

Excavations at 1 Westgate Street, Gloucester, 1975

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LIMITED excavation in Gloucester showed timber structures replacing stone in the late 4th century. The town centre was re-planned in the early 5th century, creating the line of medieval Westgate Street. Preserved organic levels of the 9th century indicate an agricultural economy with animal stabling in the town centre. 10th- to 12th-century levels were also excavated. Specialist reports are offered on Saxon and medieval pottery, seeds, textiles, wood and other materials.

INTRODUCTION

1 Westgate Street is close to the central crossroads of Gloucester (Fig. 1). The site straddles the line of the main Roman E.-W. street, and is directly in front of the Roman *forum*.¹ The Roman street alignment is not preserved in the medieval and modern Westgate Street, which has shifted north, so that the line of Westgate Street, in its course down to the crossing of the River Severn, overlies the site of several Roman *insulae*.² Although Gloucester's street plan is thought to be early 10th century,³ the cardinal streets, two of which continue to use Roman openings in the walls, may have been in existence before then.

We are indebted to the following: the developers, William and Glyn's Bank for permission to excavate; volunteers who worked on the site; Joanna Vince (finds supervisor); Tom Adamson (finds); Lynne Marley, Christopher Marley, Arnold Pryor, and Terence Hayes (planning and recording); Judith Sheard (finds drawing); Lynne Marley (pottery, section, and leather drawings); Elizabeth Greenshields (pottery drawings); Christopher Frost (wood identification); Robert Milne (figure drawings); and Richard Bryant (completion of all final figures).

Feature numbers are prefixed F; wall numbers W; building numbers B; wood samples WS; small finds SF; post-holes PH. Numbers in brackets are layer numbers (circled on section). The full site records are in Gloucester Museum Excavation Unit. Roman finds will be published elsewhere.⁴

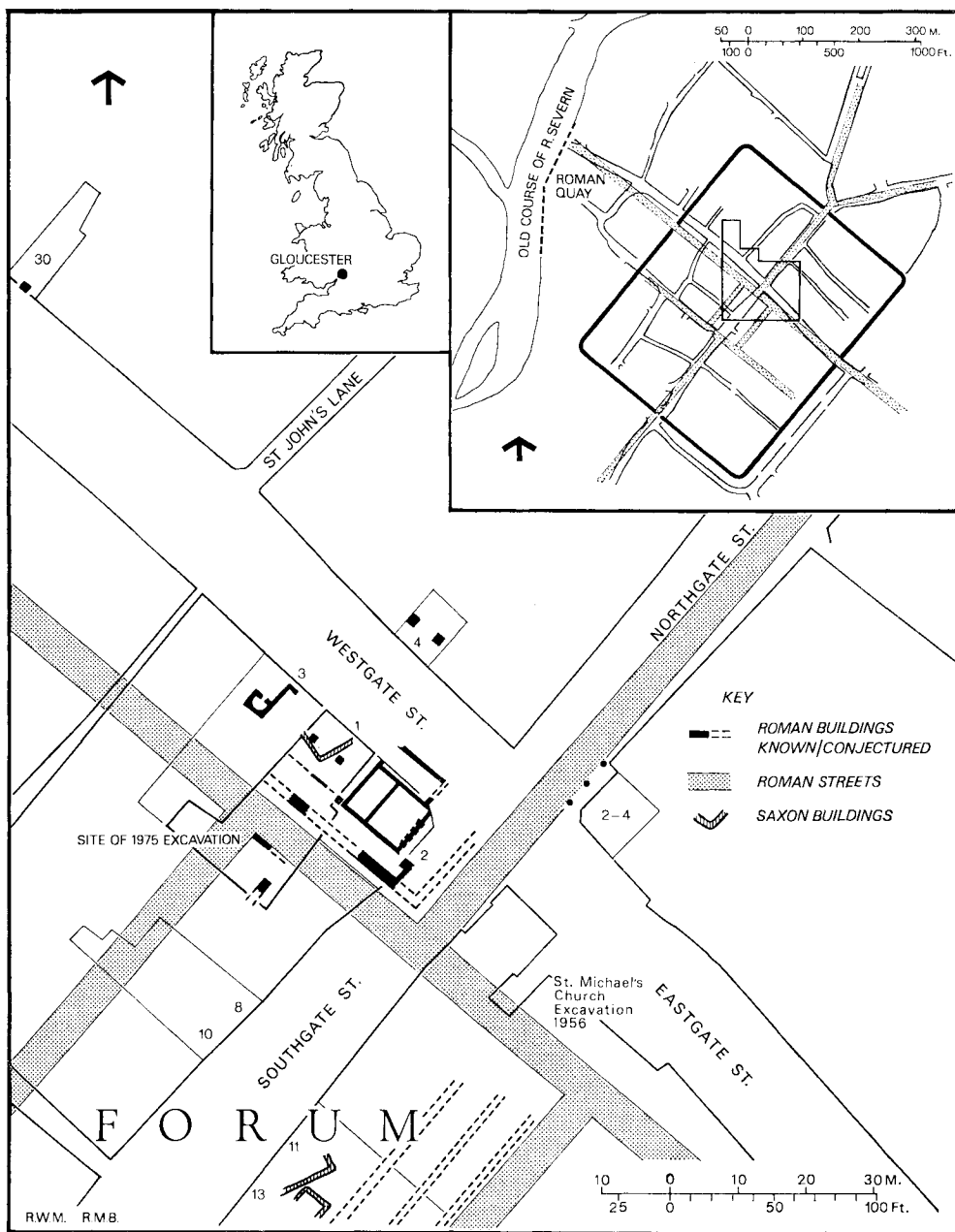


FIG. 1

Excavations at 1 Westgate St., Gloucester: location plan

THE EXCAVATION

The site, a typical long, narrow burgess tenement, was further restricted by shoring for adjacent buildings, and trenches were limited to 2 m width (Fig. 2). The excavation area was further reduced by post-medieval intrusions. The sequence of events obtained is thus more significant than the plan. In addition to the excavated trenches V, VI, VII, VIII, trial holes I–IV were dug by contractors before building demolition: only I–III were recorded.

Excavation took place in the base of Victorian cellars, except that in trench VIII, a cellar wall was removed to reveal 11th- to 13th-century layers in section (Figs. 2 and 6), which continued the stratigraphic sequence revealed in trench VI up to the 13th century.

Period 1: Roman, 1st–2nd century

The main Roman street was located. The earliest of its surfaces must represent the *via principalis* of the Flavian fortress, followed by the streets of the *colonia*. Associated with these streets were metallated surfaces, occupation levels, and timber slots.

*Period 2**Period 2A: Building 1 (Fig. 3, left)*

The latest Roman stone building was a colonnaded structure, B1, north of the Roman street (Figs. 1 and 3, left). One of the oolitic limestone column bases (F50) remained and was associated with a sandstone flag floor. Another column was represented by a rubble foundation. The building produced no pottery but sealed 1st- or early 2nd-century wares.

The Roman street was flanked by stylobate blocks representing the street-side colonnade. The colonnade S. of the street would have bounded the forecourt of the *forum*.⁵ The forecourt was represented by a floor of sandstone flags, very damaged. A massive but undated robber-trench, F23, may represent part of a formal entrance to the *forum* (Figs. 1 and 3, left).

Period 2B: B1 alteration (Fig. 3, left)

Walls 51 and 56, and floors with lime-based surfaces, were added to B1, dividing the building into smaller units which, judging by the presence of a hearth, were then used for domestic or possibly industrial occupation. This phase produced 3rd-century coins⁶ and a group of late 3rd-century pottery. Two slots (F47, 48) set in *opus signinum* floors, form spaces too narrow to be rooms and may have been cisterns or storage bays.

Interpretation

The property to the E. of the site, no. 2 Southgate Street, occupied in medieval times by the Tolsey (Council House) and church of All Saints, was excavated in 1893–94 (Fig. 1).⁷ Beneath the medieval buildings was a Roman building, which had been burnt down. The adjacent property to the W., no. 3 Westgate Street, produced part of a hypocaust and apsidal room, excavated in 1959.⁸ On the other side of medieval Westgate Street, at no. 4, Roman columns about 1 m in diameter have been reported. Hurst suggested that all this building complex might be a public baths suite.⁹

1 WESTGATE ST. GLOUCESTER

Location of trenches and published sections

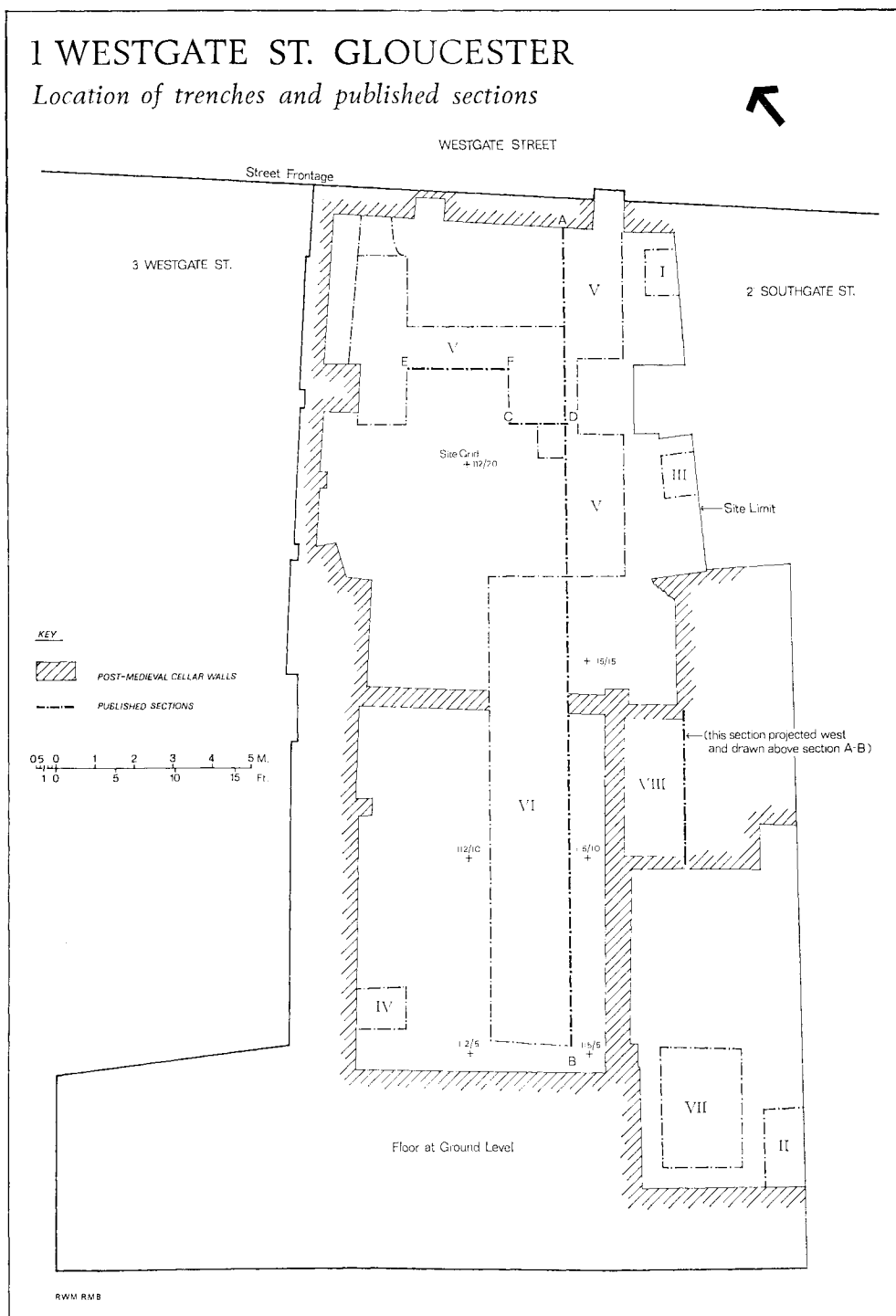


FIG. 2

Excavations at 1 Westgate St., Gloucester: plan of trenches and published sections

*Period 3**Building 2 (Fig. 3, right)*

3A: In the late 4th century, B1 was deliberately demolished and the debris levelled over. The destruction material contained late Roman pottery including shell-tempered wares (Appendix 1). It also contained a collection of pewter moulds of oolitic limestone. Coins indicate a date soon after A.D. 370.

3B: Over this destruction layer was constructed B2. This was a timber structure originally at least 2 m square (only parts of two sides survived: see Fig. 3, right). Its remains apparently consisted of planks only a few cm thick laid on the ground, but the wood structure, when analysed, showed that the 'planks' were the charred surfaces of what had once been substantial timbers, so their thinness must have been the result of compression. The deliberate relation of B2 to the demolished B1 was shown by the fact that the planks were placed around the surviving column base of B1, which must have been left protruding above the floor of B2. It could have been used as a foundation for a table.

