus several wild and cultivated fruits/nuts. None were particularly remarkable; all are known from other sites in Oxford for these periods, and the types of remains do not point to such plants being cultivated or processed in this part of the town, although some may have been. Some small fragments of mineralised textile were also recovered and these seem to include some flax fibres, so there is a possibility that such goods were produced somewhere in Oxford or the surrounding area in this period. Similar fragments

were recovered from cess deposits at other sites, most recently at Gloucester Priory,[169] so their use as lavatory paper is quite likely.

[169] Rebecca Nicholson (pers. comm.).

Table 13.3. Results of the plant remains analysis

Sample No.		**50**	**18**	**44**	**45**	**46**	**31**	**34**	**35**	**41**	**39**	**47**	**19**	**33**	**4**
Context		2640	2260	2502	2499	2517	2082	2397	2409	2429	2413	2573	2296	2385	2200
Feature			2259	2477	2477	2525	2075	2398	2398			2572		2387	2051
Feature type		Pit fill	Pit fill	Pit fill	Pit fill	Slumping pit fill	Pit fill	Fill of bread oven	Fill of bread oven	Charcoal spread below oven 2426	Charcoal spread	Cessy pit fill	Occupat. / consolid.	Fill of drain	Ashy hearth fill
Phase		1	1	1	1	1	2	3	3	3	3	3	4	5	5
Period		L11th-E13th C	L11th-E13th C	L11th-E13th C	L11th-E13th C	L11th-E13th C	E-L13th C	E-M14th C	E-M14th C	E-M14th C	E-M14th C	E-M14th C	L14th-E16th C	M16th-E17th C	M16th-E17th C
Sample vol. (L.)		50	38	39	40	20	20	40	35	40	30	18	30	30	40
Flot fraction		>0.25 mm	>0.25 mm	>0.25 mm	>0.25 mm	>0.25 mm	>0.25 mm	>0.25 mm	>0.25 mm	>0.25 mm	>0.25 mm	>0.25 mm	>0.25 mm	>0.25 mm	>0.25 mm
% sorted		100	100	50	50	50	100	100	25	100	100	100	50	100	100
Cereal grain															
Hordeum vulgare L.	barley, hulled asymmetric	1	9	4	2		3	54	7		5				24
Hordeum vulgare L.	barley, hulled symmetric		3	1	8		5	37	7	1	2				13
Hordeum vulgare L.	barley, hulled	4	13	14	1	2	5	233	51	11	16	2	2	4	51
Hordeum vulgare L.	barley	2	2	2	1		2	15	3	1	1				4
cf. *Hordeum sp*.	cf. barley		2	2		2			1						
Secale cereale L.	rye	4					14	704	322	29	13			2	34
cf. *Secale cereale* L.	rye	1	1				1	181	35	4	11			1	17
Secale/Triticum	rye/wheat	2		3			4	69	131	14	14				
Avena sp.	oats	17	1	15	10		86	15	9	2	9	2		3	26

Sample No.		**50**	**18**	**44**	**45**	**46**	**31**	**34**	**35**	**41**	**39**	**47**	**19**	**33**	**4**
cf. *Avena* sp.	cf. oats		2	6			2	15	4	8	3			1	3
Triticum aestivum/ turgidum	free threshing wheat, bread wheat type/rivet wheat type	25	74	77	26	13	8	1968	160	29	127	2	9	18	124
Triticum sp.	wheat	2		6	5		6	60	30	2	40	2		4	
cf. *Triticum* sp.	cf. wheat	1	2		5	3	3	8	9	78	19			4	1
Cerealia	indet. cereal	28	24	22	19	2	6	552	303	238	102	3	3	19	109
Cerealia	detached cereal embryo								15						+
Cerealia/Poaceae	cereal/large grass		1				1		1		1		2		
Chaff and straw															
Hordeum vulgare L.	barley, six-row rachis internode								7						
Hordeum sp.	barley, rachis internode							3	14						
cf. Hordeum sp.	cf. barley, rachis internode							1							
Hordeum vulgare L.	barley, lemma base, lax-eared								1						
Hordeum/Secale	barley/rye, rachis internode						1	14	6	4					
Secale cereale L.	rye, rachis internode						1	74	264	20	4				11

Sample No.		**50**	**18**	**44**	**45**	**46**	**31**	**34**	**35**	**41**	**39**	**47**	**19**	**33**	**4**
cf. *Secale cereale* L.	cf. rye, rachis internode							15	9		1F				3
Avena sp.	oats, floret							2							
Hexaploid wheat - *Triticum aestivum* s.l.	bread wheat, rachis internode							6	75		12				
Triticum cf. *aestivum type*	cf. bread wheat, rachis							32			28			1F	3
Tetraploid wheat - *Triticum turgidum* type	rivet wheat, rachis internode								4						
Triticum cf. *turgidum* type	cf. rivet wheat, rachis							6							
Triticum sp.	wheat, rachis internode						4F	66	9	12	1			1F	3
Cerealia	cereal, rachis internode							13	41	8	12				Fs
Cerealia	cereal, basal rachis internode								5						
Cerealia	cereal, culm node	1					2	105	36	8	1				2
Cerealia	cereal, culm base					1		3							
Cerealia/Poaceae	cereal/grass, culm node							47			4			4	4
Cerealia	charred & silicified awns/frags.							+++	+++						
Cultivated legumes															

Sample No.		**50**	**18**	**44**	**45**	**46**	**31**	**34**	**35**	**41**	**39**	**47**	**19**	**33**	**4**
Pisum sativum L.	pea	1						9	1						1
cf. *Pisum sativum* L.	cf. pea						1		1	16			1	1	
Vicia faba L. var. *minor*	small horse bean/field bean						1			10 + Fs	1				
Vicia cf. *faba*	cf. horse bean		1F				Fs			6	4 + 11F				
Vicia/Pisum/Lathyrus	bean/vetch /pea/wild vetch	5 + Fs	1	2.5	1+Fs	1	3 + 4F	8 + Fs	12 + Fs	35+120+ F	12.5 + 45F			4 + Fs	1
Vicia/Pisum/Lathyrus	bean/vetch /pea/wild vetch, sprouted embryo							1							
Oil/fibre crops															
Linum usitatissimum L.	linseed/flax		1												
cf. *Linum usitatissimum*	linseed/flax				1										
Brassica cf. *nigra*	cf. black mustard							1							
Fruits and nuts															
Vitis vinifera L.	grape, pip														3+Fs
cf. *Vitis vinifera*	grape, small whole fruit														1
cf. *Vitis vinifera*	cf. grape, pedicel														2
Malus/Pyrus (Malus type)	apple/pear, apple type											1			1
Crataegus monogyna Jacq.	hawthorn, fruit											1			

Sample No.		**50**	**18**	**44**	**45**	**46**	**31**	**34**	**35**	**41**	**39**	**47**	**19**	**33**	**4**
Crataegus monogyna Jacq.	hawthorn, stone											1			
cf. *Crataegus* sp.	cf. hawthorn, stone fragment														1F
Corylus avellana L.	hazelnut shell/fragments (F)		6F	5F	6F	9F	16F			1F	5F			1F	7F
Indet.	fruit/nut shell fragment													1F	
Wild species															
Pteridium aquilinum (L.) Kuhn.	bracken, frond fragments													2F	2F
Chelidonium majas L.	greater celandine							4							
Ranunculus sp.	buttercup						4								
Vicia/Lathyrus sp. >3 mm	vetch/vetchling/tare, etc	2	1			1		8		1	18.5			0.5	3
Vicia/Lathyrus 2-3 mm	vetch/vetchlings/tares etc	5					35	2	2	35 + Fs	3.5				
Vicia/Lathyrus <2 mm	vetch/vetchlings/tares etc	3					14	59	3	10				2	3
Medicago lupulina L.	black medick							27	12						
Medicago cf. *lupulina*	cf. black medick							16	4						
Melilotus /Medicago/Trifolium	mellilot/medick/trefoil		1F		1		40	12	26	13	12			4	15
Melilotus/ Medicago/Trifolium	mellilot/medick/trefoil, large						5								

Sample No.		50	18	44	45	46	31	34	35	41	39	47	19	33	4
Fabaceae	pea family						5	7							12
Fabaceae	pea family, pod frag.							1F	65+					2	3
cf. Fabaceae	cf. pea family							2			1				
Potentilla sp.	cinquefoil												1		
Euphobia helioscopia L.	sun spurge														3
Quercus sp.	leaf buds														*c.* 30 + Fs
Malva sylvestris L.	common mallow						16								
Malva cf. *sylvestris*	cf. common mallow						8								
Malva sp.	mallow						111								
cf. *Malva* sp.	cf. mallow						32								
Brassica/Sinapis	cabbage/mustard						25	1	1	1	4				
Brassicaceae	cabbage family							2	1	1	8				
Brassicaceae	cabbage family, siliqua														1
Persicaria maculosa Gray	red shank, persicaria										1				
Persicaria sp.	persicaria/ bistort						1								
Polygonum aviculare L.	knotgrass			1			11	1							1
Fallopia convolvulus (L.) A. Love	black bindweed		1				2								Fs
cf. *Fallopia convolvulus*	cf. black bindweed							1							
Rumex acetosella L.	sheep's sorrel				2		24								5
Rumex cf. acetosa L.	cf. common sorrel							4							

Sample No.		50	18	44	45	46	31	34	35	41	39	47	19	33	4
Rumex sp.	dock	1					16	48	5	2	9			6	5
Rumex sp.	dock, tubercle						1								
Polygonaceae indet.	knotweed family							1							
Stellaria/Cerastium	stitchwort/ mouse-ear								2						
Agrostemma githago L.	corncockle, seed							4							
Agrostemma githago L.	corncockle, capsule segs.							2							
Silene sp.	catch fly								1						
Caryophyllaceae indet.	pink family						13							2	
Chenopodium album L.	fat hen						12		1						
Chenopodium sp.	goosefoot			2	1		20				2				
Chenopodium/Atriplex	goosefoot/ orache				1		12								
Galium aparine L.	goosegrass, cleavers							2	1		4			1	
Plantago lanceolata L.	ribwort plantain						7						1		
Lamiceae indet.	dead-nettle family, small								2						
Centaurea cyanus L.	cornflower							5			4				
Centaurea sp.	knapweed							2	1						
cf. *Centaurea* sp.	cf. knapweed						1F				1F				
Anthemis cotula L.	stinking mayweed						81				4				
cf. *Anthemis cotula* L.	cf. stinking mayweed						88		2		8				

Sample No.		**50**	**18**	**44**	**45**	**46**	**31**	**34**	**35**	**41**	**39**	**47**	**19**	**33**	**4**
Asteraceae	daisy family, small						49	2							
Valerianella dentata (L.) Pollich	narrow-fruited cornsalad						4								
cf. *Apium* sp.	cf. marshwort				1F										
Apiaceae indet.	carrot family								1						3
Eleocharis palustris (L.) Roem. & Schult.	common spike-rush						16								
Carex sp. (trigonous)	sedge, 3-faced						6						1		6
Carex sp. (biconvex)	sedge, 2-faced						49								
Poaceae	grass, small						48		1	8			1	2	
Poaceae	grass, medium	1									4				
Poaceae	grass, large													1F	3F
Poaceae	culm node	1					24	7	36	19				2	12
Other															
Indet.	seed/fruit						30	4	8	12			3 + Fs	8	8 + Fs
Indet.	leaf bud						17	2		4					50+ Fs
Indet.	nutshell fragment									1F					1
Indet.	storage organ							2F						1F	
Indet.	capsule fragment							2F							
Indet.	culm fragment							23F							
Anguina tritici	earcockles							4 + 5F							

Sample No.		**50**	**18**	**44**	**45**	**46**	**31**	**34**	**35**	**41**	**39**	**47**	**19**	**33**	**4**
Cenococcum geophyllum	fungal sclerotia, charred			+			++	+			+		+		*
Mineralised remains															
Hordeum vulgare L.	hulled barley grain											1			
Avena sp.	oat grain											1			
Cerealia	indet. cereal grain											1			
Cerealia	indet. chaff fragments											3F			
Cerealia/Poaceae	culm nodes											2			
cf. *Vicia faba* L. var. *minor*	cf. small horse bean											1			
Vitis vinifera L.	grape											1			
Melilotus /Medicago/Trifolium	mellilot/medick/trefoil											2			
Viica/Lathyrus	vetch/vetchling/tare, etc						1		1						
Prunus sp.	small (sloe/cherry) fruit kernel											3			
cf. *Prunus* sp.	cf. small (sloe/cherry) kernel											5F			
Malus/Pyrus	apple/pear											5F			
cf. *Malus/Pyrus* sp.	cf. apple/pear											2F			
Prunus/Malus/Pyrus	sloe/cherry kernal or degraded											12F			

Sample No.		50	18	44	45	46	31	34	35	41	39	47	19	33	4
	apple/pear pip														
cf. *Prunus/Malus/Pyrus*	cf. sloe/cherry/apple/pear											5F			
Fragaria spp.	strawberry											4			
Fragaria/Potentilla	strawberry/cinquefoil											4			
Potentilla sp.	cinquefoil											3			
Rhamnus cathartica L.	purging buckthorn											1			
cf. *Linum usitatissumum*	cf. linseed/flax											1 + F			
Malva sp.	mallow											1			
Brassica/Sinapis	cabbage/mustard, etc.											4 & Fs			
Rumex sp.	dock											1			
Polygonaceae	knotweed family											1			
cf. Caryophyllaceae	cf. pink family											1F			
Galium sp.	bedstraw											1			
Lithospermum arvense L.	field gromwell							17	3	5					
Plantago lanceolata L./media L.	ribwort/hoary plantain											2			
cf. Lamiaceae	cf. dead-nettle family											1			
Rhinanthus sp.	yellow-rattle											1			
Foeniculum vulgare Mill.	fennel											1			

Sample No.		50	18	44	45	46	31	34	35	41	39	47	19	33	4
cf. *Foeniculum vulgare* Mill.	cf. fennel											1			
Apium sp.	marshwort											1			
Apiaceae	carrot family											1			
Poaceae	grass, small											1			
Poaceae	grass, large	1													
Indet.	large fruit/seed		5F									1			
Indet.	seed/fruit						2 + Fs					5 + Fs			
Indet.	catkin											2F			
Mineralised textile frags. incl. cf. *Linum usitatissimum*	bast fibre textile incl. cf. flax fibres											6F			
Mineralised cists												2			
Thoracocaeta zosterae	seaweed fly pupae/puparia											+++			
Other insect remains												++			
Mineralised wood												+++			
cf. Coprolite frags.												++			
Worm eggs/frags.												++			
Bone frags												+			
Cessy lumps												+++			
Limestone coral frag.	fossil											+			
Quantity codes: + - present; ++ - in moderate quantities; +++ - abundant															

14 WOOD CHARCOAL *BY SHEILA BOARDMAN*

Introduction

Of the 49 samples assessed for wood charcoal and other plant remains (see Boardman above), 27 were selected for charcoal analysis. This was a combination of full analysis, of 100+ charcoal fragments per sample (for 16 samples), and rapid analysis of 50–76 fragments (11 samples). This was expanded from the original recommendations, to include more samples and/or material from the metalworking hearths and associated deposits. In addition to the fully and rapidly analysed samples, the assessment results for a further 14 samples (with identifications of 20–36 charcoal fragments) have been included for comparative purposes.

The numbers of samples per phase, the different levels of analysis and assessment, and types of deposits sampled are summarised in Table 14.1. The wood charcoal investigation was undertaken in order to answer the following questions:

- What were the preferred fuels in use in the different phases at the site?
- Were different fuels used for industrial and domestic purposes?
- Is there evidence for building materials or other non-fuel wood uses?
- Does the wood charcoal provide evidence for how different features were used?
- Do trends in wood and fuel use reflect wider changes taking place in Oxford, the local or regional landscape or further afield?
- Is there evidence for trade in wood and charcoal?

Table 14.1. Summary results of the wood charcoal analysis

Phase	Analysis type (see Key)	No. of samples	Fragments identified/ sample	Sample volumes (L.)	Feature types
1	Full	2	104, 105	30-37	Pits
1	Rapid	2	55, 56	38-40	Pits
1	Assessment	3	20-21	20-39	Pits
2	Rapid	1	60	20	Pit
3	Full	2	103, 104	35-40	Hearth/furnace and oven
3	Rapid	5	53-61	9-40	Pits, charcoal spread and oven
3	Assessment	3	20-27	1-37	Fill of structure, stake-hole occupation/ levelling deposits
4	Full	4	100-133	7-30	Metalworking hearth, possible floor, occupation/consolidation deposits.
4	Rapid	1	60	9	Charcoal layer
4	Assessment	5	21-35	10-40	Levelling, occupation/ consolidation deposits
5	Full	8	100-115	1-40	Levelling, metalworking hearths and associated debris, occupation deposits

5	Rapid	2	54-56	10-20	Metalworking hearths
5	Assessment	3	21-23	8-36	Pit, drain, demolition deposit
Key: Full analysis - of 100-133 frags/sample; Rapid analysis - of 53-61 frags/sample;					
Assessment - typically of 20-35 frags/sample					

Methods

The samples were processed and initially assessed using the methods described by Boardman (above). For the charcoal analysis, the flots were dry sieved at 4mm and 2mm. Individual charcoal fragments were extracted, fractured by hand and sorted into groups based on the features observed in the transverse sections, at magnifications of x10–40. Sub-samples of these were then fractured longitudinally, along their radial and tangential planes, and examined at magnifications of up to x400, using a Brunel SP400 metallurgical microscope with brightfield/darkfield illumination. Identifications were made using a modern slide reference collection held by OA, and keys by Hather, Gale and Cutler, and Schweingruber.[170] Julia Meen assisted with the identification of the wood charcoal. Plant nomenclature follows Stace.[171]

Results

The most common taxa overall were beech (*Fagus sylvatica*), oak (*Quercus*) and hawthorn group (Pomoideae). The latter may include hawthorn (*Crataegus*), crab-apple (*Malus*), pear (*Pyrus*) and/or rowan/whitebeam/service (*Sorbus*) species. Hazel (*Corylus avellana*) charcoal was also widely present. The other identified taxa were blackthorn/cherry (*Prunus* sp.), blackthorn/plum (*Prunus spinosa/domestica*) type, ash (*Fraxinus excelsior*), field maple (*Acer campestre*), elm (*Ulmus*), willow/poplar (*Salix/Populus*), alder/hazel (*Alnus/Corylus*), buckthorn (*Rhamnus cathartica*), holly (*Ilex aquifolium*), birch (*Betula*), alder buckthorn (*Frangula alnus*), alder (*Alnus glutinosa*), legume (Fabaceae) wood and dogwood (*Cornus*) (Tables 14.2–6 and Graphs 14.1–8).

The fully and rapidly analysed samples (hereafter called 'analysed samples') had an average 6.6 taxa groups per sample, so were quite mixed. One Phase 3 sample (35) and three Phase 5 samples (4, 6, 8) had 10 or more charcoal taxa, while only two (Phase 4) samples (25, 10) had three or fewer taxa. The results from the analysed samples are summarised in Graphs 14.1 and 14.2. When the analysed and assessed samples were combined there were 5.4 taxa per sample. Table 14.6 provides a summary of presence/absence of taxa in all the samples (analysed and assessed), highlighting the dominant/co-dominant taxa in each. Beech dominated in 14 of the analysed samples (see above). This was followed by oak (seven samples), hawthorn group (three samples), oak with beech (two samples) and hazel with hawthorn group (one sample). The assessed samples were dominated by beech (seven samples), oak (two samples), hawthorn group (one sample) or hawthorn group with hazel (one sample).

[170] J. G. Hather, *The Identification of Northern European Woods: a Guide for Archaeologists and Conservators* (London, 2000); R. Gale and D. Cutler, *Plants in Archaeology: Identification Manual of Vegetative Plant Materials used in Europe and the Southern Mediterranean to c. 1500* (Otley, 2000); F. H. Schweingruber, *Microscopic Wood Anatomy*, 3rd edn (Birmensdorf, 1990).
[171] C. Stace, *New Flora of the British Isles*, 3rd edn (Cambridge, 2010).

Phase 1 (Table 14.2; Graph 14.3)

The eight late eleventh- to early thirteenth-century samples all came from pit fills. Five samples were fully or rapidly analysed, while three were assessed. Samples were dominated by oak, hawthorn group, or jointly by hazel and hawthorn group charcoal. The other taxa were blackthorn/cherry, blackthorn/plum type, field maple, beech, holly, elm, ash and willow/ poplar. Oak charcoal included heartwood, sapwood and roundwood, with slightly more heartwood overall. Roundwood from a number of taxa was also recorded, including hazel, hawthorn group, blackthorn/cherry and blackthorn/plum type. The maturity of the hazel roundwood, the most common taxon, is summarised in Graph 14.3. Most frequent were fragments with around 5 or 8–9 growth rings. The roundwood diameters (not shown on Graph 14.3) were 3–11mm.

Phase 2 (Table 14.2; Graph 14.4)

One sample (31) from the early to late thirteenth century was rapidly analysed and produced small amounts of oak charcoal (including roundwood, sapwood and heartwood) and a few fragments of beech, hazel and hawthorn group roundwood. The numbers of growth rings on the hawthorn group roundwood fragments varied from 6 to 12. These results are summarised in Graph 14.4, together with hawthorn group charcoal from the Phase 3 samples (below).

Phase 3 (Table 14.3; Graph 14.4)

Of the 10 early to mid-fourteenth-century samples investigated, seven were fully or rapidly analysed and three were assessed. They were from a mixture of domestic and industrial features, including fills of a metalworking hearth (sample 17), an oven (34, 35), charcoal spreads (39, 41), pits (37, 38), a stake-hole (42), a structure (48) and a levelling/occupation deposit (1). Three analysed samples (17, 39, 3) and one assessed sample (17) were dominated by beech. Two analysed samples (37, 41) and two assessed samples (48, 41) were dominated by hawthorn group, and two analysed samples (38, 35) by oak. Unusually, the least mixed deposits (with three or four taxa) were from a levelling deposit (1), the primary fill of structure 2488 (48) and a possible stake-hole 42), but this may be a reflection of the low numbers of fragments assessed for these samples. The analysed samples had between 5 and 11 taxa. Birch was present for the first time in an oven sample (35), but definite alder was absent. Otherwise, the range of taxa was identical to that from Phases 1–2. The mix of material in the stake-hole sample (42), including roundwood, suggests this is probably fuel waste rather the structural wood burnt *in situ*.

As in Phase 1, the oak charcoal was mixed but there was slightly more heartwood overall. The hawthorn group roundwood fragments from Phases 2 and 3 (Graph 14.4) had mostly 9–10, or 14–15 growth rings. No diameter measurements were collected. This was also the first phase with moderate to large numbers of beech fragments. Beech roundwood fragments as compared to timber ones varied from zero in samples 34 and 39, to 33% and 60% roundwood in samples 17 and 1 respectively. Despite reasonable quantities of roundwood being present in some samples, data on roundwood diameters and the numbers of growth rings could only be collected in a handful of beech fragments. These had diameters of 7–11 mm, with 7–14 growth rings.

Phase 4 (Table 14.4; Graphs 14.5–6)

Of the 10 samples from the late fourteenth to early sixteenth century, four were fully analysed, one was rapidly analysed and five were assessed. One sample (32) came from a fill of a possible metalworking hearth (2388). Another sample (10) came from below the Phase 5 metalworking hearth (2051), so may include debris from this. The remaining samples came from a possible floor (25), a gravelly charcoal layer (24) and a series of occupation/ consolidation layers (28, 21, 19, 15, 15). Again, contrary to expectations, the occupation/ consolidation layers had relative few charcoal taxa, suggesting they were discrete dumps of material rather than mixed fuel debris from a range of activities.

Nine of 10 samples were dominated by beech, although one (sample 32) had similar proportions of beech and oak. The other sample was dominated by hawthorn group charcoal. In general, there was markedly less hawthorn group or hazel charcoal, as compared to the Phase 1–3 (or Phase 5) samples. With the exception of the oak-rich sample (32), there were few fragments of taxa other than beech in these samples. Birch was also present in sample 32. Beech roundwood varied from 25–50% of total beech fragments, although one assessed sample (28) only had beech timber. The numbers of growth rings and diameters of the beech roundwood charcoal recovered are summarised in Graphs 14.5–6. The numbers of growth rings recorded varied from 6–30, and there were peaks in the numbers of fragments in at 7 and 10 rings, with a mini peak at 14–15 rings (Graph 14.5). The curve for beech roundwood diameters in Graph 14.6 is much smoother. Nearly 80% of the fragments had diameters of 4.5–11.5mm.