Layers of debris inside B2 produced coins, the latest of 367–83, a lead weight, a bronze scale-pan and a steelyard. The timbers rendered a radiocarbon date of A.D. 430 ± 80 (Appendix 3).

A N.-S. ditch cut Period 2 levels and may be a drainage ditch for this period.

3C: A metalling covering the S. stylobate of the Roman street may represent levels in the street area contemporary with 3B: the street may have been in use, although the streetside drains were not.

3D: The timber booth, B2, went out of use c. 390 on coin evidence and the area was covered with a metalling or debris of sandstone tiles.

3E: (Fig. 4, left) Shortly afterwards, the main Roman street was eliminated. Several large pits were dug into it and the level of the area was brought up above that of B2 by infilling with stony loam. Over this infill was a well-laid metalling of pebbles and pounded building materials. This metalling covered most of the area excavated. Although it was mostly destroyed in the area of B2 by Victorian cellar floors, it overlapped B2 at one point (Fig. 3, right: inset). Like the construction and demolition of B2, it contained shell-tempered wares.

3F: After a time the new metallated area subsided into the backfilled street. In the hollow thus caused, a sterile silt collected which represents an unknown period of time. A scatter of large stones in this layer, resting on the metalling of Period 3E, may have fallen from adjacent buildings. A Saxon leather hairslide and offcut (Appendix 7) from this layer could be intrusive from Period 4, or else indicate that this deposit represents a considerable time span.

3G: (Figs. 4, right and 6) Overlying the 3E metalling were several hard stony loam deposits with iron panning. These cannot be well dated: they contained only late Roman pottery and coins, and some slag and hearth-lining. They could be any date from the early 5th century to somewhere in Period 5 (10th century).

Late Roman Gloucester: some conclusions

It is apparent that there was considerable activity in Gloucester at the end of the 4th century. The city wall had already been rebuilt.¹⁰ At the centre of the town a large public building, already converted to domestic or industrial use, was demolished after a fire, and replaced by a timber booth, B2, perhaps one of several in existence c. 370–90. The presence of butchers' bones in the debris of B2 (Appendix 4) suggests that the area was still a market area, continuing the function of the *forum*.

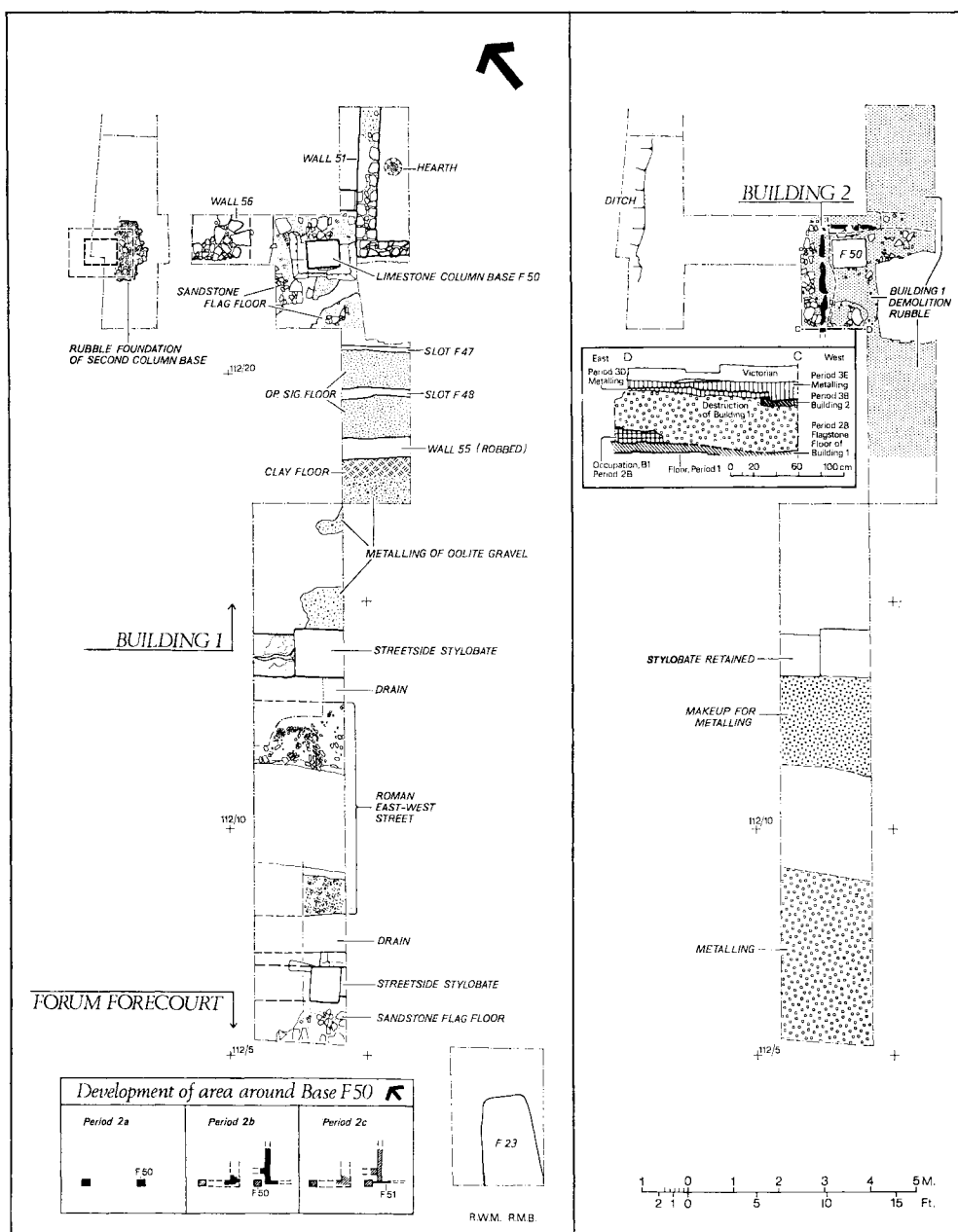


FIG. 3

Left: 1 Westgate St., Gloucester: Roman features, Period 2, 2nd and 3rd centuries
 Right: 1 Westgate St., Gloucester: Period 3, Building 2, late 4th century

Some time after A.D. 390 a reorganization took place which involved the creation of a large metalled area. The effect of this was to bring the level of the whole area up to that of the *forum* courtyard and forecourt (the street had previously been sunken, see Fig. 6), so creating a large open space, which, combined with that of the *forum*, would have covered a considerable area. At 8–10 Southgate Street, at the centre of the *forum* courtyard, there was found c. 1900, 'a Roman road covered with pebbles'.¹¹ Hurst thought that this might have been the rubble make-up of the *forum* courtyard; it now seems that it may have been an extension of our Period 3E metalling. If so, perhaps the whole *forum* was re-surfaced in this way, the metalling extending north to the row of Roman columns on the north side of Westgate Street (Fig. 1).¹² There is no evidence for the use of this open area, although it seems logical to assume that it continued to be the market and administrative area of the town.

An important conclusion is that the elimination of the Roman E.–W. street was initiated in the late Roman period, whilst the line of Westgate Street was subsequently conditioned by the great colonnade which had formed part of the possible baths complex.

Period 4: 9th century

Features (Fig. 4, right)

Above the sterile silt were found dense 'peaty' organic levels 40–50 cm thick (Pl. ix, A) of clay-like, plastic consistency which contained wood, seeds, straw, and other perishable matter. Although these layers are typical of waterlogged material, they were in fact above the water table when found. The water table has risen since the Roman period, but not sufficiently to cover these layers permanently. Their preservation, under essentially anaerobic conditions, could perhaps therefore be due rather to rapid compression of damp organic material over the relatively impervious street surface.¹³ Sealed beneath the organic layers were several timber structures, which due to the small area examined we have made no attempt to interpret. A wattle fence (Wall 49) of ash and oak wood had uprights of sharpened stakes made from woods which included hawthorn type, hazel and ?sycamore. Nearby was scattered oak planking and other debris, including wooden objects (Appendix 8): many of the planks had dowel holes with the remains of willow trenails. A section of interwoven material was made of ?ivy (inset, Fig. 4, right; Pl. ix, B); this was perhaps a floor covering or door hanging. No iron nails were present, all joints being fixed with hazel or willow trenails (in contrast, 10th-century charcoal burials at St Oswald's Priory did use iron nails for coffin construction).¹⁴ There was a conspicuous absence of iron slag. The timber structures had obviously been covered quite rapidly by the organic matter: Wall 49 had one upright protruding from it and one flattened by it.

The carbon-nitrogen ratio of the organic material was analysed by C. Frost¹⁵ and calculated at 11.8, suggesting an exceptionally high organic content. Much of this material may be stable litter with animal manure. The seed evidence suggests that it is unlikely to be human cess (Appendix 5), whilst the types of seeds present are consistent with dung or stable litter. (The organic material also included a layer several cm thick of chopped straw.) The large number of arable weeds and the few plants of wet habitat were probably also brought in with the litter, or perhaps in the stomachs of animals.

Dating and discussion

Similar deposits to these Period 4 levels have occurred on two other Gloucester sites, both close by. On the site of St Michael's church, excavated in 1956,¹⁶ were

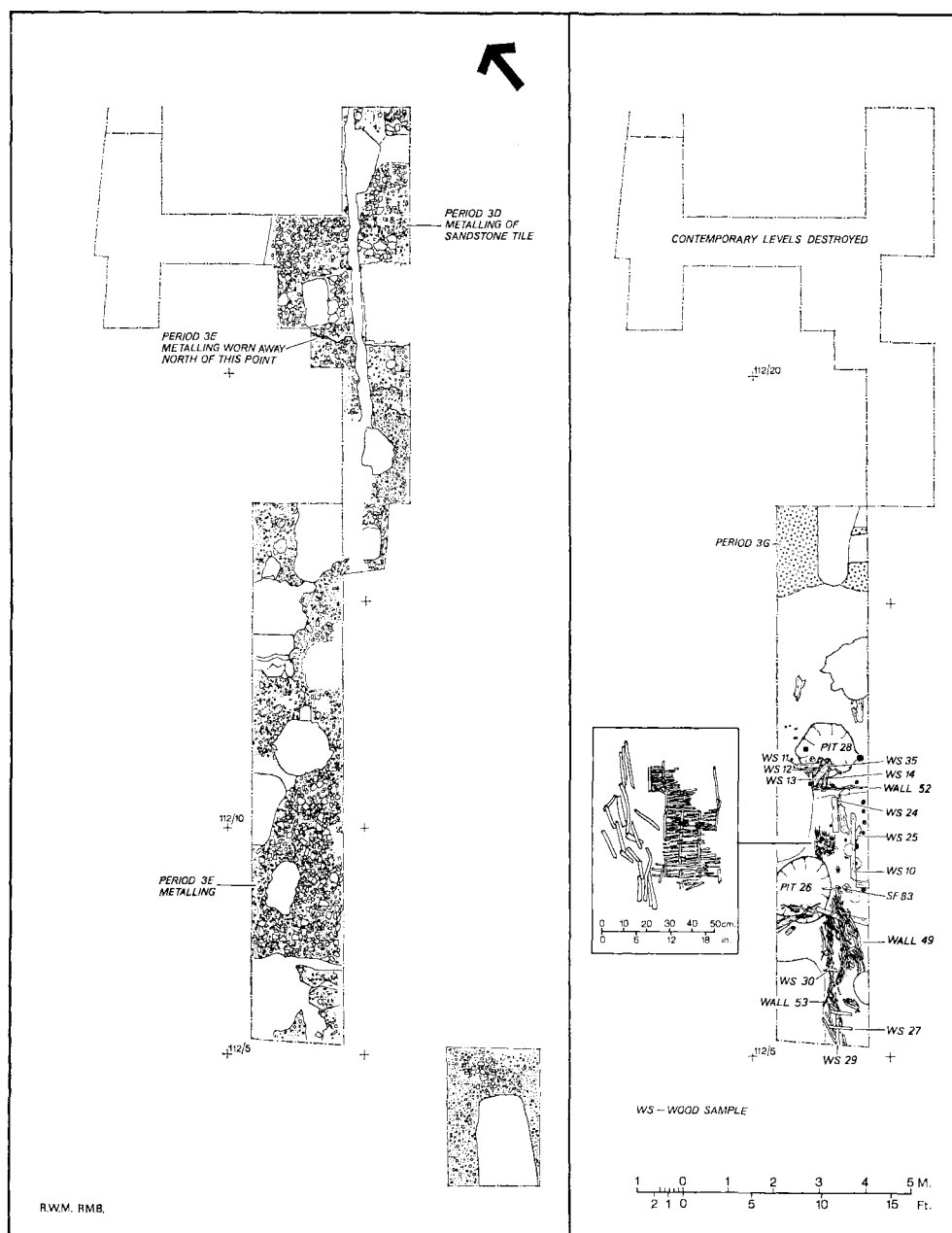


FIG. 4
 Left: 1 Westgate St., Gloucester: Period 3: late/sub Roman metalling
 Right: 1 Westgate St., Gloucester: Period 4: 9th-century timber structures

found deposits described as 'peat' and ascribed to waterlogging. The site of the Roman forum at 11-17 Southgate Street excavated by Hurst in 1968¹⁷ also produced preserved organic levels in which were two timber building phases, pre-dating the mid-11th century.¹⁸ At 1 Westgate Street, two late 8th- to 10th-century radiocarbon dates came from uprights of Wall 49 (Appendix 3). Here, the organic levels contained very little pottery: the only well-stratified sherds were non-local (TF 42, 47; Appendix 1). There were, however, wood and leather objects (Appendices 6 and 8). The Period 4 levels were sealed by levels containing 10th-century wares, so it seems reasonable to assume that the Period 4 layers are 9th-century or possibly earlier. If they do in fact represent a short period of time, as suggested above, it is likely that earlier and later levels are both missing, but might yet be found in adjacent areas. The similar levels at St Michael's church probably dated somewhere between the 8th and 10th centuries.