Phase 5 (Table 14.5; Graphs 14.7–8)

Of 13 samples from the mid-sixteenth to early seventeenth century, eight were fully analysed, two were rapidly analysed and three were assessed. Four of the analysed samples (22, 30, 7, 4) came from three metalworking hearths (features 2332, 2383, 2051). Another four samples (2, 8, 6, 5) came from hearth-related contexts, mixed with probable occupation debris. The other sampled deposits were pit fill(s) (3), a drain (35), which cut through earlier hearths and the Phase 3 oven, a demolition deposit (9) and two occupation deposits (14, 13).

Ten of 13 samples (including the three assessed ones) were dominated by beech, two (6, 7) by oak and one (8) by beech and oak (Table 14.5). Oak was present in moderate quantities in most samples, and low numbers of hawthorn group and hazel fragments were again widely present. New taxa included buckthorn (*Rhamnus cathartica*), alder buckthorn (*Frangula alnus*), dogwood (*Cornus*) and legume (Fabaceae) wood – the latter most likely gorse (*Ulex*) or broom (*Cytisus*). Dogwood and legume wood were represented by single fragments. The other taxa present in the Phase 5 samples were blackthorn/plum type, blackthorn/cherry, elm, alder/ hazel, alder, willow/ poplar, field maple, ash and holly.

In the beech dominated samples, roundwood fragments accounted for 30–70% of total beech fragments, although 50–60% roundwood was most common. Also, one sample (2) had only beech timber. Oak timbers were dominated by heartwood, but sapwood and occasional roundwood fragments were again recorded. The maturity and sizes of the beech roundwood fragments are summarised in Graphs 14.7–8. Most frequent were fragments with 7–9 growth rings (Graph 14.7) (as compared to the multiple peaks in the Phase 4 samples), while more than 90% of the Phase 5 fragments had diameters of 4.5–12 mm. This may point to an increasing standardisation of the ages and sizes of the roundwood harvested (e.g. from short

cycle coppice) or collected in beech woodlands, for transportation and trade with local urban settlements. In addition a loss of weight on charring (commonly by 50–75%), shrinkage by 30% or more commonly occurs, but this is uneven, with greater shrinkage in the tangential as compared to radial plane.[172] This should be borne in mind when examining roundwood diameters for all the taxa from the site.

Broad trends in the assemblage

The Phase 1 samples were dominated by either oak, or hazel and hawthorn group. One Phase 2 sample had mostly hawthorn group charcoal. The Phase 3 samples were the most mixed in terms of the dominant taxa, which included oak, beech and hawthorn group. The Phase 4 samples were mostly beech dominated. Samples from this phase also had the narrowest range of taxa per sample – four or less in all but one (32) of the analysed samples. The more mixed sample came from an industrial hearth and it had nine taxa groups. The Phase 5 samples had proportionally more oak charcoal, as compared to the Phase 4 samples, although 7 of 10 samples were again dominated by beech. The analysed samples from Phase 5 were quite mixed generally, with an average 7.5 taxa/sample, and the widest range of non-*Fagaceae* (beech/oak) charcoal taxa from the site (Tables 14.5–6; Graphs 14.1–2).

Fuels used in industrial and domestic features

Mixtures of timber and roundwood were present throughout the phases. From discussions above, it is clear that both were being used as fuel in domestic and industrial contexts at the site. The main fuel species, oak and beech, both have good thermal capacities so they would have been suitable for most domestic purposes. In the oven samples, a large (or the largest proportion) of the fuels were from timber rather than roundwood. Roundwood may have been used predominantly to increase temperatures quickly. For bread ovens, generally, particular woods were sometimes preferred. Legume wood, in particular small gorse (*Ulex*) roundwood, which cannot be distinguished from broom (*Cytisus*), has been associated with Roman and later bread ovens.[173] Gorse is an abundant shrub that burns with a hot flame and ashes well, leaving little charcoal residue. Only one fragment of legume wood was recovered from these samples, from a Phase 5 ashy hearth fill (sample 4). The oven samples from Lincoln College seem to have a more diverse range of taxa, as compared to the industrial hearth samples.

Five of seven of the samples associated with the Phase 3–5 industrial hearths were dominated by beech, with between 10–75% roundwood. One was dominated by oak heartwood, and one by beech (including *c.* 25% roundwood) with oak (again largely heartwood). The phase with the most hearth samples and other deposits with industrial debris was Phase 5, and this also had the widest range of woody taxa, reflecting a range of different possible environments (including damp ground, possibly acidic conditions, dry woodland on base rich soils, hedgerows, underwood and possible coppice). Thus this material may have come from a variety of areas around Oxford (see below), and some of this may have been in the form of prepared charcoal rather than wood fuels. Unfortunately, it is not possible to tell from wood

[172] R. Gale and D. Cutler, *Plants in Archaeology: Identification Manual of Vegetative Plant Materials used in Europe and the Southern Mediterranean to c.1500* (Westbury and Kew, 2000).
[173] C. Dickson and J. Dickson, *Plants and People in Ancient Scotland* (Stroud, 2000).

charcoal remains, whether the original fuels were wood or wood charcoal. For metalworking, a mixture of wood and charcoal was traditionally used, depending on the processes involved and the temperatures required.[174]

Evidence for building materials and other non-fuel uses

There were no postholes with structural timbers burnt *in situ* and the one stake-hole sample (42) had a mixture of material, including roundwood, so this is also unlikely to contain structural debris. There was no widespread evidence for wattle structures, although it is possible that some of the (small amounts of) Phase 1 hazel roundwood with 3–5 and 7–10 growth rings came from different wattle hurdle elements that were later burnt on domestic fires. In light of this limited evidence, it must be assumed that the majority of the wood charcoal represents fuel debris of various types.

Other sites

During earlier excavations of the kitchen area at Lincoln College, Challinor recorded a beech-dominated sample from a fifteenth-century deposit and suggested beech may have taken over from oak as the main source of fuel around this time.[175] More recent work at 4a Merton Street[176] and Queen's College kitchen[177] has revealed apparently widespread replacement of oak by beech in Oxford. At Merton Street, this also seems to have taken place around the fifteenth century,[178] while at Queen's College, the beech-dominated samples date to the late fifteenth/early sixteenth century, and included predominantly larger roundwood with 15–20 growth rings.[179] In contrast, at recent excavations at Brewer Street, 17 of 18 samples from deposits dating from the late eleventh to the early sixteenth centuries were dominated by oak, or oak charcoal with hawthorn group. The remainder had a mixture of species including beech, hawthorn group, blackthorn/cherry, hazel and oak.[180] It is possible that the Brewer Street assemblage reflects some of the noxious industries taking place in the southern suburb at this time: animal butchery, leather working, textile processing, dyeing, artefact production and metalworking.[181] Oak wood, bark and charcoal were used in many of these industries.[182]

With the exception of the Brewer Street material, few or no pre-fifteenth-century charcoal samples were available for most of the Oxford sites above. Thus, evidence in this report for some beech-dominated samples from early to mid-thirteenth-century deposits onwards is of

[174] Gale, 'Wood-based Industrial Fuels and their Impact in Lowland Britain', pp.30-47.
[175] D. Challinor, 'The Wood Charcoal', in Kamash *et al*., 'Lincoln College, Oxford 1997-2000', pp. 271-4.
[176] Poore *et al*., '4a Merton Street', pp. 211-342.
[177] Norton and Mumford, 'The Queen's College, Oxford', pp. 165-217.
[178] D. Druce, 'Merton College: Charcoal Assessment', unpublished OA archive report (2006); Poore *et al*., '4a Merton Street', pp. 211-342.
[179] D. Challinor, 'The Wood Charcoal', in Norton and Mumford, 'The Queen's College, Oxford', pp. 165-217.
[180] S. Boardman, in S. Teague and B.M. Ford, 'Excavations in Oxford's South Suburb at Brewer Street, Littlegate Street and Rose Place', unpublished OA report (2019).
[181] Dodd, *Oxford before the University*; B. Durham 'Archaeological Investigations in St. Aldate's, Oxford', *Oxoniensia*, 42 (1977), pp. 83-203; M. Robinson, 'Plant and Invertebrate Remains from the Priory Drains', in Lambrick, 'The Second Site of the Dominican Priory, Oxford', pp. 196-201; Poore *et al*., '4a Merton Street'.
[182] R. Gale, 'Wood-based Industrial Fuels and their Impact in Lowland Britain', in P. Murphy and P.E.J. Wiltshire (eds.), *The Environmental Archaeology of Industry. Symposia of the Association for Environmental Archaeology*, Vol. 20 (Oxford, 2003), pp. 30-47.

importance. This falls within an historical period (twelfth to fourteenth centuries) associated with wider changes taking place in southern England, including population increases, expansion of the areas cultivated and widespread fuel shortages.[183] Much of the beech charcoal, at least from Phase 4 onwards, was in the form of roundwood with fairly regular diameters, which points to standardisation in the supply of fuel wood to the medieval town. The possibility that some of this material came from coppiced woodland is discussed below.

The local and regional landscape and trade in wood and charcoal

The trees and shrubs represented in the charcoal assemblage are all native to Britain and many have been recovered from Anglo-Saxon, medieval and later deposits in Oxford (see above) and further afield.[184] Thus, a local origin is possible for much of the woody taxa, particularly from the earlier phases. Only beech is presumed to have come from further afield, probably from the beech forests of the Chilterns to the south and east of Oxford. However, the introduction of beech into Oxford may also mark increased organisation in the regional wood fuel trade more generally.

In his account of medieval woodland in the Chilterns, Roden notes that assarting had largely ended by 1300, possibly in part due to the high value of fuel wood.[185] The Chiltern woodlands were comprised of high beech, oak and ash forest, and underwood, predominately of beech, and also hazel, cherry, field maple, wych elm, oak and ash in different locations.[186] Regional trade and longer distance trade down the Thames to Southwark was predominantly in fuel wood rather than large timbers for building. The value of the fuel wood trade may have protected the central and southern Chiltern woodlands from widespread change for up to 300 years.[187] Private (as opposed to common) woods were especially valued for fuel. Early woodland management seems to have included some limited selective felling but not widespread coppicing, prior to the late fifteenth century/early sixteenth century. In the north-eastern Chilterns, the woodlands were under more pressure and coppicing was widely used by 1400. By the sixteenth century, with renewed clearances for cultivation and expanding timber sales, coppicing became the norm everywhere. Beech became ever more prominent and the rise of the furniture trade led to the conversion of woodlands to high beech forests after around 1800. [188]

The beech wood reaching the Lincoln College deposits from the late fourteenth century was probably in the form of (waste) timber and faggots. The latter are bundles of (similar sized) twiggy wood or roundwood. The lengths and sizes of wood and bundles later became standardised.[189] The mix of different ages of roundwood in the samples up to Phase 4 points

[183] Gale, 'Wood-based Industrial Fuels and their Impact in Lowland Britain', pp.30-47; J.A. Galloway, D. Keene and M. Murphy, 'Fuelling the City: Production and Distribution and of Firewood and Fuel in London's Region, 1290-1400', *Economic History Review*, 69(3) (1996), pp. 447-72.
[184] W. Smith, *A Review of Archaeological Wood Analyses in southern England*, Centre of Archaeology Report, 75/2002 (2002).
[185] D. Roden, 'Woodland and its Management in the Medieval Chilterns', *Forestry*, 41(1) (1968), pp. 59-71.
[186] P.G. Preece, 'Medieval Woods in the Oxfordshire Chilterns', *Oxoniensia*, 55 (1990), pp. 55-72.
[187] Roden, 'Woodland and its Management in the Medieval Chilterns'.
[188] Ibid.
[189] P. Preece, 'Firewood in the Oxfordshire Chilterns', *SOAG Bulletin*, No. 58 (2003), pp. 26-8.

to faggots cut from felled timbers, underwood, hedges or similar, rather than from similar aged coppice. However, different sized faggots may reflect different uses, the spent fuel from which later became mixed in refuse deposits. It is interesting that more mature roundwood, with 15 to 20 growth rings, as seen at Queen's College kitchen, was not apparently present in the Lincoln College samples with their industrial hearts/furnaces.[190] The Queen's College roundwood sizes would appear to correspond to the large faggots/kiln faggots/bavins (of at least 15 years' growth) sold in the region for use in furnaces, brick and tile kilns and so on.[191] In terms of markets selling wood fuels in medieval Oxford, in *c.* 1370, timber, faggots and charcoal were all sold on the High Street, with other wood sellers working in Northgate Street and St Aldates Street.[192]

Conclusions

Investigation of the wood charcoal has provided new evidence for the range of fuels used in domestic and industrial deposits, from possibly the late eleventh to the early seventeenth centuries. The assemblage sheds new light on the shift in fuel wood supplies, with beech replacing oak, and why this may have occurred, as well as a developing regional trade in fuel wood. On current evidence, it seems probable that much of the beech roundwood recovered from samples in Oxford, from deposits pre-dating *c.* 1600, are likely to have come from collected material (e.g. from underwood, hedges, felling/gleaning faggots, etc.), rather than from coppiced beech woodland managed on strict cycles. Its will be interesting to see whether this picture stands up with further work.