The indications are that preserved organic levels exist in a concentrated area at the centre of Gloucester, and it is vital that they be further excavated if a clearer picture of the 9th-century town is ever to emerge. At present, it can only be said that the town centre was occupied by timber buildings which may in part have consisted of cattle byres, although the proximity at 1 Westgate Street of a cobbler's workshop (Appendix 7) and domestic refuse (Appendix 8) shows that there was no definitive economic zoning. Although some Roman buildings were demolished in the late 4th century (as at 1 Westgate Street), others survived much longer: it may be significant that late Saxon buildings have so far only been found in areas which were open space in the late Roman period. The final demolition of Roman Gloucester may only have occurred in the early 10th century when the town was re-planned;¹⁹ certainly the Roman colonnade which conditioned the line of Westgate Street would have been an impressive, if ruinous, feature of the mid Saxon town.²⁰ Near the town perimeter, however, there is no surviving evidence of Saxon occupation. The presence in many areas of a post-Roman grey stony loam layer 500-700 mm thick may be due to cultivation within the walls²¹ (and indeed until the 18th century large areas of the town near the walls were occupied by gardens).

The economy of this mid to late Saxon town is still very imperfectly understood. Wood and leather objects were plentiful, but there is no sign of iron being extensively used for fastening. Weaving was carried out on the warp-weighted loom, the treadle loom being introduced in the 10th century or possibly in the 9th (Appendix 6). The one pottery vessel found was apparently from another district (Appendix 1), but there is nothing like the extensive trade of a site such as 8th-century 'Hamwih' (Southampton). In agriculture, another parochial trait seems to be the use of spelt rather than the free-threshing cereals thought to have been introduced to this country in the post-Roman period (Appendix 5).

Period 5: 10th century

Features (Fig. 5, left)

At the site frontage, much cut by later features, was a cellar building B3 with walls represented by trenches (presumably for sill beams) which also contained preserved

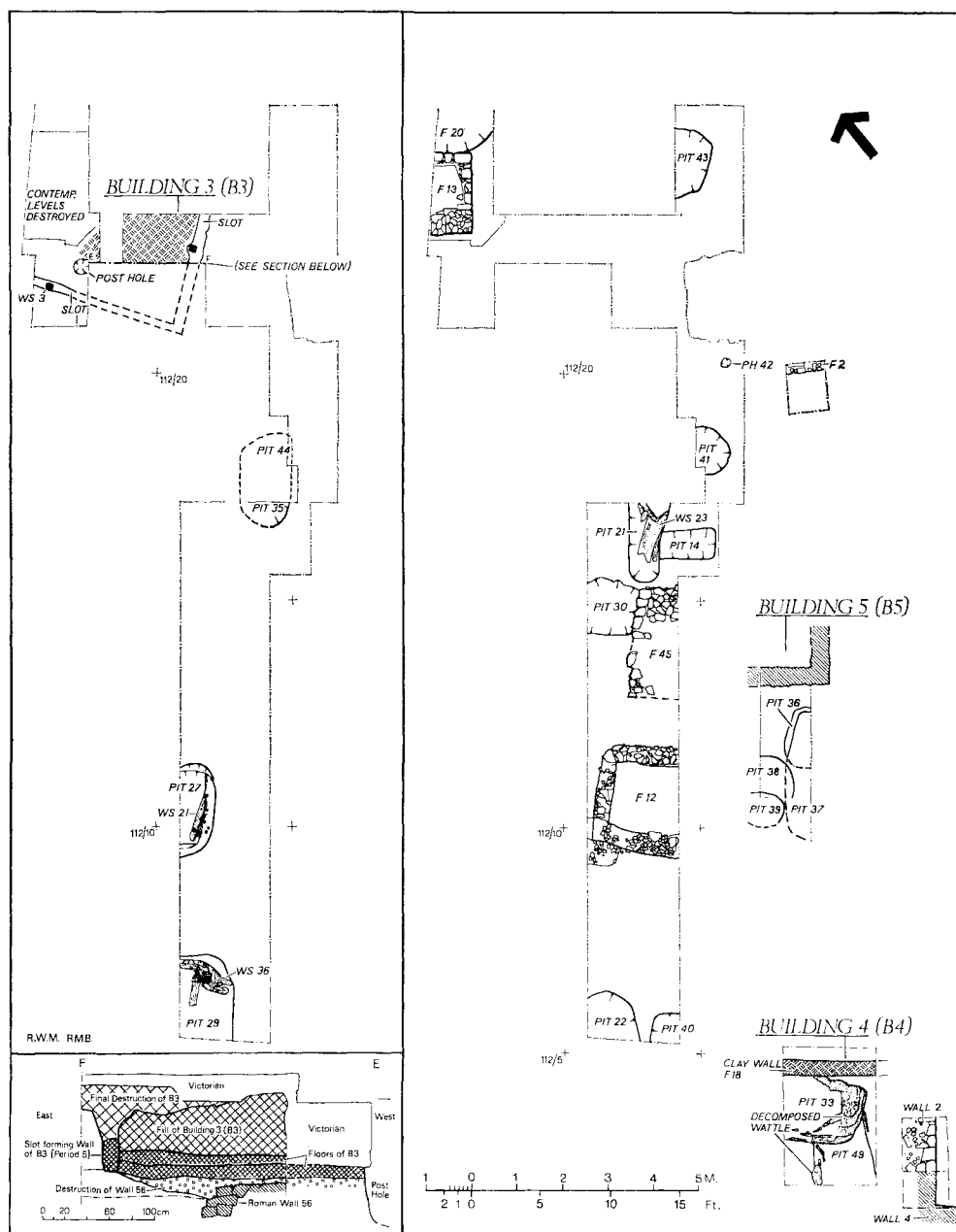


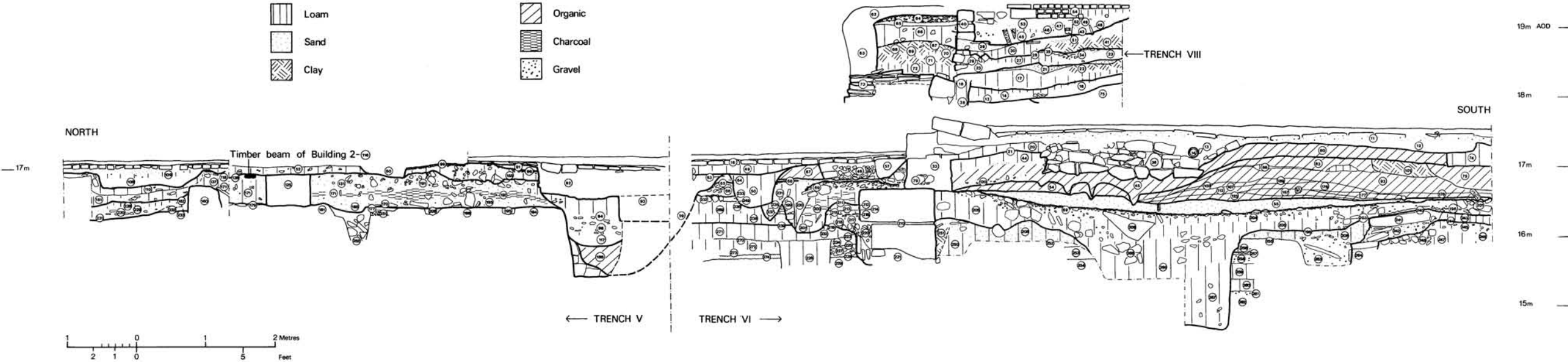
FIG. 5

Left: 1 Westgate St., Gloucester: Period 5, 10th century

Right: 1 Westgate St., Gloucester: features of Periods 6, 7 and 8

1 WESTGATE STREET GLOUCESTER

SECTION



INTERPRETATION

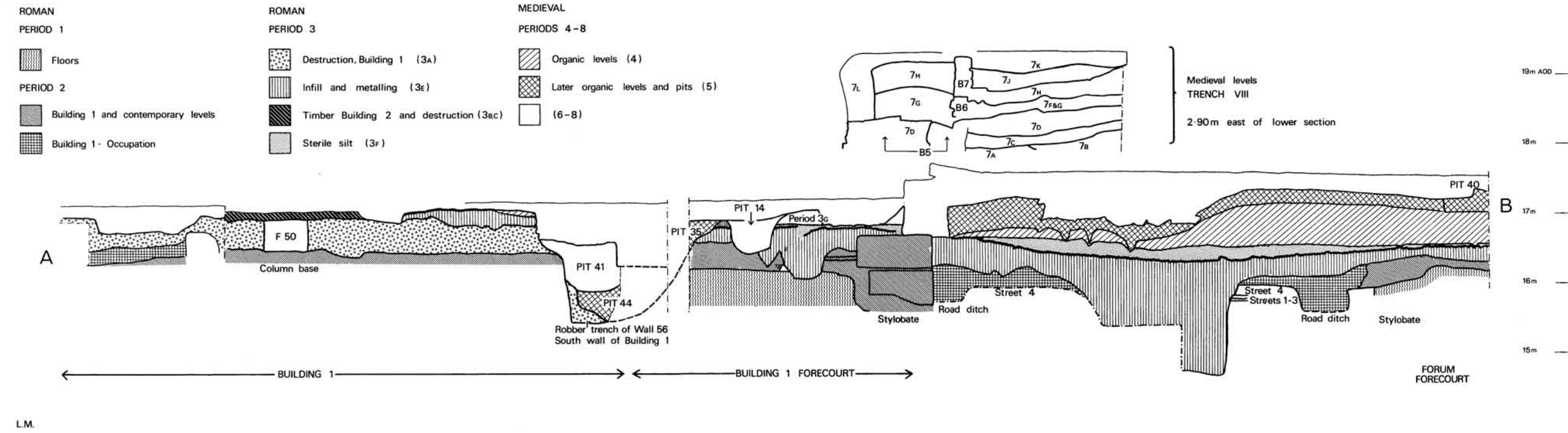


FIG. 6
Section A-B (north-south) of 1 Westgate Street, Gloucester (for location see Fig. 2)

vertical timbers. The cellar had two successive clay floors, and had been filled with tips of loam. Both building floors and fill contained 10th-century pottery as well as glass-melting crucibles (Appendices 1 and 10); the radiocarbon date was 1020 ± 80 (Appendix 3).

The alignment of B3 is neither that of modern Westgate Street, nor that of Roman buildings, although it is close to the alignment of phase 7 buildings at 11–17 Southgate Street (Fig. 1).²²

Several buildings with timber-lined, earth-cut cellars have been found in Gloucester: some at 13–17 Berkeley Street,²³ and one at 30 Westgate Street.²⁴ Their date is 11th to 12th century: the 1 Westgate Street example is apparently 10th century.

Pit 44 was unsealed, but contained kiln wasters of limestone-tempered 10th-century pottery as well as kiln lining (Appendix 1). The pit had no dimensions which could be recorded as it was severely damaged by later features (Fig. 6) and was also obscured by part of the site shoring. B3 contained similar pottery. *Pit 35* also contained similar pottery and was probably part of *Pit 44*.

Pit 27 contained planks and had apparently been wattle-lined. It contained a possible warping-board, possibly residual from Period 4 (Appendix 7). *Pits 27 and 29* were sealed by, and filled with, a soft brown organic material (apparently not human cess — see Appendix 5) which contained pottery similar to that from the pits. The 10th-century ground level was thus preserved. This shows that Building 3 apparently survived to roughly its original ground level, so its profile (Fig. 5, left) can be taken to represent its original depth.

Period 6: 11th to 12th centuries

Features (Fig. 5, right)

Pit 21 was straight-sided and flat-bottomed and contained charred timbers and wooden objects (Appendix 8). One of the smallest timbers was selected for radiocarbon dating and gave A.D. 1060 (Appendix 3); the pottery was late 11th or early 12th century (Fig. 9, no. 58). Contemporary pottery in trench VIII soil levels suggest that this pit was originally about 2 m deep.

Pit 22 was well sealed by layers of organic material (possibly human cess — see sample 229, Appendix 5). Other pits and features were unsealed: *Pit 40*, *Pit 41*, *PH 42*, *Pit 43*, and without useful dating material: *Pit 14* was dated by the pottery within it.

In trench VII the Period 5 organic deposits were overlain by occupation levels associated with wood-lined *Pit 33*, containing 11th-century pottery. The seed remains suggest this was a cess-pit (Appendix 5). Above *Pit 33* were remains of Building 4, of rough lias stones set in a collapsed wall-base F18 of green lias clay. The dimensions of the building were not obtained. Associated with it was 11th-century pottery. *Pit 49* apparently made use of the late Roman robbed wall F23. The pit contained pottery of the 10th to 12th centuries. F23 may have been robbed at this time.

Seed evidence (Appendix 5) suggests that more human faecal material was present in Period 6 than in Periods 4 or 5. Presumably there was more intense human occupation of the town centre, although the evidence comes from a very small area and could be misleading.

Period 7

The sequence in trench VIII: 12th to 13th centuries and later (Fig. 5, right)

In trench VIII a record was made in section of levels dating from the end of Period 6 to the late 13th century.

7A: In the earliest levels was *Pit 36* containing late 12th-century pottery; there was evidence of smithing, since the pit contained slag in some quantity, and hearth lining.

7B–F: Over this were accumulations of green-stained loam, and *Pit 37*. *B5* was then constructed, though working continued nearby. The pottery from all these phases was

early 13th century. A tuyere associated with copper alloy melting was found in Period 7F (Fig. 19, no. 31).

7G: B6 (Fig. 6) was late 13th century or later: much smithing slag was still present, and there was now also some coal.

7H, 7J: Two more rebuilding phases, B7 and B8 (Fig. 6), produced no dating evidence: later medieval levels had been removed by the Victorian brick floor.

Some of the external levels for these buildings survived. Phase 7H (Fig. 6) shows loam accumulations east of B5 which produced no finds.

7L: Cutting these external loams was a trench c.2.2 m wide and at least 3 m deep: it was undated and its purpose is unknown.

Period 8

Features (Fig. 5, right)

The Victorian cellar, in the base of which the excavation started, incorporated remains of a stone 17th-century cellar with stone walls with which the following features may have been associated.

Pit 30: Pit with trace of stone wall. Only Roman pottery.

F12, F45: Stone cess-pits. Scraps of 18th-century pottery.

F13: Stone chimney foundation. No finds.

F20: Cinder pit. 17th-century pottery, 17th-century clay pipes; Gloucester token farthing, Richard Chandler sadler, c.1670.²⁵

F2: Trench III: a mortared wall, probably a post-medieval cess-pit.

Walls 2 and 4: Trench II: two walls at right angles faced only on the inside and cutting Period 5 organic levels; probably a post-medieval cess-pit.

APPENDIX I

THE POTTERY. *By A. G. VINCE, Dept. of Archaeology, University of Southampton*

The Roman pottery is published elsewhere,²⁶ but since it is relevant to the late and sub-Roman history of the site, the conclusions of the report are summarized here. The Saxon pottery from Periods 4 and 5 is published in full, whilst the later pottery from Periods 6 and 7 is summarized; full details of the fabrics, forms and dating of these wares are published elsewhere.²⁷

The pottery from Gloucester has been classified into Type Fabrics²⁸ and the normal procedure in processing is to refer all sherds to a reference series which has been the subject of binocular microscope and petrological examination. The pottery from Periods 4 and 5 was examined in greater detail because of the rarity of stratified levels of this date.

The conventions used in the pottery drawings are as follows. Hatching of the pot section indicates hand-made; solid section: wheelthrown. The pie-diagram indicates the proportion of the rim which has survived. The second, stippled circle, where used, indicates glazing on the interior (left half of circle) or exterior (right half of circle).

Roman pottery

The pottery from Period 2B is probably a late 3rd or early 4th-century group, a date in accordance with that of the coins. The most common ware (59%) is Dorset black-burnished (BB1: TF 4). The next most common ware (9%) is of local origin, 'Severn Valley Ware' (TF 11). The only other of numerical importance (9%) is Oxfordshire colour-coated (TF 12). Shell-tempered ware (TF 22) is absent from this group, but present (1%) in the group from Period 3A. With this minor difference, the Period 3A group is remarkably similar to that from Period 2B. The coins, however, suggest that the Period 3A group was deposited almost a century later.

The pottery from the use and destruction of B2 (Periods 3B and 3D) is quite different. Dorset black-burnished ware is virtually absent; shell-tempered ware accounts for 13% of all sherds and a local grey ware (TF 5) accounts for 16%. Oxfordshire colour-coated (29%) and 'Severn Valley Ware' sherds (22%) are also still common.

The decline of the black-burnished ware industry in the last quarter of the 4th century is a well-known phenomenon,²⁹ and for some areas it has been suggested that this marks the beginning of the end of long-distance pottery trade. At Gloucester, however, the wares which replace it are not all local, the shell-tempered ware coming from sources in the Midlands and the Oxfordshire wares from the Upper Thames Valley. North African amphorae, sherds of which are now regularly recognized in small quantities on Gloucester sites, either first appear or become more common during this latest phase. The marketing network in the Severn Valley was therefore probably just as efficient during the late 4th and early 5th centuries as it had been earlier, and there is no evidence for a decline in pottery trade before its sudden and complete demise at an unknown date in the 5th century. A group of pottery from the New Market Hall site at Gloucester must date from well into the 5th century, but is very similar in character to that from 1 Westgate Street, Period 3D, although with enough differences in typology to indicate that it is a later group.³⁰ The only pottery used in the area after the end of the Roman-type industries was hand-made and usually grass or chaff-tempered, probably domestically produced.³¹

Saxon pottery (Periods 4 and 5)

The pottery, glass-working crucibles and fired daub from Periods 4 and 5 are of five fabrics which are described below. Comments upon the stratification, dating and the evidence for pottery production will be found in the discussion.

TF 41A (limestone-tempered pottery): This is a hard and usually black or dark grey fabric. Some of the sherds from Pit 44 are oxidized very pale brown (10 YR 7/4) or mottled in colour, and some have been fired to a sufficiently high temperature to decompose the limestone inclusions³² and cause the partial breakdown of the sherds. The pottery is tempered with a poorly-sorted sand grade material consisting of rounded grains from 0.2 mm to 2.0 mm (but mainly less than 1.0 mm) across. The most common constituents of this sand are limestone fragments which include fossiliferous and oolitic limestone and crystalline calcite. Some of the limestone is stained brown. Quartz is less common and is found mainly in the form of colourless rounded grains from 0.2 mm to 1.0 mm across. Fine-grained colourless sandstone is a rare inclusion, as are fragments of brown opaque chert or flint and dark brown iron ore. These inclusions are set in a matrix of optically anisotropic baked clay containing small angular fragments of limestone, quartz and occasionally white mica.

The pottery from the 'waster pit', Pit 44, is all of one form (Fig. 8). The vessels have globular, baggy bodies with everted rims. The body seems to have been formed by hand from a single lump of clay, since there is no evidence of coiling, and the rim was added later. This gives a thick neck and often a roughly-smoothed join (nos. 80 and 92 have probably broken away at the join, which can be seen in the section of no. 91). The pots have round bottoms, only slightly flattened, and there is no distinct base angle. The surface of the vessels is quite rough, although the pot was wiped horizontally around both sides of the rim, and vertically on the body. The body thickness is very variable, from c. 3.0 mm to c. 8.00 mm.

The sherds of this fabric from other contexts on the site do not include wasters, with the possible exception of two sherds found with used cooking-pot sherds in Pit 35. The remaining sherds all have traces of their use, such as sooting on the outside or a 'kettle fur' deposit on the inside. Some are similar to the pots from Pit 44, for examples nos. 69, 70 and 76-78, although on some of these vessels the rims are taller with less pronounced rim joins.

Alongside these vessels and in exactly the same fabric are sherds from wheelthrown pots, for examples nos. 71-75, 127 and possibly no. 133. Body sherds show that the whole vessel was thrown, but no examples of thrown bases were found; so that either the bases were added later or, more likely, the bases were dishd out after throwing. Two rim forms are found: a lid-seated rim (nos. 75 and 127) and an everted rim with a distinct vertical neck (nos. 71-74 and 133). Glass-working crucibles from the fill of B3 (nos. 59-66) are in the same fabric. A number of sherds from trench VII are also in an identical fabric but come from completely different forms, including

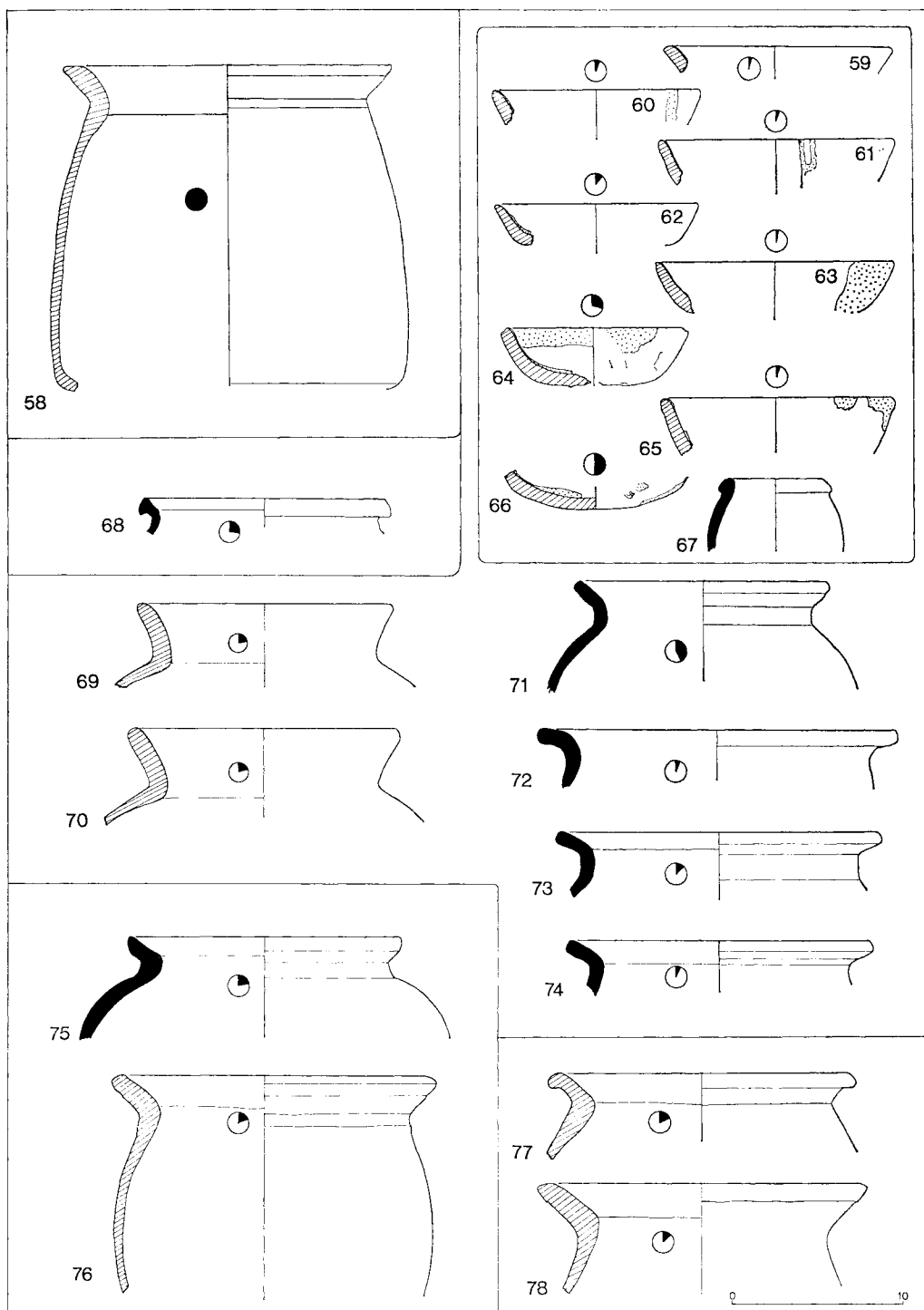


FIG. 7

Saxon pottery. 58: Period 4, TF 47, HMCP (= handmade cooking-pot), VI (279). 59-66: Period 5, TF 41A, handmade crucibles for glass-melting, B 3. 67: Period 5, TF 42, wheelthrown crucible for silver working? B3. 68: Period 4, TF 42, WTCP (= wheelthrown cooking-pot), VI (112). 69-70: Period 5, TF 41A, HMCP, B3. 71-74: Period 5, TF 41A, WTCP, B3. 75: Period 5, TF 41A, WTCP, Pit 27. 76: Period 5, TF 41A, HMCP, Pit 27. 77-78: Period 5, TF 41A, HMCP, Pit 35. Scale 1:4. Note: hatched sections = handmade, solid sections = wheelthrown