[190] Challinor, 'The Wood Charcoal', in Norton and Mumford, 'The Queen's College, Oxford', pp. 165-217.
[191] Preece, 'Medieval Woods in the Oxfordshire Chilterns'; Preece, 'Firewood in the Oxfordshire Chilterns'.
[192] Chance *et al*., *A History of the County of Oxford*, pp. 305-12, http://www.british-history.ac.uk/vch/oxon/vol4/pp305-312 (accessed March 2015).

Table 14.2. Results from Phase 1

Site Code		OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12
Sample No.		18	50	46	43	52	44	51	31
Context		2260	2640	2517	2433	2601	2502	2623	2082
Feature		2259	2636	2525	2434	2477	2477	2617	2075
Phase		1	1	1	1	1	1	1	2
Period		Late 11th-early 13th C	Late 11th-early 13th C	Late 11th-early 13th C	Late 11th-early 13th C	Late 11th-early 13th C	Late 11th-early 13th C	Late 11th-early 13th C	Early-late 13th C
Description		Pit fill	Pit fill	Fill of possible pit	Pit fill	Pit fill	Pit fill	Upper fill of ?quarry pit	Pit fill
Sample Vol. (litres)		38	30	20	40	37	39	35	20
Analysis type/Assessment		Rapid	Full	Assess.	Rapid	Full	Assess.	Assess.	Rapid
Rosaceae									
Prunus spinosa/domestica type	blackthorn/plum type		5r						
Prunus sp.	blackthorn/cherry, etc.	2	1r	1	3	1			3
cf. *Prunus* sp.	cf. blackthorn/cherry, etc.	1							
Pomoideae (see below)	hawthorn group	5r	33r	6r	2	4		1	37r
cf. Pomoideae	cf. hawthorn group		1	2			1	1	
Ulmaceae									
Ulmus	elm					2			
Fagaceae									
Fagus sylvatica	beech		1r		4	3		1	1r
Quercus	oak	30h	19rhs	3s	27hsr	63hsr	13hr	15rh	6rsh
Betulaceae									

Corylus avellana	hazel	4r	34r	5r	17r	27r	4r	3r	9r
Alnus glutinosa	alder						1		
Alnus/Corylus	alder/hazel		1	2		1			
Salicaceae									
Salix/Populus	willow/poplar	1							
Sapindaceae									
Acer campestre	field maple		4r			2	1		2r
cf. *Acer campestre*	cf. field maple				1				
Oleaceae									
Fraxinus excelsior	ash					1r			
Aquifoliaceae									
Ilex aquifolium	holly		1		1				
Indet. charcoal fragments		3	4	1		1	1		2b
Total fragments		56	104	20	55	105	21	21	60
KEY: Counts include: h - heartwood; s - sapwood; r - roundwood; b- bark.									
Pomoideae inc: Pyrus (pear), Malus (apple), Crataegus (hawthorn) & Sorbus (rowan, service, whitebeam).									

Table 14.3. Results from Phase 3

Site Code		OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12
Sample No.		17	1	38	48	42	37	39	41	35	34
Context		2152	2145	2414	2598	2436	2407	2413	2429	2409	2397
Feature		2289/2285		2416	2466	2441	2415			2398	2398
Phase		3	3	3	3	3	3	3	3	3	3
Period		Early-mid 14th C	Early-mid 14th C	Early-mid 14th C	Early-mid 14th C	Early-mid 14th C	Early-mid 14th C	Early-mid 14th C	Early-mid 14th C	Early-mid 14th C	Early-mid 14th C
Description		Metal working hearth/ furnace - fill & structure	Levelling/ occupation deposit?	Ashy pit fill	Primary fill (cess & gravel) of Structure 2488	Fill of possible stake-hole	Ashy pit fill	Extensive charcoal spread	Charcoal below bread oven 2426	Fill of bread oven 2398	Fill of bread oven 2398
Sample Vol. (litres)		40	20	9	37	1	20	30	40	35	40
Analysis type/Assessment		Full	Assess.	Rapid	Assess.	Assess.	Rapid	Rapid	Rapid	Full	Rapid
Rosaceae											
Prunus spinosa/domestica type	blackthorn/plum type	1		7r			5r		2r	8r	3
Prunus sp.	blackthorn/cherry, etc.		2	4			3	1	4r	5	7
cf. *Prunus* sp.	cf. blackthorn/cherry, etc.										
Pomoideae (see below)	hawthorn group			11r	10r	13r	24r	8r	32r	15r	11r
cf. Pomoideae	cf. hawthorn group				1					2	1
Ulmaceae											
Ulmus	elm	2								3	1
Fagaceae											
Fagus sylvatica	beech	74r	22r	1	5			30	2	17r	17

Quercus	oak	19hrs	2	18hs	5rhs	5h	11hsr	18hsr	12hsrb	41hsr	4h
Betulaceae											
Betula	birch									2	
Corylus avellana	hazel	3r	1	10r	1r		11r		4r	4r	4r
Alnus/Corylus	alder/hazel					2					
Salicaceae											
Salix/Populus	willow/poplar									1	
Sapindaceae											
Acer campestre	field maple	1		1r				1		1	
cf. *Acer campestre*	cf. field maple	1									
Oleaceae											
Fraxinus excelsior	ash							1		3	5
Aquifoliaceae											
Ilex aquifolium	holly								4r		
Indet. charcoal fragments		2b		1	1				1	2b	6
Total fragments		103	27	53	21	20	54	59	61	104	59
KEY: Counts include: h - heartwood; s - sapwood; r - roundwood; b- bark. *Pomoideae inc: Pyrus (pear), Malus (apple), Crataegus (hawthorn) & Sorbus (rowan, service, whitebeam).											

Table 14.4. Results from Phase 4

Site Code		OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12
Sample No.		25	24	36	32	28	21	10	19	16	15
Context		2360	2356	2355	2386	2252	2251	2231	2296	2248	2249
					2388						
Phase		4	4	4	4	4	4	4	4	4	4
Period		Late 14th-early 16th C	Late 14th-early 16th C	Late 14th-early 16th C	Late 14th-early 16th C	Late 14th-early 16th C	Late 14th-early 16th C	Late 14th-early 16th C	Late 14th-early 16th C	Late 14th-early 16th C	Late 14th-early 16th C
Description		Possible floor surface	Gravelly charcoal layer	Levelling?	Clay-lined metal-working hearth group: Hearth 2388	Occupation / consolidation	Occupation/ consolidation	Occupation / consolidation Ash rich mat below Hearth 2051 & pits	Occupation/ consolidation	Occupation/ consolidation	Occupation/ consolidation
Sample Vol. (litres)		10	9	40	7	20	20	25	30	10	15
Analysis type/Assessment		Full	Rapid	Assess.	Full	Assess.	Assess.	Full	Full	Assess.	Assess.
Rosaceae											
Prunus spinosa/domestica type	blackthorn/plum type				1						
Prunus sp.	blackthorn/cherry, etc.						1				
cf. *Prunus* sp.	cf. blackthorn/cherry, etc.			1	1						
Pomoideae (see below)	hawthorn group			11r	5r	2					
cf. Pomoideae	cf. hawthorn group				4						
Ulmaceae											
Ulmus	elm						1				
Fagaceae											

Fagus sylvatica	beech	111r	50r	2r	39r	12r	13r	98r	121r	31r	31r
cf. *Fagus sylvatica*	cf. beech							1b			
Quercus	oak	5hsr	8sh	7hs	32hsr	1	9h		7h	3r	
cf. *Quercus*	cf. oak				1						
Betulaceae											
Betula	birch				5r						
Corylus avellana	hazel		1r	1r	4r	1				1r	
Salicaceae											
Salix/Populus	willow/poplar	1					1		3r		
Sapindaceae											
Acer campestre	field maple		1	1	1r			1r			
Oleaceae											
Fraxinus excelsior	ash				2r				1r		
Indet. charcoal fragments		3b		2	13b	5	2		1		
Total fragments		120	60	25	108	21	27	100	133	35	31
KEY: Counts include: h - heartwood; s - sapwood; r - roundwood; b- bark. *Pomoideae inc: Pyrus (pear), Malus (apple), Crataegus (hawthorn) & Sorbus (rowan, service, whitebeam).											

Table 14.5. Results from Phase 5

Site Code		OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12	OXLG12
Sample No.		3	2	22	33	30	14	13	8	6	5	7	4	9
Context		2181	2165	2337	2385	2382	2263	2270	2216	2208	2207	2211	2200	2220
Feature				2332	2387	2383		2273					2051	
Phase		5	5	5	5	5	5	5	5	5	5	5	5	5
Period		Mid 16th - early 17th C	Mid 16th - early 17th C	Mid 16th - early 17th C	Mid 16th - early 17th C	Mid 16th - early 17th C	Mid 16th - early 17th C	Mid 16th - early 17th C	Mid 16th - early 17th C	Mid 16th - early 17th C	Mid 16th - early 17th C	Mid 16th - early 17th C	Mid 16th - early 17th C	Mid 16th - early 17th C
Description		?Mixed upper fills of pits 2190, 2228, etc.	Associated w clay lined metal working hearth group	Clay lined metal-working hearth group: Hearth 2332	Fill of drain 2387 - cuts throrough bread oven & industrial hearths	Clayline d metal-working hearth group: Hearth 2383	Occupation deposit contemp w Hearth 2051	Occupation deposit in depression	Occupation deposit/ debris from hearth 2051	Occupation deposit/ debris from 2051 below 5/2207	Occupation deposit/ debris from hearth 2051	Fill of metal working Hearth 2051, pos with collapsed structure/re-flooring?	Ashy fill of hearth 2051	?Demolition deposit
Old description				Post hole		Post pipe						Fill of hearth 2345		
Sample Vol. (litres)		8	8	1	30	10	40	8	26	40	10	20	40	36
Analysis type/Assessment		Assess.	Full	Full	Assess.	Rapid	Full	Full	Full	Full	Full	Rapid	Full	Assess.
Fabaceae														
Fabaceae undiff.	legume wood												1	
Rosaceae														
Prunus spinosa/domestica type	blackthorn/plum type					1	1r		2					

Prunus sp.	blackthorn/cherry, etc.		1		2r				1r			1	1	
Pomoideae (see below)	hawthorn group		3		1	2r	13r		8r	3r	2	4	13r	
cf. Pomoideae	cf. hawthorn group		3r		1		1		1		1	1r	1	
Rhamnaceae														
Rhamnus cathartica	purging buckthorn								4r	4				
Frangula alnus	alder buckthorn									2				
Ulmaceae														
Ulmus	elm						7hr		3		1	1r	2	
Fagaceae														
Fagus sylvatica	beech	14r	53r	90r	14r	39r	39r	102r	33r	24r	87r	9r	44r	17r
cf. *Fagus sylvatica*	cf. beech			1										
Quercus	oak	3h	36hs		4hs	3hs	24hs	7hs	35hsr	55hsr	3	30hsr	31hrs	3h
cf. *Quercus*	cf. oak		3b									2r		
Betulaceae														
Corylus avellana	hazel		2r	6r		3r	5r	2r	8r	12r	3r		5r	
Alnus glutinosa	alder			1										
Alnus/Corylus	alder/hazel					1				1			1	
Salicaceae														
Salix/Populus	willow/poplar			1			4r	1		4	3r			
Sapindaceae														
Acer campestre	field maple			2		7	1		2	2r	2r	2	1	