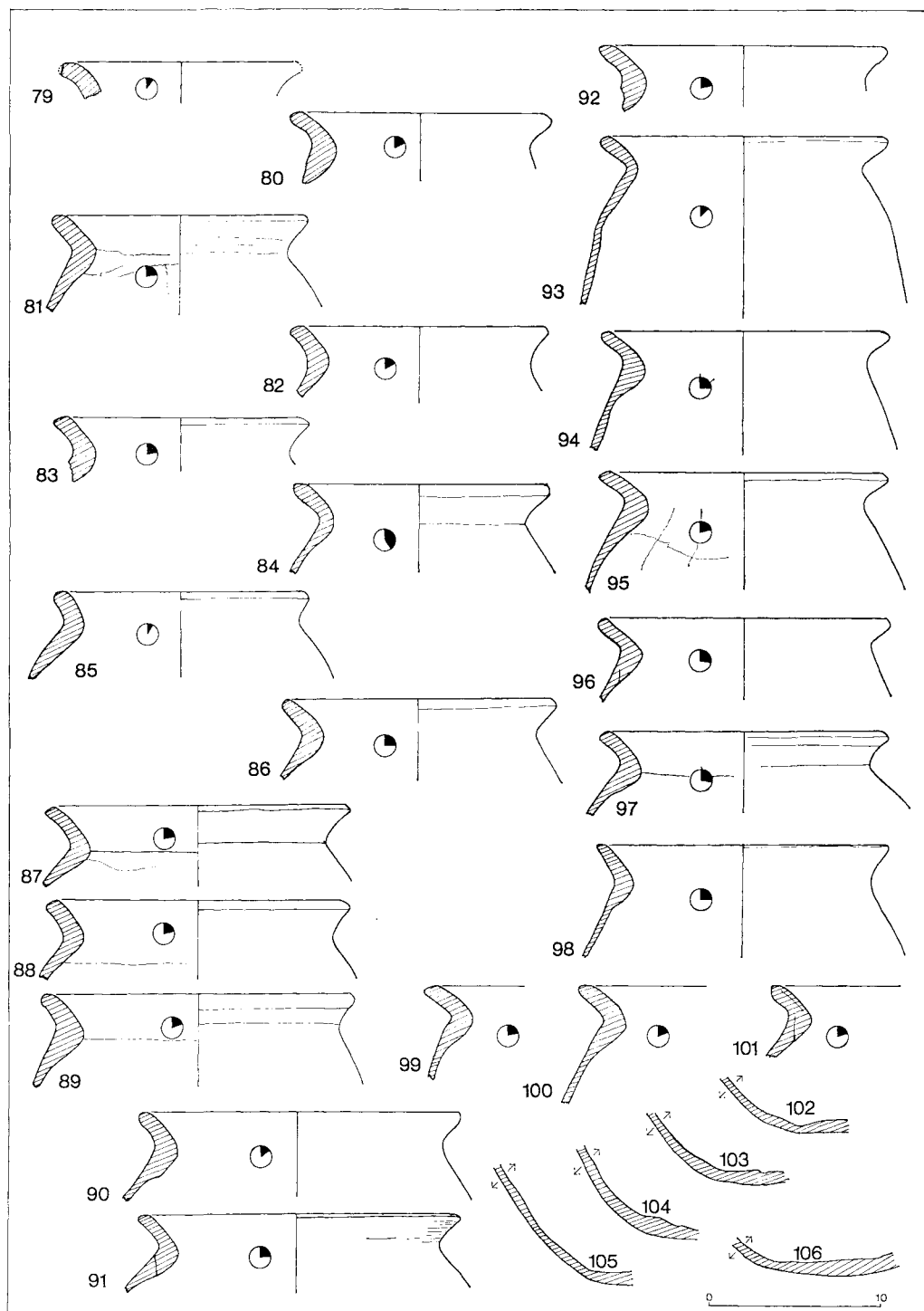


FIG. 8

Saxon pottery. 79-106: Period 5, TF 41A, HMCP wasters, Pit 44. Scale 1:4

straight-sided and globular cooking-pots with club rims (nos. 108, 110). They are associated with later 11th-century cooking-pots (TF 41B) and may show the influence of these new types on the Gloucester industry.

TF 42 (quartz sand-tempered wares, unknown sources): No. 67 is a wheelthrown vessel with a beaded rim used as a crucible, in a hard white fabric with abundant inclusions of angular and subangular, often cloudy, quartz up to 0.5 mm across. The clay matrix contains a little fine angular quartz and is optically anisotropic. The fabric is very porous and contains remarkably little iron, either in the matrix or as ore inclusions. The crucible came from the construction of B3 in Period 5, but may be residual from Roman levels.³³ It contains residue from silver-working (see Appendix 11). No. 68 is a rim sherd from a wheelthrown cooking-pot with a moulded lid-seated rim. The fabric is hard, grey and rough to touch, and has abundant poorly-sorted angular quartz inclusions and a few colourless fragments of chert or flint, all less than 0.5 mm across. The rim was recovered from the section during the taking of a soil column and was definitely within the Period 4 organic layers. This is therefore the earliest securely stratified post-Roman vessel from Gloucester.

TF 43 (quartz sand and limestone-tempered pottery): The fired daub from Pit 44 and the fill of B3 and the two glass-melting crucible fragments are tempered with abundant rounded quartz grains, well sorted and less than 0.5 mm across. These are poorly mixed with the clay, occurring in lenses. Grass impressions are also common in the daub. Limestone and sandstone fragments up to 3.0 mm across are present in small quantities. This fabric is very similar to that of the late 11th-century pottery fabric TF 43 and to samples of the sandy terrace clays present to the N. of Gloucester.

TF 45 (hand-made, shell-tempered ware): The fabric is soft with a grey core and oxidized yellowish-brown surfaces (10 YR 5/4). There are abundant inclusions of white shell, up to 0.5 mm thick and 4 mm long, and rare inclusions of subangular quartz, rounded iron ore and microfossils all up to 0.2 mm, as well as clay pellets and medium-grained limestone fragments up to 1 mm. The clay matrix contains a little white mica and angular quartz and numerous specks of limestone, mainly less than 0.02 mm across. The size range and type of shell fragments distinguish this fabric from shell-tempered late Roman, late Saxon (St Neots type) and medieval (St Neots jugs) wares. All, however, have a very similar clay matrix with a little quartz, scattered iron ore and microfossils (which may differ in detail). This suggests the use of the Oxford clay, although probably other Jurassic clays have similar characteristics.

The sherds are hand-made and come from cooking-pots. No other details could be discerned. Only two other sherds of this fabric have been found in Gloucester: one from 11-17 Southgate Street in a 10th-century context, the other a globular-bodied cooking-pot with an everted rim thickened at the lip, from a post-Roman pit (F506) on the North Gate site.³⁴ The petrological analysis suggests a source in an area of Jurassic rocks, and at Oxford visually similar fabrics occur from the late 8th to the late 10th or early 11th century and are the major fabrics found.³⁵ The only other sites W. of Oxford to have produced this fabric are Worcester, Sidbury, where sherds were stratified in late Saxon pits,³⁶ and Swindon, unstratified in a collection containing other late Saxon wares.

TF 47 (flint and/or chert-tempered wares): Four of the six sherds in this fabric were examined in thin-section and two groups recognized. The first (three sherds from Period 4) is hard, black, with abundant angular light brown flint up to 3 mm long and rounded fine-grained limestone, some leached or burnt-out, up to 1 mm across. The clay matrix contains numerous small iron ore pellets about 0.04 mm across and some larger subangular quartz and iron ore fragments up to 0.3 mm across. The second (one sherd from Period 5) is hard, black with angular light brown flint fragments up to 3 mm long, subangular brown chert up to 1 mm, rounded fine-grained limestone up to 2 mm across, quartz and metaquartzite up to 2 mm across and fine-textured clay or grog pellets with subangular quartz inclusions. The clay matrix contains numerous subangular quartz fragments up to 0.1 mm across and subangular to rounded grains up to 0.3 mm across.

Neither of these two groups is identical to the one sherd of flint-tempered ware from the North Gate site (from a 12th-century context), nor to a widespread flint-tempered ware found in the 12th and 13th centuries in N. Wiltshire and Berkshire, which also contains a high quantity of coarse rounded quartz sand.³⁷

All but one of the sherds come from hand-made vessels, the exception being a wheelthrown body sherd from trench VII with pronounced external rilling. The three sherds from Period 4 include no. 58, although the latter is thought to have been in a small feature which could barely be distinguished from the levels it cut. Another sherd came from Period 6 Pit 29, which cut the

Period 4 levels, and the wheelthrown sherd from trench VII was associated with late 11th-century fabrics.

Only three other post-Roman flint-tempered sherds have been found in Gloucester. One from 11-17 Southgate Street is a rim sherd very similar to no. 58 and came from a 10th-century context. The other two sherds are hand-made body sherds from 14th-century and 12th-century contexts.³⁸ There are no parallels in the Severn Valley, but at Oxford a few sherds of this type are known, one from a level sealed by the Castle mound (and therefore pre-1070). Early medieval pottery at Abingdon, dated to the 11th century,³⁹ is all of similar fabric and includes wheelthrown vessels. To judge by the distribution of later cooking-pots in a similar fabric, the sources of these wares must be in Berkshire or E. Wiltshire.

Discussion

The study of late Saxon pottery in Gloucester, as in many other towns, is frustrated by the small size of the excavations, the lack of absolute dating evidence, and the small quantity of pottery found. The general sequence of stratigraphy at Westgate is clear although trench VII could not be stratigraphically correlated with the rest of the site. It would, for instance, be unwise to make too much of the absence of pottery from the Period 4 levels since so small an area was excavated. However, only seven sherds of medieval-type pottery were found in Period 4, although other domestic refuse, such as animal bone, was common. In the late Roman and in the 12th- and 13th-century levels potsherds are as common as animal bone fragments. The difficulty in recognizing intrusive features in the Period 4 levels means that only two sherds, from the same vessel (no. 68) can be regarded as securely stratified.

Period 5 is characterized by the presence of TF 41A, including the group from Pit 44, which for several reasons is interpreted as production waste. Firstly, the quantity of pottery found is much higher than in any of the other Period 5 contexts, and none has the appearance of domestic rubbish (there are no animal bones from the pit and none of the sherds have external sooting or 'kettle fur' deposits). Secondly, some of the sherds are overfired and decomposed, and others have a mottled firing pattern which suggests that they had lain broken in ash while still hot, so that only parts of the sherds were oxidized. Finally, the fired daub in the pit is interpreted as part of a kiln superstructure. The daub fragments have one smoothed face, often concave, and one rough with wattle impressions, suggesting a wattle dome with a smooth daub lining and rough exterior.

The evidence shows that at least some of the TF 41A pottery was made close to the site and probably all was made in Gloucester. Comparison of thin-sections of the pottery with clay samples and gravel from around the town failed to provide a good match, although the clay used to make the fired daub, the glass-melting crucibles, and another local pottery fabric, TF 43, is matched by samples from the sandy terrace clays N. of the town.

The distribution of TF 41A within Gloucester is of some interest, since it suggests occupation along the street frontages, but not on sites close to the defences. Occupation can also be demonstrated along the streets outside the N. and W. gates.⁴⁰ The distribution of this ware outside Gloucester is limited at present to two sites: Hereford and Worcester. At Hereford, the ware is found associated with Chester-type ware on several sites. It is absent from levels sealed by the turf and timber rampart (?late 9th century), and is present on the Victoria Street site in levels pre-dating a smashed red-painted Stamford ware vessel of early 10th-century date.⁴¹ A starting date of c. A.D. 900 at Hereford is therefore likely. At Worcester, both hand-made and wheelthrown vessels in this fabric were found in a group of late Saxon pits together with sherds of several late Saxon fabrics.