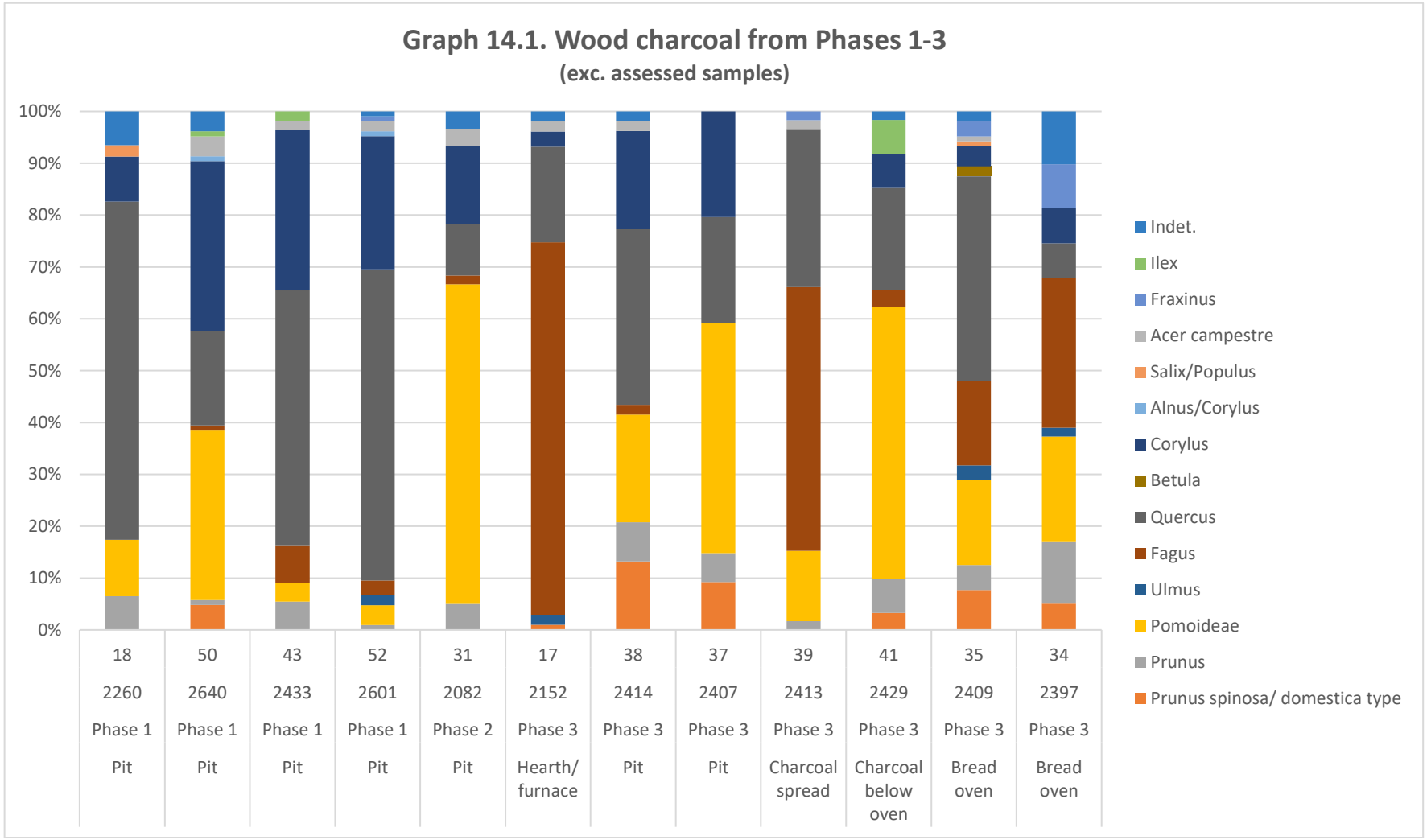
cf. *Acer campestre*	cf. field maple											1		
Cornaceae														
Cornus sanguinea	dogwood								1					
Oleaceae														
Fraxinus excelsior	ash	3h					4r	2r	8r	2r	11hr	2r	5r	
Aquifoliaceae														
Ilex aquifolium	holly												2	
Indet. charcoal fragments			7	3	1		1	1	7br		1b	1	3b	1
Total fragments		20	108	104	23	56	100	115	113	109	114	54	110	21
KEY: Counts include: h - heartwood; s - sapwood; r - roundwood; b- bark. *Pomoideae inc: Pyrus (pear), Malus (apple), Crataegus (hawthorn) & Sorbus (rowan, service, whitebeam).														

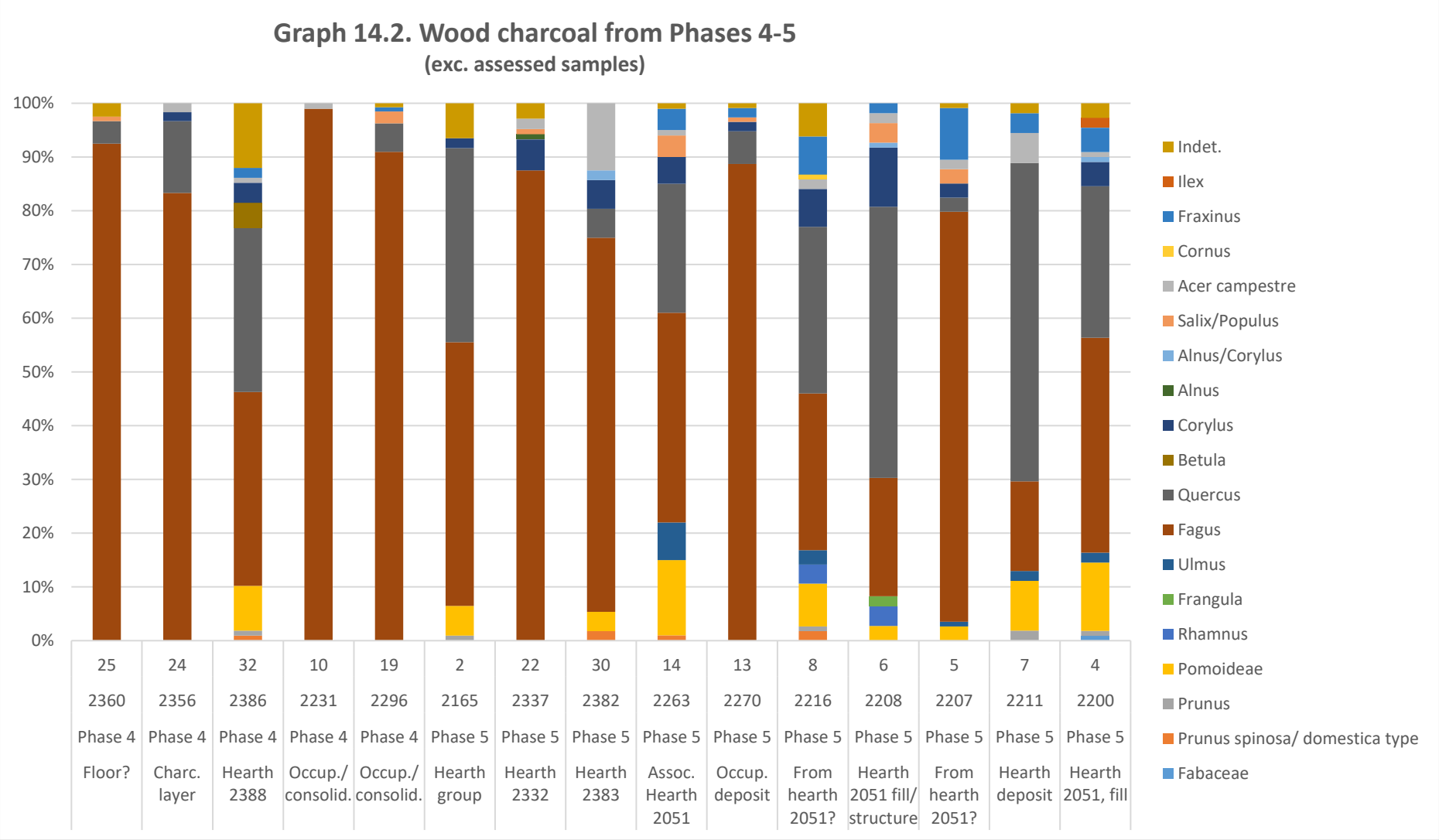
Table 14.6. Presence and absence of certain taxa

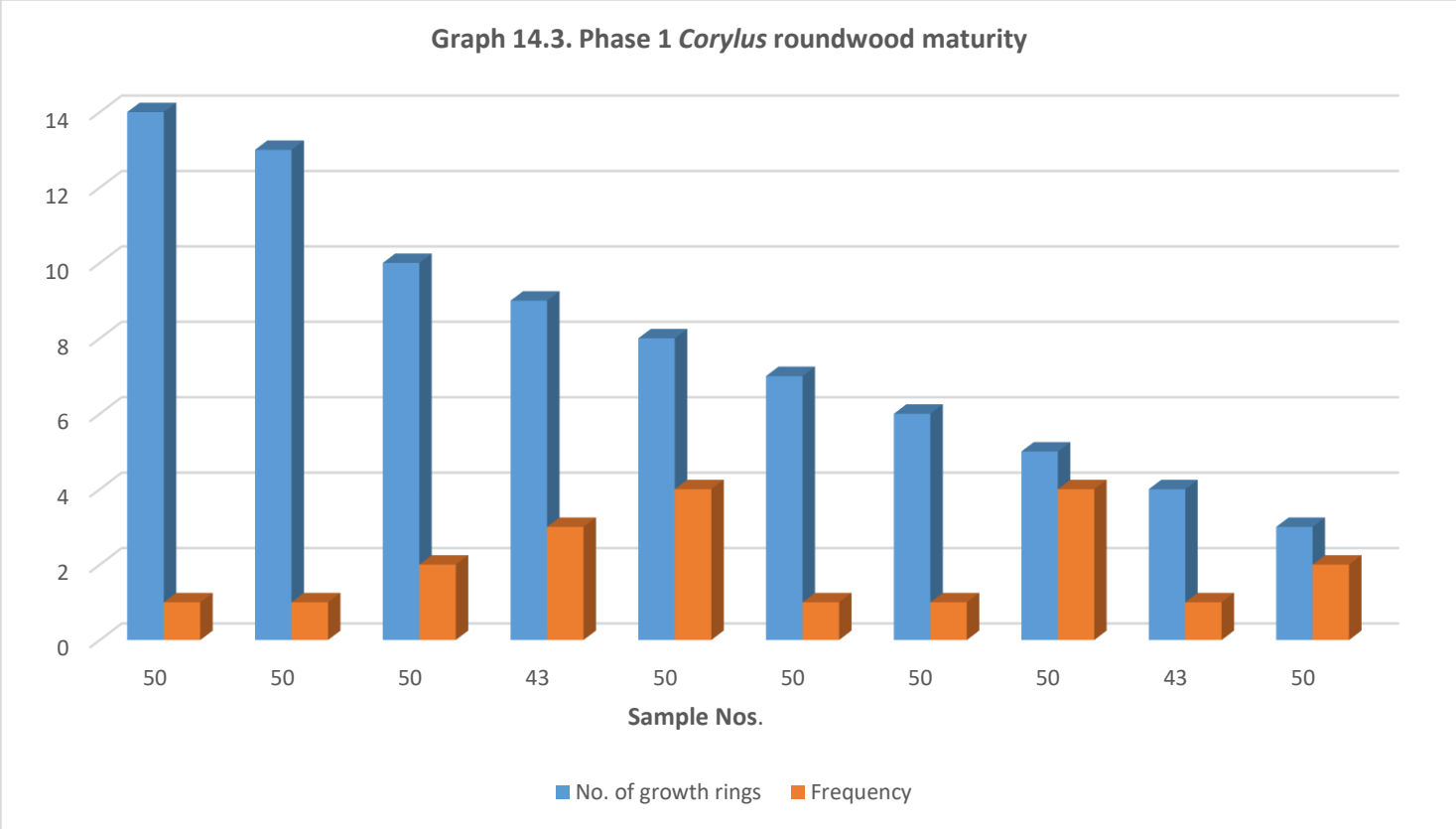
Sample	**Context**	**Feature**	**Phase**	*Fagus*	*Quercus*	Pomoideae	*Corylus*	*Acer*	*Prunus* sp.	*P. spinosa/ domestica* type	*Fraxinus*	*Ulmus*	*Salix/ Populus*	*Alnus / Corylus*	*Ilex*	*Betula*	*Alnus*	*Rhamnus*	*Frangula*	Fabaceae	*Cornus*
				beech	oak	hawthorn group	hazel	field maple	blackthorn/ cherry, etc.	blackthorn/ plum type	ash	elm	willow/ poplar	alder / hazel	holly	birch	alder	buckthorn	alder buckthorn	legume wood	dogwood
18	2260	2259	1		**X**	x	x		x				x								
50	2640	2636	1	x	x	X	X	x	x	x				x	x						
46	2517	2525	1		x	x	x		x					x							
43	2433	2434	1	x	**X**	x	x		x						x						
52	2601	2477	1	x	**X**	x	x	x	x		x	x		x							
44	2502	2477	1		**X**		x	x									x				
51	2623	2617	1	x	**X**	x	x														
31	2082	2075	2	x	x	**X**	x	x	x												
17	2152	2285	3	**X**	x		x	x		x		x									
1	2145	2285	3	**X**	x		x		x												
38	2414	2416	3	x	**X**	x	x	x	x	x											
48	2598	2466	3	x	x	**X**	x														
42	2436	2441	3		x	**X**								x							
37	2407	2415	3		x	**X**	x		x	x											
39	2413		3	**X**	x	x		x	x		x										
41	2429		3	x	x	**X**	x		x	x					x						
35	2409		3	x	**X**	x	x	x	x	x	x	x	x			x					
34	2397	2398	3	**X**	x	x	x		x	x	x	x									
25	2360		4	**X**	x								x								
24	2356		4	**X**	x		x	x													

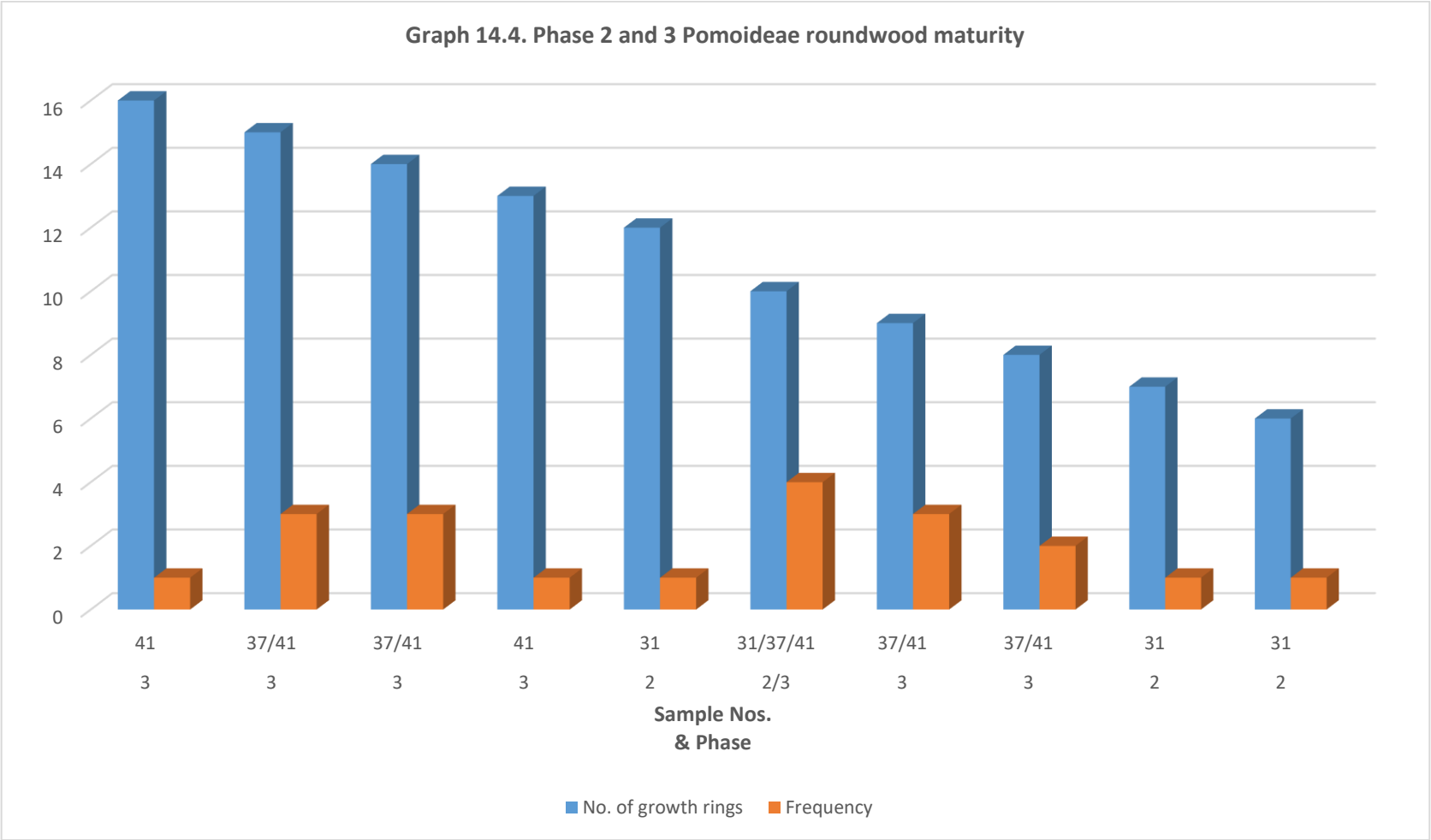
36	2355		4	x	x	**X**	x	x												
32	2386	2388	4	**X**	X	x	x	x		x	x					x				
28	2252		4	**X**	x	x	x													
21	2251		4	**X**	x				x			x	x							
10	2231		4	**X**				x												
19	2296		4	**X**	x						x		x							
16	2248		4	**X**	x		x													
15	2249		4	**X**																
3	2181		5	**X**	x						x									
2	2165		5	**X**	x	x	x		x											
22	2337	2332	5	**X**			x	x					x				x			
33	2385	2387	5	**X**	x	x			x											
30	2382	2383	5	**X**	x	x	x	x		x				x						
14	2263		5	**X**	x	x	x	x		x	x	x	x							
13	2270	2273	5	**X**	x		x				x		x							
8	2216		5	X	X	x	x	x	x	x	x	x						x			x
6	2208		5	x	**X**	x	x	x			x		x	x				x	x		
5	2207		5	**X**	x	x	x	x			x	x	x								
7	2211		5	x	**X**	x		x	x		x	x									
4	2200		5	**X**	x	x	x	x	x		x	x		x	x					x	
9	2220		5	**X**	x																

Key: X - dominant taxon; X - co-dominant taxon; x - taxon present

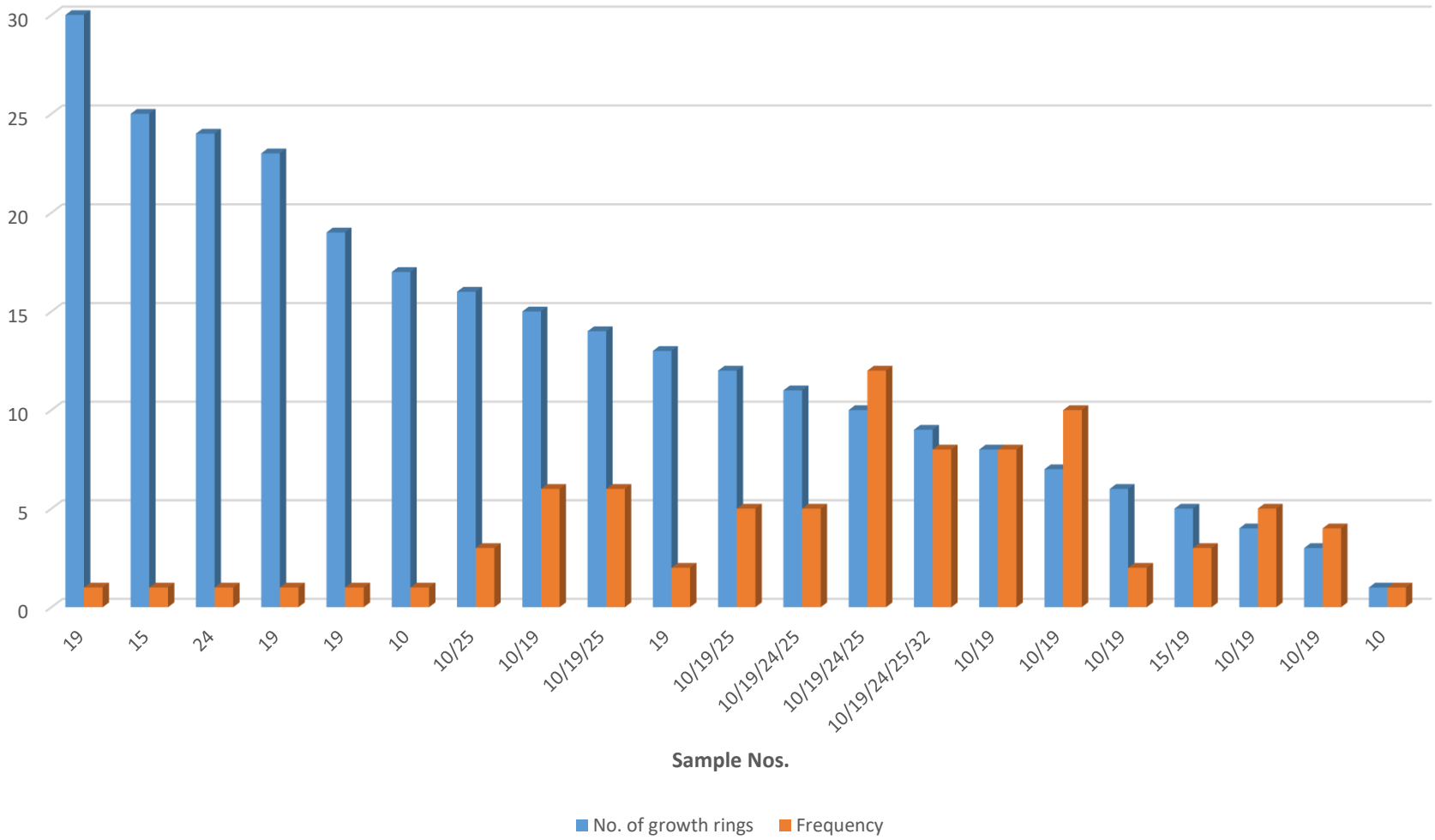

Graph 14.1. Wood charcoal from Phases 1-3
(exc. assessed samples)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
18 2260 Phase 1 Pit
50 2640 Phase 1 Pit
43 2433 Phase 1 Pit
52 2601 Phase 1 Pit
31 2082 Phase 2 Pit
17 2152 Phase 3 Hearth/ furnace
38 2414 Phase 3 Pit
37 2407 Phase 3 Pit
39 2413 Phase 3 Charcoal spread
41 2429 Phase 3 Charcoal below oven
35 2409 Phase 3 Bread oven
34 2397 Phase 3 Bread oven
Indet.
Ilex
Fraxinus
Acer campestre
Salix/Populus
Alnus/Corylus
Corylus
Betula
Quercus
Fagus
Ulmus
Pomoideae
Prunus
Prunus spinosa/ domestica type