Although several distinct forms occur in the cooking-pots, there is no proven difference in date between them. Wheelthrown and hand-made vessels occur together at this site, at other sites in Gloucester, and at Hereford and Worcester. Although this

might be taken as evidence for a short lifespan for the ware, it must be remembered that there is no typological progression in the cooking-pots produced by the E. Midlands Saxo-Norman industries during a period of 200 years.⁴² The variety of contemporary forms and methods of production suggest that several groups of potters were working in Gloucester. Since there is no demonstrable history of pottery making in the town before the appearance of this fabric, it is likely that these differences are due to potters migrating to Gloucester from different areas of England.

The medieval pottery

The number of sherds of each fabric can be seen in Table 1 (strictly speaking these numbers are the minimum number of vessels of each fabric in each context, since if sherds are obviously from one vessel they are counted as one).

TF 40: Malvern Chase cooking-pots, first found in Gloucester in the early 12th century.⁴³ Nos. 118–21, 126, 140, 142, 144, 149, 155–56, 161–62, 164–65.

TF 41B: Oolitic limestone-tempered cooking-pots (quite distinct from *TF 41A*) first found in Gloucester in the late 11th century. Nos. 107, 112–15, 117, 122–24, 128–32, 134–37, 141, 145, 147–48, 150–54, 157.

TF 43: Cooking-pots tempered with quartz and limestone sand, first found in Gloucester in the late 11th century (although crucibles and kiln-lining in this fabric are found in the 10th century (see above).). No. 125.

TF 44: N. Wiltshire tripod pitchers, tempered with oolitic limestone (but distinct from *TF 41A* and *TF 41B*), and first found in Gloucester in the early 12th century. Nos. 116, 158, 159.

TF 51: Stamford ware pitchers first found in Gloucester in the 10th century (these particular sherds are of a type first found in the late 11th century) and a green-glazed Developed Stamford ware jug, No. 139, first found in Gloucester in the late 12th century.

TF 52: Malvern Chase tripod pitchers in a sandy fabric, first found in Gloucester in the early 12th century.

TF 53: Ham Green wares, mainly jugs of Barton's type B,⁴⁴ and one cooking-pot. First found in Gloucester in the early 13th century. Nos. 143 and 146.

TF 90: Worcester-type jugs in a quartz sand-tempered fabric, first found in Gloucester in the early 13th century. Nos. 160, 163.

TF 91: Worcester-type sand-tempered cooking-pots (a coarser fabric than *TF 90*), first found in Gloucester in the 12th century. No. 166.

TF 93: Winchester-type ware first found in Gloucester in the 10th century. This particular sherd, in an 11th-century context, is coarser than most from Gloucester but is still within the range of fabrics found at Winchester.⁴⁵

TF 108: Shrewsbury-type ware. A sherd from a quartz sand-tempered vessel with a sagging base and external glaze. This fabric first occurs in Gloucester in the early 13th century.

Unprovenanced wares: *TF 50:* One sherd from a wheelthrown jug with a thin external clear lead glaze with a few broken speckles. The fabric is hard, oxidized very pale brown (10 YR 7/4) with fine inclusions of subangular quartz, a little red iron ore, and some burnt-out or leached limestone voids. The clay matrix contains numerous flecks of white mica. This fabric is not petrologically distinctive and is not common locally. For these reasons it is impossible to suggest its source. It was found in an early 13th-century context, Period 7E.

Roof tiles: *TF 89:* Five fragments of glazed ridge tile were found in Period 7 deposits. The earliest context contained late 12th-century pottery, and the others early 13th-century pottery. The source of this roof tile fabric is unknown. These are some of the earliest ridge tiles from medieval Gloucester. Unlike the later medieval tiles, which are obviously by-products of the hollow-ware industry, no pottery vessels are known with the same fabric.

Discussion

Table 1 shows that the medieval wares appear in the Period 6 and 7 sequence in the same order as found elsewhere in the town and this allows the groups to be roughly dated. The only external dating evidence comes from Pit 21 (Period 6) where dendrochronology and radiocarbon dating suggest an early 12th-century date (Appendices 2 and 3).

Only three vessel forms are present: the cooking-pot, the tripod pitcher and the jug. Open wares, for example dishes or bowls, are occasionally found in Gloucester, but none

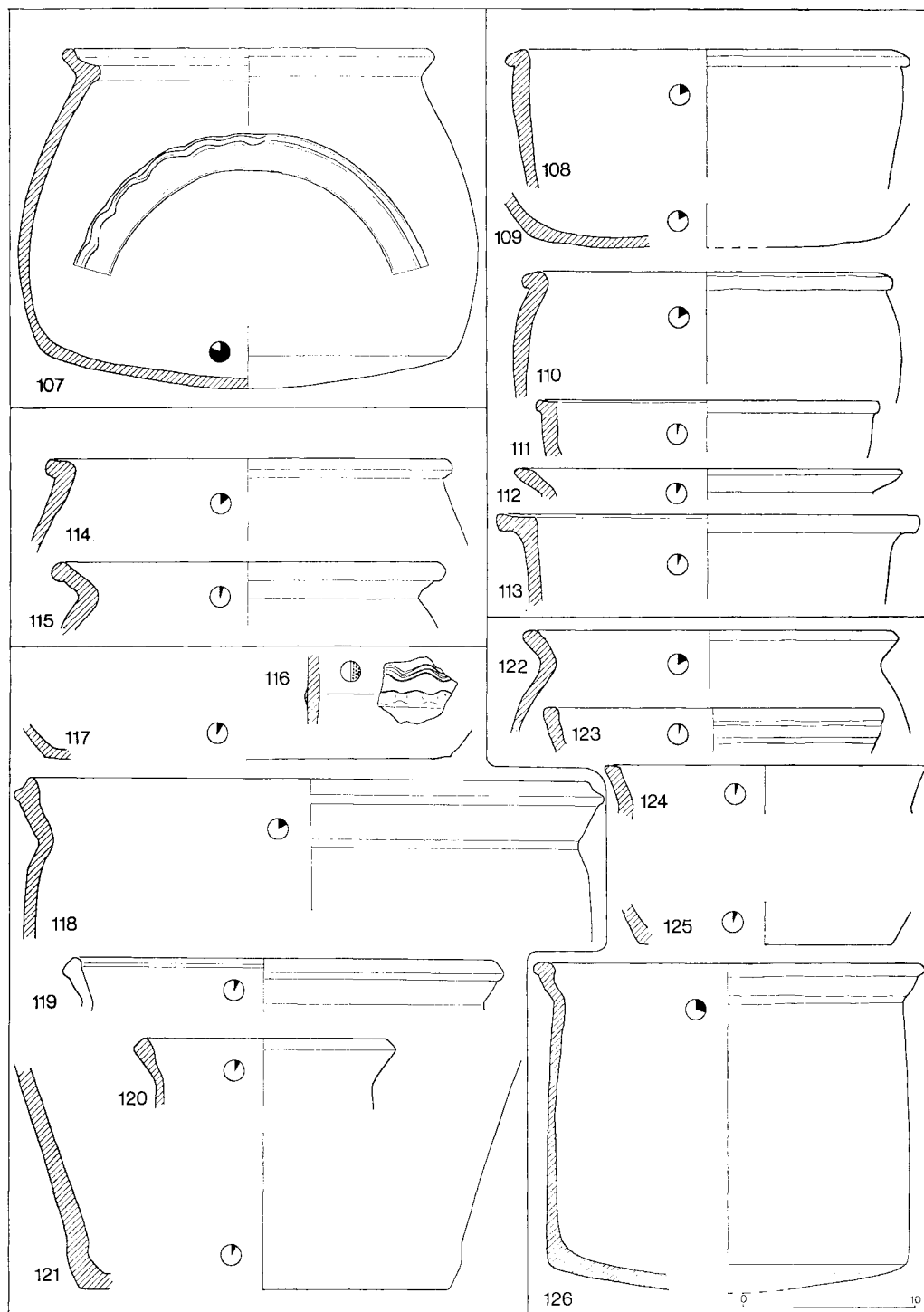


FIG. 9

Medieval pottery. 107: Period 6, TF 41B, HMCP, Pit 21. 108-111: Period 6, TF 41A, HMCP, Pit 49. 112-115: Period 6, TF 41B, HMCP, Pit 49. 116: Period 6, TF 44, HMTP, Pit 22. 117: Period 6, TF 41B, HMCP, Pit 22. 118-21: Period 6, TF 40, HMCP, Pit 22. 122-24: Period 6, TF 41B, HMCP, VI (53). 125: Period 6, TF 43, HMCP, VI (53). 126: Period 6, TF 40, HMCP, VI (53). Scale 1:4

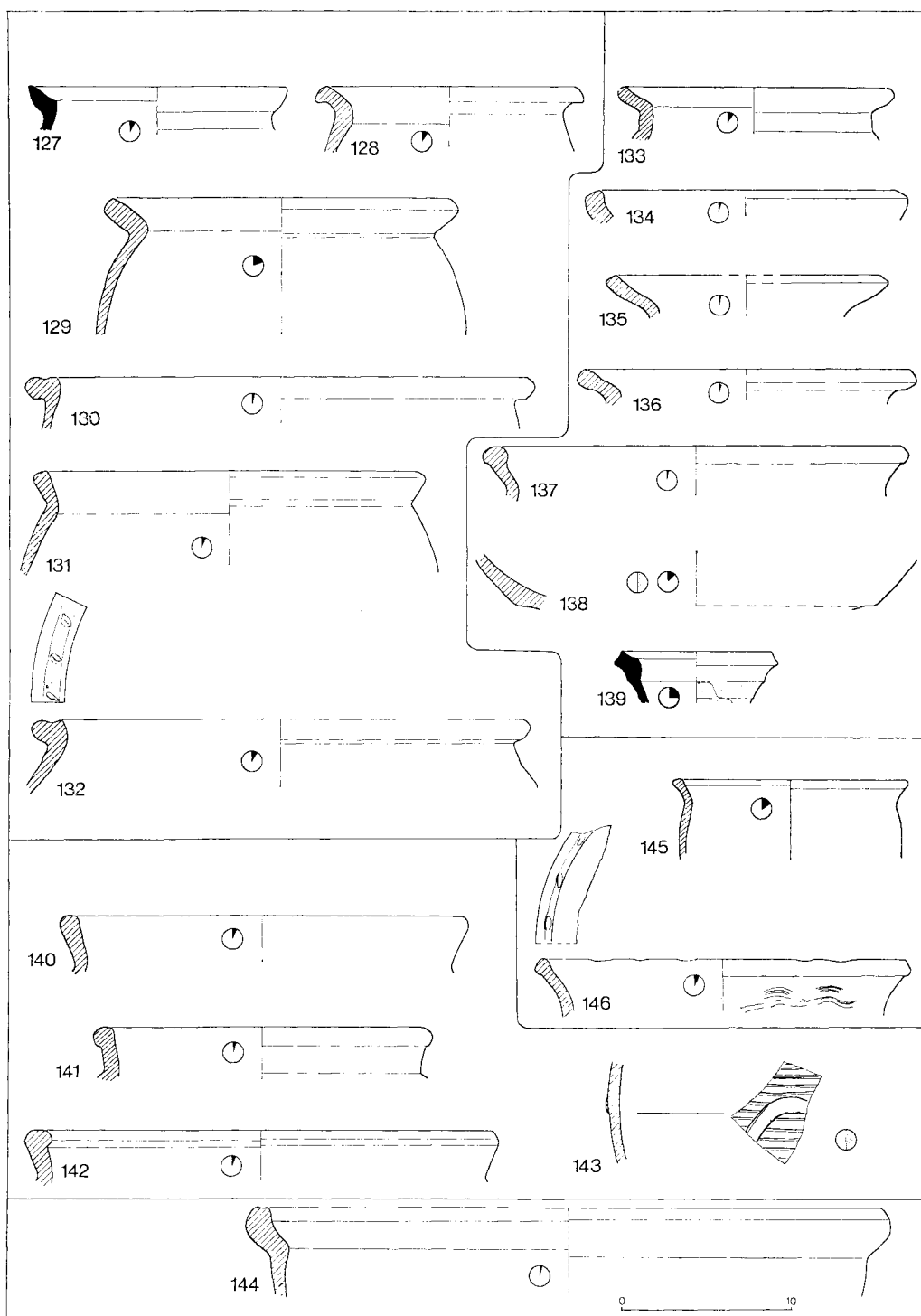


FIG. 10

Medieval pottery. 127: Period 7A, TF 41A, WTCP. 128-32: Period 7A, TF 41B, HMCP. 133: Period 7A, TF 41A, ?WTCP, Pit 36. 134-37: Period 7A, TF 41B, HMCP, Pit 36. 138: Period 7A, TF 52, HMTP, Pit 36. 139: Period 7A, TF 51, WT jug (developed Stamford Ware), Pit 36. 140: Period 7B, TF 40, HMCP, Pit 37. 141: Period 7B, TF 41B, HMCP, Pit 37. 142: Period 7B, TF 40, HMCP, Pit 37. 143: Period 7B, TF 53, HM jug, Pit 37. 144: Period 7B, TF 40, HMCP, Pit 37. 145: Period 7C, TF 41B, HMCP. 146: Period 7C, TF 53, HMCP. Scale 1:4

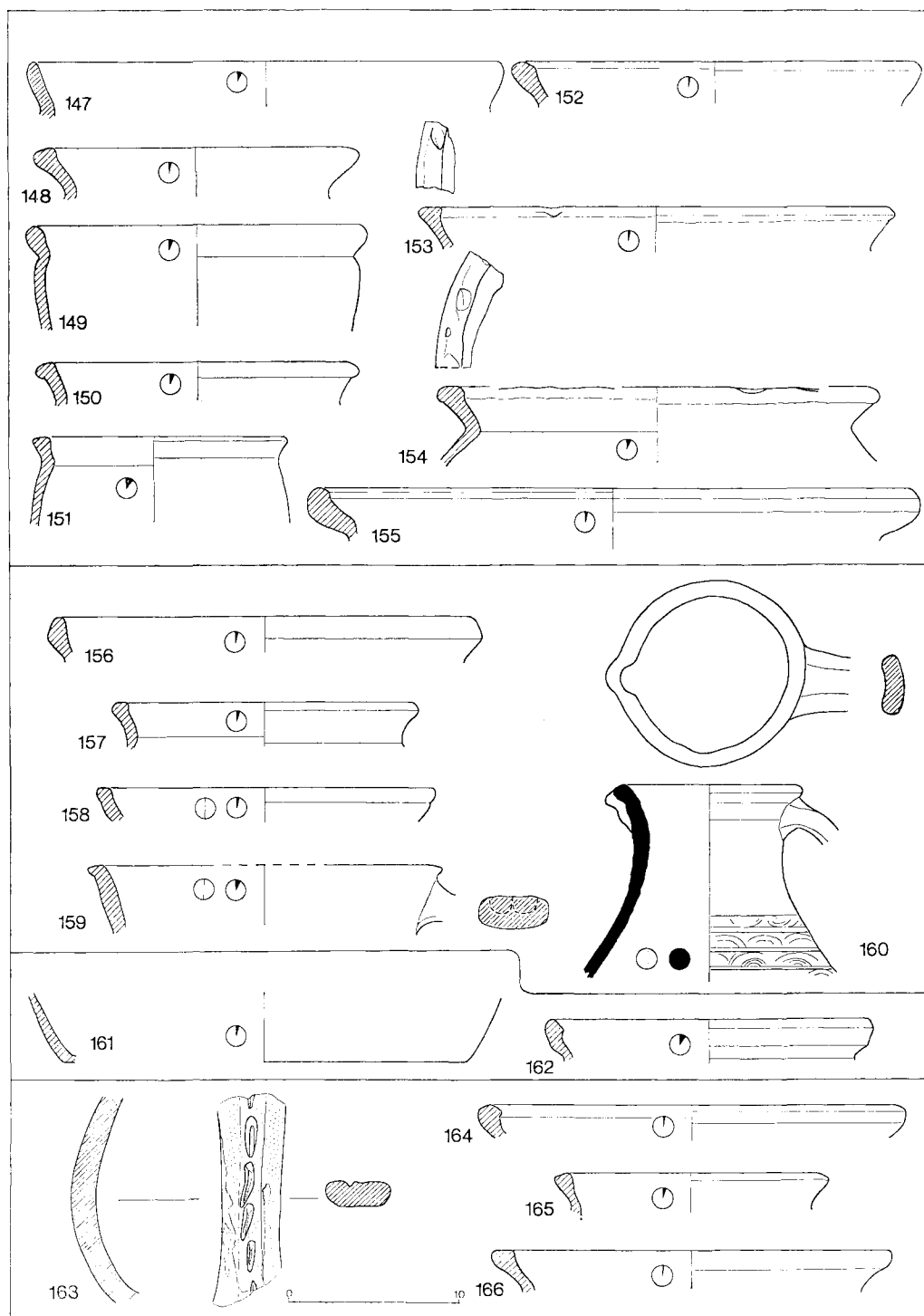


FIG. 11

Medieval pottery. 147-48: Period 7D TF, 41B, HMCP. 149: Period 7D, TF 40, HMCP. 150: Period 7D, TF 41B, HMCP. 151-54: Period 7D, TF 41B, HMCP. 155: Period 7D, TF 40, HMCP. 156: Period 7E, TF 40, HMCP, Pit 38. 157: Period 7E, TF 41B, HMCP, Pit 38. 158-59: Period 7E, TF 44, HMCP, Pit 37. 160: Period 7E, TF 90, WT jug, Pit 38. 161-62: Period 7E, TF 40, HMCP, Pit 39. 163: Period 7F, TF 90, WT jug. 164-65: Period 7F, TF 40, HMCP. 166: Period 7F, TF 91, ?HMCP. Scale 1:4

TABLE I
SHERD COUNTS OF SAXON AND MEDIEVAL POTTERY

| Period | Feature | 41A { limestone tempered | 43 | 40 TP { Malvern Chase | 44 TP | 53 CP | 53 jug | 91 CP | 90 jug | 45 | 47 | 51 Stamford ware | 93 Winchester ware | 108 | 42 Misc. | 41A { crucibles | 42 | 89 roof tile | Suggested date | Publication Numbers |
|--------|----------------------------------|--------------------------------|----|-----------------------------|-------|-------|--------|-------|--------|----|----|------------------|--------------------|-----|----------|--------------------|----|--------------|----------------------------------|--|
| 7F | | | | 3 | 4 | 4 | 1 | 2 | 3 | | | | | | | | | | early 13th cent. | 163-66 |
| 7E | Pit 39 Pit 38 | 4 | | 8 | 1 | 7 | 3 | 4 | | | | | | | 1 | | | | early 13th cent. | 161-62 156-60 |
| 7D | | 13 | 1 | 8 | 4 | 1 | 3 | 1 | | | | | | | | | 1 | | early 13th cent. | 147-55 |
| 7C | | 6 | | 10 | 1 | 1 | 1 | | | | | | 1 | | | | 1 | | early 13th cent. | 145-46 |
| 7B | | 9 | | 12 | 2 | 2 | | | | | | | | | | 1 | | | early 13th cent. | 140-49 |
| 7A | Pit 36 | 1 | 18 | 6 | 2 | 3 | | | | | | 1D* | | | | | 2 | | late 12th cent. | 133-39 |
| 7A | | 1 | 8 | | | | | | | | | 1 | | | | | | | late 11th to early 12th cent. | 127-32 |
| 6 | Pit 22 Pit 14 | 3 | 45 | 1 | 19 | 10 | 4 | | | 1 | 1 | 2 | | | | | | | late 12th cent. | 116-62 |
| 6 | Pit 21 | 3 | 75 | | | | | | | | | | 1 | | | | | | early 12th cent. | 107 |
| 6 | Tr. VII | 9 | 17 | | | | | | | | 1 | 1 | | | | | | | late 11th cent. | 108-115 |
| 5 | Pit 44 B3 Pit 27 Pit 35 | c.300 33 27 | | | | | | | | | | | | | | 30 | 1 | | 10th to early 11th cent. | 79-106 59-67, 69-74 73-76, 77-78 |
| 4 | | 1 | | | | | | | 1 | 3 | | | | 2 | | | | | ?9th cent. | 58, 68 |

*D = developed Stamford Ware

were found in this sequence, apart from a sherd from a Malvern Chase curfew from Period 7C. Spouted pitchers, often with stamped decoration on the shoulders, are found in fabric TF 41B in the late 11th and early 12th centuries, but again none were present here. (Body sherds of this form are immediately recognizable because the internal limestone inclusions have been heavily leached by the acidic contents of the vessels.)

During the period covered by this sequence the cooking-pot continued to be the main vessel form (almost 100% at the beginning and 65% at the end of the period). Glazed wares are found from the beginning, the earliest vessels being wheelthrown Saxo-Norman pitchers, but only become common during the 12th century when tripod pitchers form about one-fifth of all pottery found. By the early 13th century the proportion of glazed wares had risen to over one-third with the appearance of jugs with thumb-frilled bases and bridge spouts.

The sources of these wares, as far as they are known, show that there was a widening of the area supplying the town. Whereas in the late Saxon period (Period 5) virtually all the pottery used was made in the town, in the late 11th century the industry had been replaced, possibly by that at Haresfield, 9 km to the S. Pottery in TF 41A, but in new forms, and the few sherds of TF 43, show that pottery-making was probably still practised in the town or its suburbs. In the 12th century, pottery from the Malvern Chase (25 km to the N.) and from N. Wiltshire, probably from the Forest of Braydon (35 km to the SE.) first appears, and is still found in the early 13th century with new wares from Ham Green (52 km to the S.) and Worcester (40 km to the N.). As might be expected, at all points in the sequence the glazed wares were obtained from further afield than the cooking-pots, although some cooking-pots from up to 52 km away, i.e. Ham Green, are found. The only numerically important pottery from further afield was Stamford ware, mainly of the late 11th and 12th centuries. Only one sherd in this sequence might be a Continental import, although it does not belong to any recognized fabric. That is the sherd from Period 7E, TF 50.

Acknowledgements

I would like to thank R. Shoesmith for permission to quote from his forthcoming publication of the Hereford excavations; K. Killmurry and K. Barclay for examining the sherds of Saxo-Norman glazed wares; and M. Mellor, E. Morris and the Swindon Excavation Unit staff for showing me comparative pottery from Oxford, Worcester and Swindon respectively. D. Hinton kindly read and criticized an earlier draft of this report. I am most grateful to C. Goudge who assisted with research and checking of the text.

APPENDIX 2

TREE RING ANALYSIS. *By* RUTH MORGAN, *Dept. of Archaeology, University of Sheffield*

Thin cross-sections of five oak (*Quercus* sp.) timbers were examined with the aim of dendrochronological dating. All were planks or beams of narrow-ringed oak (i.e. slow grown, possibly under forest conditions); three (WS29, WS35 and WS12 from Period 4: see Fig. 4, right) had some outer sapwood remaining, indicating proximity to the bark and the date of felling.

Despite their satisfactory length, the tree-ring sequences are not in most cases sufficiently sensitive for cross-dating; none could be matched with any other, although the overall trends of wide and narrow rings and the sapwood boundaries of the three Period 4 timbers suggest that they, at least, are contemporary. The variations in ring width from year to year are too great to create a mean curve for absolute dating.

There are no local reference tree-ring curves close to this region for absolute dating, although the German curves have proved useful for dating in central Wales and the West Midlands; also the comparisons are involved in the very early part of these curves

as published (back to c. A.D. 820) where they are only representative of a small number of timbers and thus less reliable and less wide-ranging. Visual and computer comparison with both German and southern English reference data produced no acceptable matches except for a tentative one: the tree-ring sequence of timber WS26 from Pit 21 fits satisfactorily with the West German reference curve and a curve for the London area between A.D. 946 and 1086, some of the major signatures being common to all. As no sapwood remains, allowance must be made for it and any missing heartwood: the tree must then have been felled sometime after c. A.D. 1110. This tentative dating is in fact supported by the radiocarbon date (of A.D. 1060 ± 70 : see Appendix 3) and by early 12th-century pottery in the same context.

APPENDIX 3

(see facing page 183)

APPENDIX 4

THE ANIMAL BONES. *By* J. M. MALTBY, *Dept. of Environment Faunal Remains Project, University of Southampton*

A total of 1,618 animal bone fragments was recovered, and divided into Roman, Saxon and medieval groups. Eight animal and seven bird species were represented: sheep, goat, cattle, pig, red deer (*Cervus elaphus*), horse, dog, cat, domestic fowl, domestic or grey lag goose (*Anser anser*), domestic duck or mallard (*Anas platyrhynchos*), teal (*Anas crecca*), pigeon or rock dove (*Columba livia*), woodpigeon (*Columba palumbus*), jackdaw (*Corvus monedula*). Table 3 shows that all the samples were dominated by the remains of caprines (sheep and goat), cattle and pigs, but that the relative proportions varied greatly. These fluctuations need not reflect any change in the relative importance of these animals in the diet, since the samples were small and were not necessarily representative of all the faunal material deposited in the city at the time.