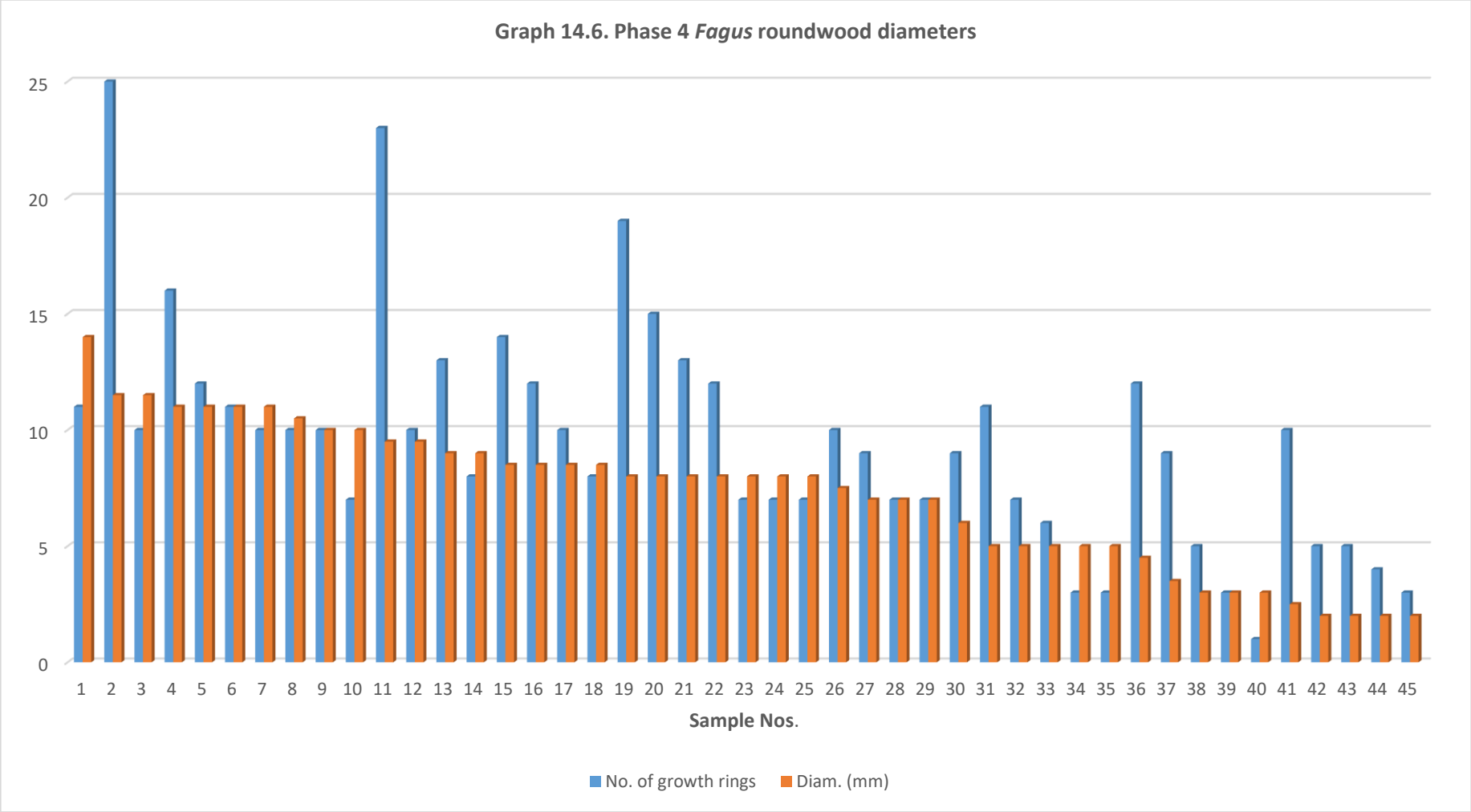

Graph 14.2. Wood charcoal from Phases 4-5
(exc. assessed samples)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
25 2360 Phase 4 Floor?
24 2356 Phase 4 Charc. layer
32 2386 Phase 4 Hearth 2388
10 2231 Phase 4 Occup./ consolid.
19 2296 Phase 4 Occup./ consolid.
2 2165 Phase 5 Hearth group
22 2337 Phase 5 Hearth 2332
30 2382 Phase 5 Hearth 2383
14 2263 Phase 5 Assoc. Hearth 2051
13 2270 Phase 5 Occup. deposit
8 2216 Phase 5 From hearth 2051?
6 2208 Phase 5 Hearth 2051 fill/ structure
5 2207 Phase 5 From hearth 2051?
7 2211 Phase 5 Hearth deposit
4 2200 Phase 5 Hearth 2051, fill
Indet.
Ilex
Fraxinus
Cornus
Acer campestre
Salix/Populus
Alnus/Corylus
Alnus
Corylus
Betula
Quercus
Fagus
Ulmus
Frangula
Rhamnus
Pomoideae
Prunus
Prunus spinosa/ domestica type
Fabaceae


Graph 14.3. Phase 1 *Corylus* roundwood maturity
14
12
10
8
6
4
2
0
50
50
50
43
50
50
50
50
43
50
Sample Nos.
No. of growth rings
Frequency


Graph 14.4. Phase 2 and 3 Pomoideae roundwood maturity
16
14
12
10
8
6
4
2
0
41
3
37/41
3
37/41
3
41
3
31
2
31/37/41
2/3
37/41
3
37/41
3
31
2
31
2
Sample Nos.
& Phase
No. of growth rings
Frequency

Graph 14.5. Phase 4 *Fagus* roundwood maturity




Graph 14.6. Phase 4 *Fagus* roundwood diameters
25
20
15
10
5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
Sample Nos.
No. of growth rings
Diam. (mm)

15 OTHER FINDS

Table 15.1. Other finds

Material	No.	Weight (g)	Comments
Marine mollusc shell	243	2180	Mainly oyster
Mortar	129	637	
Plaster	1	1	
Worked flint	1		Residual prehistoric flake from context 2530

16 RADIOCARBON DATES

Table 16.1. Radiocarbon dates. Calibrated age ranges were determined using the University of Oxford Radiocarbon Accelerator Unit calibration program OxCal v4 and the IntCal13 curve.

Laboratory code	Context	Material	Radiocarbon age BP	δ13C (‰)	Calibrated date range (95% confidence)
SUERC-54895 (GU34826)	2397	Charcoal, beech (*Fagus sylvatica*) roundwood	549±36	-28.3	cal AD 1307–1385
SUERC-54896 (GU34827)	2296	Charcoal, beech (*Fagus sylvatica*) roundwood	567±36	-25.6	cal AD 1300–1381
SUERC-55475 (GU35156)	2635	Charcoal, beech (*Fagus sylvatica*) roundwood	592±30	-24.6	cal AD 1299–1380
SUERC-55476 (GU35157)	2429	Charcoal, (*Prunus* sp.) roundwood	668±30	-27.1	cal AD 1275–1350

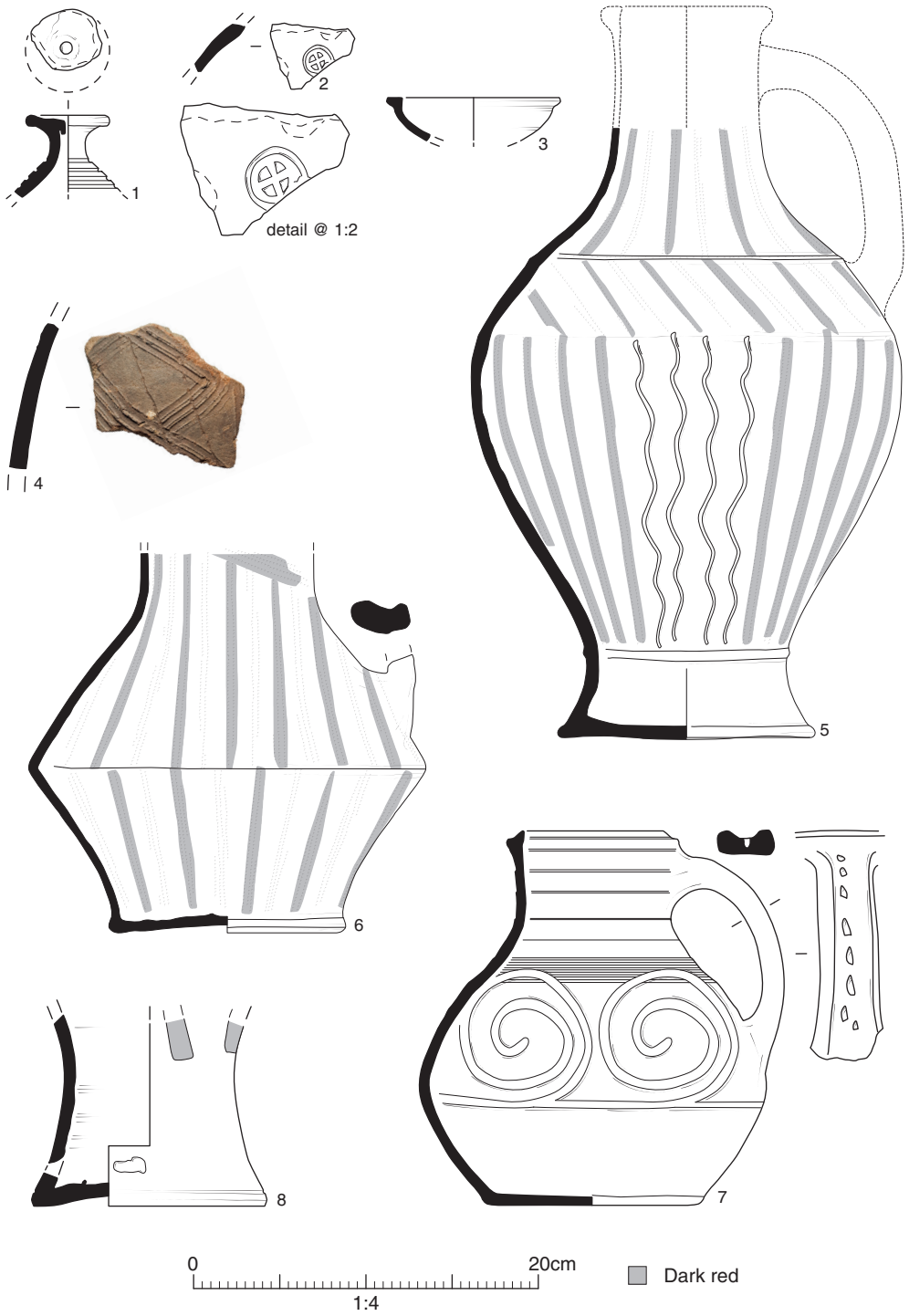


Figure 7.10: Medieval pottery, nos. 1–8

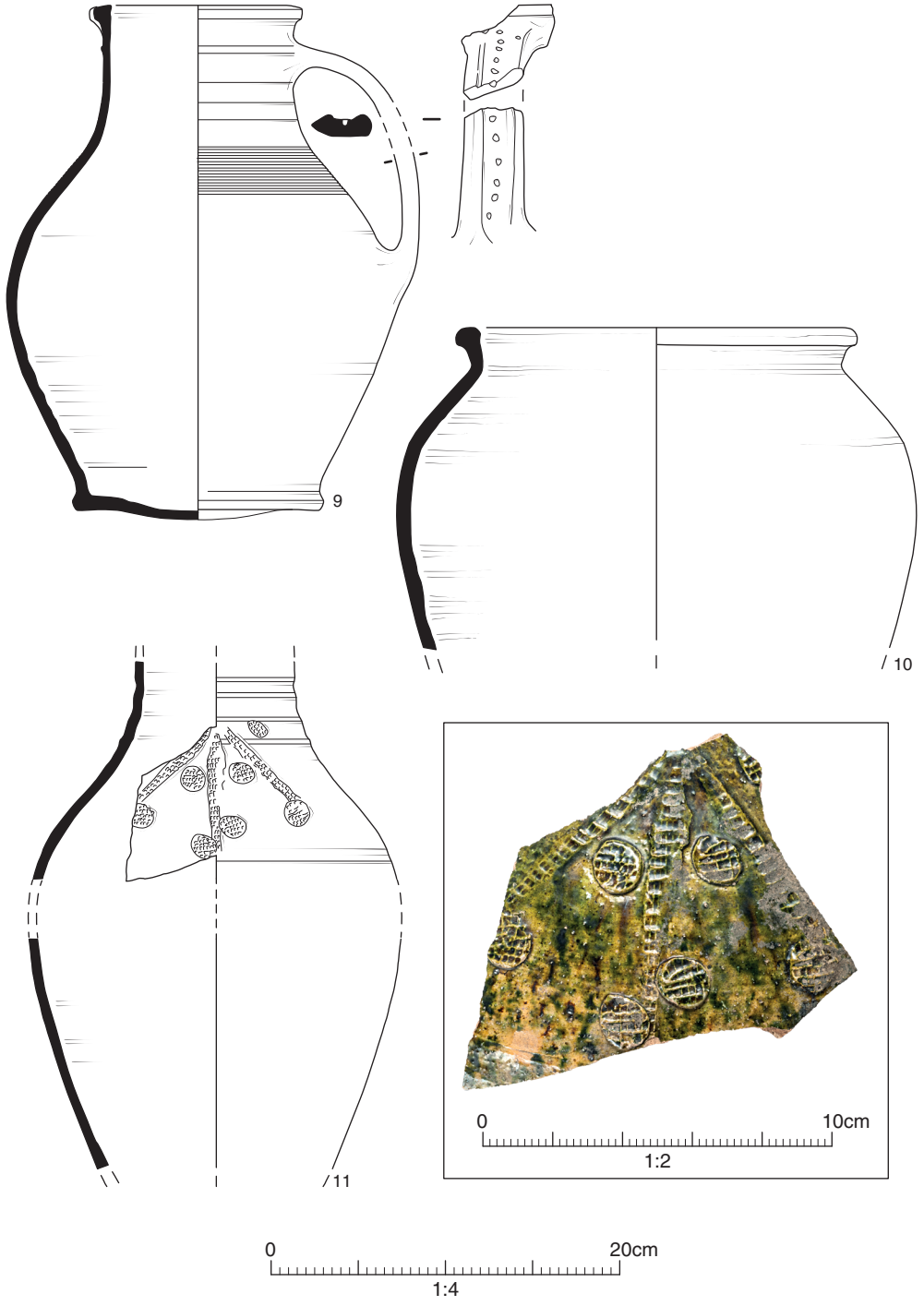


Figure 7.11: Medieval pottery, nos. 9–11

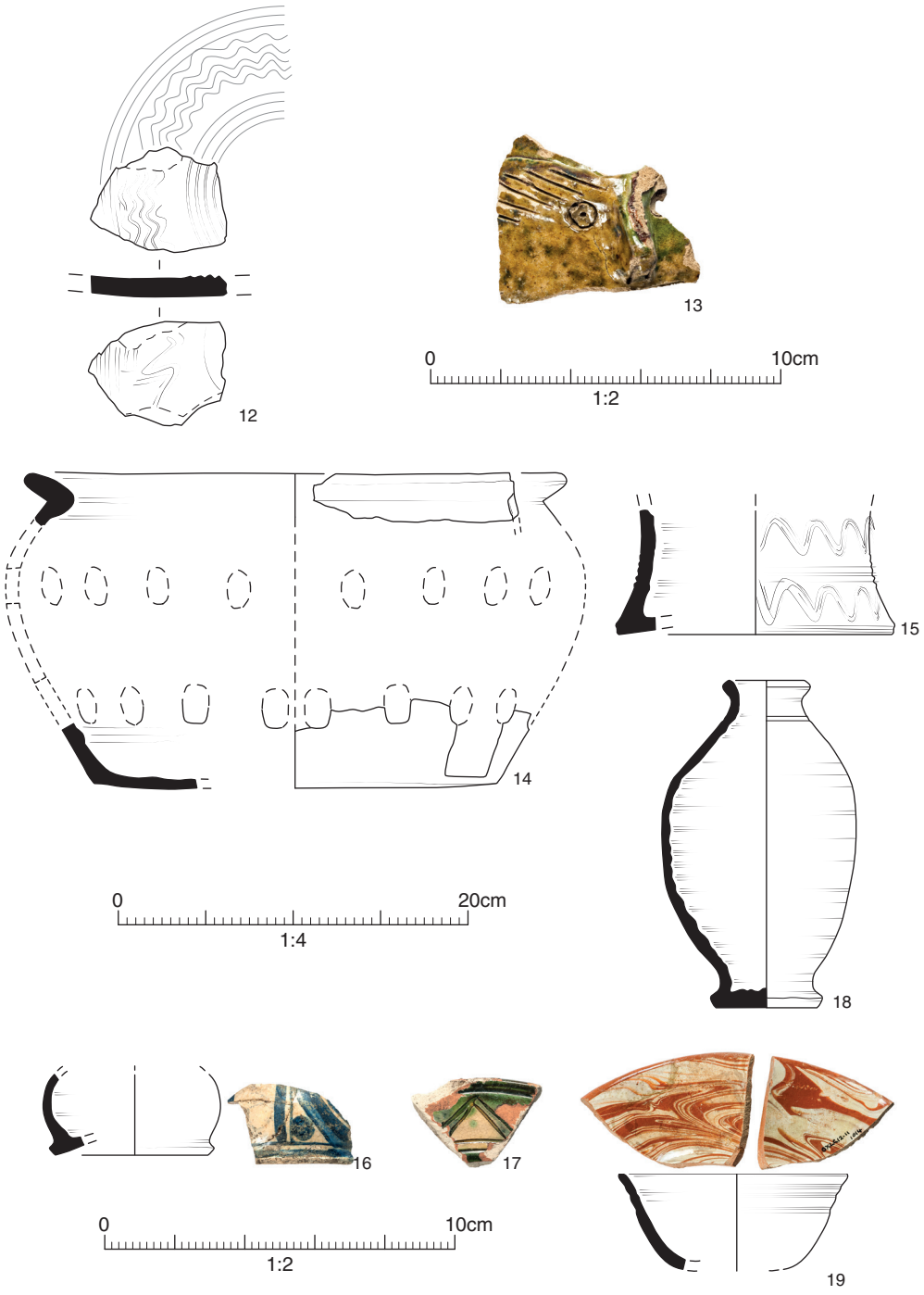


Figure 7.12: Medieval and post-medieval pottery, nos. 12–19

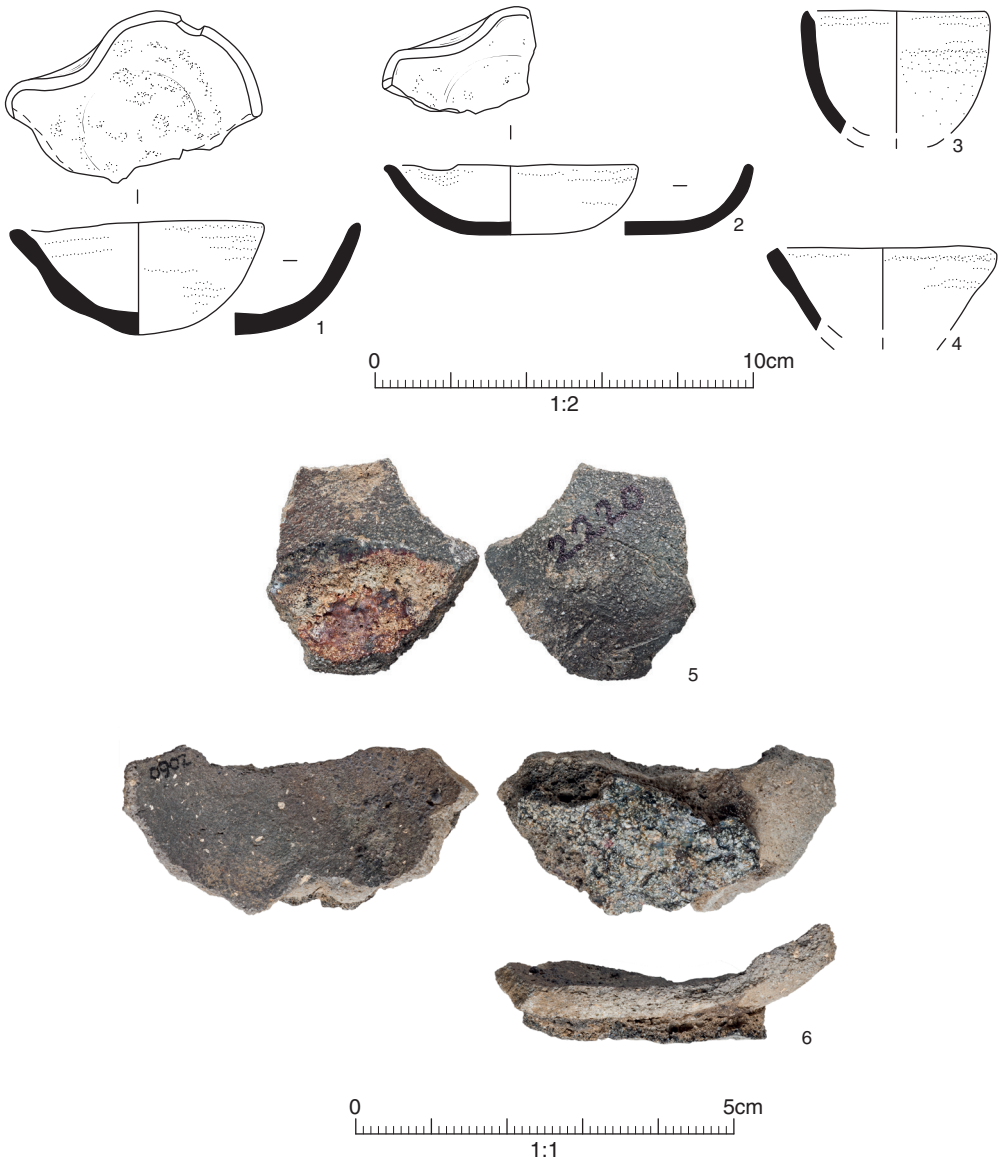


Figure 7.13: Crucibles

Figure 7.14: Glass lion mask baluster

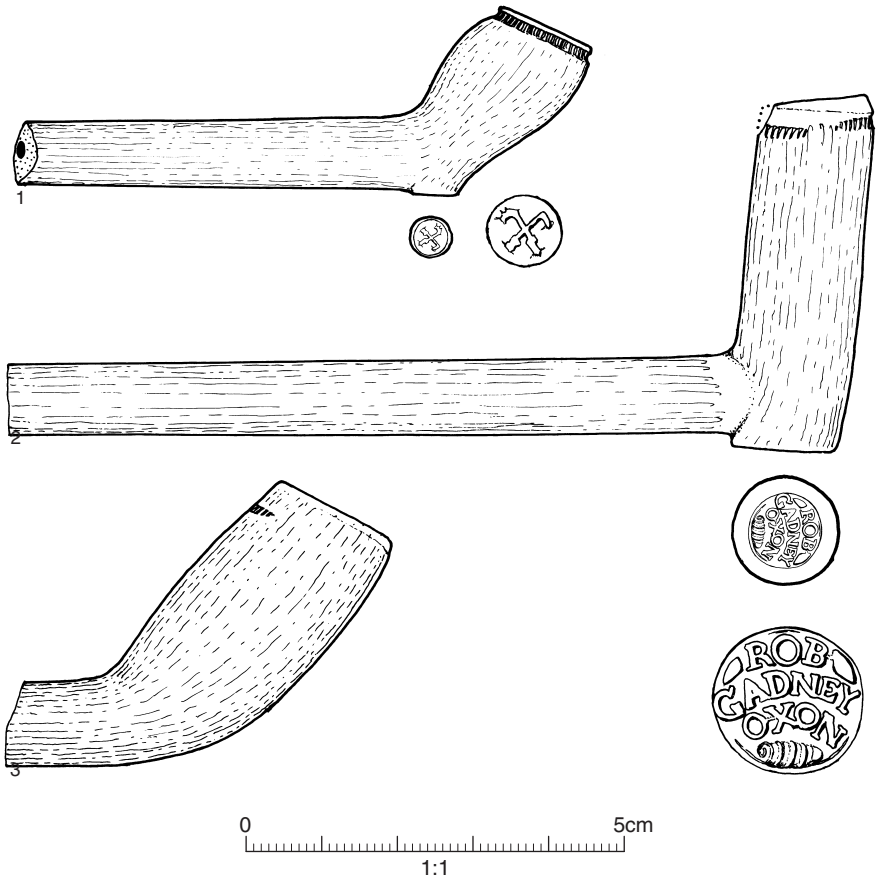


Figure 7.15: Clay tobacco pipes. Stamp details at 2:1; burnished surface areas indicated with a fine broken line. Drawing by D. A. Higgins

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