Period 3: Roman: Most of the faunal material was associated with late Roman levels. The sample was dominated by cattle (Table 3), represented mostly by the scapula, pelvis and femur (Table 4). The prevalence of metapodials in the small caprine sample may reflect only the hardness of these bones in comparison to others. The virtual absence in all periods of caprine and pig carpals, tarsals and phalanges reflects preservation conditions and excavation techniques, which precluded the recovery of these small bones (Table 4). Both caprine and pig, therefore, are probably under-represented in all periods in comparison to cattle.

Detailed examination showed a consistent practice of cattle butchery. The scapulae remains were very fragmentary and consisted mostly of sections of the blade and coracoid process (spine) of the bone. Most of them were severed across the neck of the bone, allowing the animal's fore limbs to be removed at the shoulder. Similarly, there is evidence that the hind limbs of cattle were detached at the hip joint. Several of the pelvis fragments bore cut marks on the acetabulum or close to it on the ilium, and most of the femora fragments consisted only of the proximal epiphysis, which had been severed just below the articulation with the acetabulum. Clearly the site was used for the disposal of unwanted portions of cattle carcasses. The good quality meat bones were probably sold, accounting for their low representation in the sample. The proportions of jaw, skull and limb extremity fragments were also small, which suggests that most of the cattle would have been slaughtered elsewhere, and their carcasses skinned and trimmed of unwanted skull and limb extremities. The carcasses were then brought to the vicinity of the site, where the meat was cut up into joints and various girdle bones discarded.

APPENDIX 3

RADIOCARBON MEASUREMENTS. By R. L. OTLET, Carbon-14/Tritium Measurements Laboratory, AERE Harwell

| Period | CONTEXT | | MATERIALS | | HARWELL | | Integrated Comments |
|--------|-------------|-------------------------|-------------|---|--------------------|--------------------------------|---|
| | Feature | Description | Description | Identification (C. A. Keepax, A.M.Lab.) | WS No. | Date A.D. (corrected) | |
| 3 | Building B2 | Sill beam | Charcoal | Oak (<i>Quercus</i> sp.) | 1 (Fig. 3, right) | 430 \pm 80 | 1652 Crushed fragments (max. 6.2 cm cube when received) but from large timbers, whose upper surface, only, was presumably burnt; the rest becoming unrecognizable through decay and compression(?). |
| 4 | Wall 49 | Stake from wattle fence | Wood | Hawthorn type (<i>Crataegus</i> / <i>Pyrus</i> / <i>Sorbus</i> / <i>Malus</i> sp.) | 27 (Fig. 4, right) | { 930 \pm 70 970 \pm 80 | 1658 1787 Replicate measurements were carried out on both WS 27 and WS 30, uprights from the same short-lived fence, in view of the discrepancy between the first dates obtained. |
| 4 | Wall 49 | Stake from wattle fence | Wood | Hazel (<i>Corylus avellana</i> L.) | 30 (Fig. 4, right) | { 780 \pm 80 810 \pm 90 | 1655 1788 The second dates agree well with the first and confirm them. Wood is from small-diameter branches, some bark still remained, so re-use of WS 30 not possible. Suggestions of possible modern contamination would favour the earlier date (from WS 30). No pottery |
| 5 | Building B3 | Post from undercroft | Wood | Oak | 3 (Fig. 5, left) | 1020 \pm 80 | 3140 Pottery 10th cent. (Appendix 1). Section of complete post |
| 6 | Pit 21 | Stake | Wood | Hawthorn type | 9 | 1060 \pm 70 | 1657 Pit also contained wooden artefacts, and timber dated by dendro-chronology to c. A.D. 1110 (Appendix 2); pottery early 12th cent. (Appendix 1) |

TABLE 3
ANIMAL BONE FRAGMENTS RECOVERED FROM 1 WESTGATE STREET

| Species | Period 3: Late Roman | | Period 4: Saxon | | Periods 5-7: Medieval | |
|------------------|-------------------------|-----|--------------------|-----|--------------------------|-----|
| | N | % | N | % | N | % |
| Caprine | 30 | 11 | 68 | 38 | 91 | 26 |
| Cattle | 217 | 81 | 62 | 34 | 162 | 47 |
| Pig | 16 | 6 | 49 | 27 | 84 | 24 |
| Cat | — | — | — | — | 4 | 1 |
| Dog | 1 | 0.4 | — | — | — | — |
| Red Deer | 1 | 0.4 | 1 | 0.6 | — | — |
| Horse | 4 | 1 | — | — | 3 | 0.9 |
| Total Mammal | 269 | 100 | 180 | 100 | 344 | 100 |
| Domestic Fowl | 5 | 2 | 3 | 2 | 29* | 8 |
| Grey Lag Goose | — | — | 3 | 2 | 9 | 2 |
| Mallard | 1 | 0.4 | 1 | 0.5 | — | — |
| Teal | 3 | 1 | — | — | — | — |
| Pigeon | — | — | — | — | 1 | 0.3 |
| Woodpigeon | — | — | — | — | 1 | 0.3 |
| Jackdaw | — | — | — | — | 2 | 0.5 |
| Total Identified | 278 | 100 | 187 | 100 | 386 | 100 |
| Large ribs | 68 | — | 62 | — | 99 | — |
| Small ribs | 31 | — | 68 | — | 105 | — |
| Large vert. | 22 | — | 17 | — | 28 | — |
| Small vert. | 4 | — | 8 | — | 20 | — |
| Unidentified | 90 | — | 91 | — | 54 | — |

N = number of fragments.

*Domestic fowl includes sixteen fragments from one skeleton.

Caprine = sheep/goat

Period 4: Saxon: 433 bone fragments were recovered, of which 179 were caprine, cattle or pig (Table 3). No evidence of wholesale butchery was discovered, and the proportion of cattle declines as a result. The Saxon sample, however, is too small to determine whether it was typical of the city as a whole.

Periods 5-7: medieval: 21 deposits, mostly of 10th- to 13th-century date, contained faunal material. 692 fragments were recovered (Table 3). Once again there was no evidence of any systematic disposal of particular parts of the skeletons and it is likely that most of the material was domestic waste. Indeed, the proportions of good quality meat bones of all the principal stock animals were higher than in the earlier levels. Although the proportion of cattle increased, there is insufficient evidence to suggest that they had become more important in the diet.

The exploitation of the principal stock

The limited ageing data available produced results that were consistent with the more abundant evidence from the East Gate site in Gloucester.⁴⁶ The caprine sample consisted predominantly of sheep. No detailed ageing analysis was possible since only six mandibles produced evidence of tooth eruption. Three Saxon specimens were just completing their eruption sequence and belonged to animals of *c.*30 months of age,

TABLE 4

NUMBER OF FRAGMENTS AND MINIMUM NUMBER OF INDIVIDUALS
REPRESENTED BY THE DIFFERENT BONES OF THE PRINCIPAL STOCK ANIMALS

| Bone | Roman | | | Fragments Saxon | | | Medieval | | | Minimum Number | | | Roman | | | Saxon | | | Medieval | | |
|-------------|-------|-----|-----|--------------------|-----|-----|----------|-----|-----|----------------|-----|-----|-------|-----|-----|-------|-----|-----|----------|-----|-----|
| | Cp. | Ca. | Pig | Cp. | Ca. | Pig | Cp. | Ca. | Pig | Cp. | Ca. | Pig | Cp. | Ca. | Pig | Cp. | Ca. | Pig | Cp. | Ca. | Pig |
| Mandible | 3 | 9 | 2 | 10 | 3 | 3 | 3 | 21 | 4 | 3 | 6 | 2 | 6 | 3 | 2 | 3 | 12 | 4 | | | |
| Maxilla | 1 | 1 | — | 1 | — | 4 | 4 | 1 | 4 | 1 | 1 | — | 1 | — | 4 | 4 | 1 | 3 | | | |
| Teeth | 1 | 6 | 1 | 5 | 10 | 7 | 1 | 6 | 4 | 1 | 5 | 1 | 3 | 6 | 4 | 1 | 5 | 4 | | | |
| Skull | 1 | 6 | — | 5 | 2 | 10 | 17 | 19 | 13 | 1 | 5 | — | 2 | 2 | 6 | 11 | 9 | 7 | | | |
| Humerus | 1 | 9 | 1 | 3 | 7 | 4 | 8 | 9 | 10 | 1 | 4 | 1 | 2 | 5 | 4 | 7 | 5 | 8 | | | |
| Femur | 2 | 20 | 3 | 2 | 5 | 3 | 5 | 14 | 7 | 1 | 12 | 3 | 2 | 5 | 3 | 5 | 11 | 6 | | | |
| Scapula | — | 8 | 1 | — | 3 | 7 | 1 | 12 | 13 | 3 | — | 18 | — | 3 | 3 | 1 | 8 | 9 | 3 | | |
| Pelvis | 1 | 33 | 1 | 4 | 5 | 2 | 7 | 10 | 9 | 1 | 11 | 1 | 3 | 4 | 2 | 7 | 8 | 6 | | | |
| Radius | 3 | 6 | 2 | 6 | 2 | 1 | 12 | 10 | 8 | 3 | 5 | 2 | 6 | 1 | 1 | 8 | 8 | 7 | | | |
| Ulna | 1 | 3 | — | 3 | 3 | 2 | 4 | 6 | 6 | 1 | 3 | — | 3 | 2 | 1 | 3 | 5 | 5 | | | |
| Tibia | 2 | 6 | 1 | 11 | 3 | 4 | 10 | 14 | 5 | 1 | 5 | 1 | 6 | 2 | 3 | 8 | 10 | 5 | | | |
| Metacarpal | 2 | 3 | 4 | 7 | 1 | 2 | 4 | 6 | 2 | 2 | 3 | 3 | 5 | 1 | 1 | 3 | 4 | 2 | | | |
| Metatarsal | 12 | 12 | — | 8 | 1 | — | 1 | 14 | 3 | 7 | 8 | — | 3 | 1 | — | 1 | 8 | 2 | | | |
| Metapodial | — | — | — | — | — | — | 1 | — | 2 | — | — | — | — | — | — | 1 | — | 2 | | | |
| Astragalus | — | — | — | — | 3 | — | — | 3 | — | — | — | — | — | 1 | — | — | 3 | — | | | |
| Calcaneum | — | 3 | 1 | — | 5 | 1 | — | 6 | 2 | — | 3 | 1 | — | 3 | 1 | — | 5 | 2 | | | |
| Nav. cuboid | — | 1 | — | — | — | — | — | — | — | — | 1 | — | — | — | — | — | — | — | | | |
| Phal. 1 | — | 8 | — | — | 1 | — | — | 3 | — | — | 5 | — | — | 1 | — | — | 2 | — | | | |
| Phal. 2 | — | 2 | — | — | — | 1 | — | 2 | — | — | 2 | — | — | — | 1 | — | 1 | — | | | |
| Phal. 3 | — | — | — | — | 2 | 1 | — | 1 | — | — | — | — | — | 1 | 1 | — | 1 | — | | | |
| Carpals | — | 1 | — | — | 1 | — | — | 1 | — | — | 1 | — | — | 1 | — | — | 1 | — | | | |
| Patella | — | — | — | — | 1 | — | — | — | — | — | — | — | — | 1 | — | — | — | — | | | |
| Fibula | — | — | — | — | — | 3 | — | — | — | — | — | — | — | — | 2 | — | — | — | | | |
| Atlas | — | 2 | — | — | — | — | — | 1 | 2 | — | 2 | — | — | — | — | — | 1 | 2 | | | |
| Axis | — | 4 | — | — | — | — | 2 | 2 | — | — | 4 | — | — | — | — | 2 | 2 | — | | | |
| Sacrum | — | 1 | — | — | — | — | — | — | — | — | 1 | — | — | — | — | — | — | — | | | |
| Total | 30 | 217 | 16 | 68 | 62 | 49 | 91 | 162 | 84 | | | | | | | | | | | | |

Cp. = Caprine (sheep/goat); Ca. = Cattle.

using Carter's ageing scale.⁴⁷ The other three (Roman, Saxon and medieval respectively) belonged to animals culled in their second year. The epiphyseal fusion evidence also indicated that the majority of sheep were immature, although few first-year mortalities were represented. Most, therefore, were exploited for meat alone, as they were culled too young to have been kept for wool, dairy produce, or as breeding stock.

Most of the cattle bones in the late Roman levels belonged to mature individuals, 11 out of 12 proximal femora being fused, and belonging to animals of at least 36–42 months of age. Three mandibles of Roman date would have belonged to animals of at least four years of age. There was little ageing evidence from the Saxon levels, but the medieval material suggested that some cattle failed to attain full maturity. Four mandibles of 11th-century date belonged to animals reared only for meat, since they were too young to have been employed in the plough team, or to have provided milk. Three other mandibles of the same date belonged to adult animals. These would have been draught, dairy or breeding stock before they were butchered for meat.

Most of the pigs represented were slaughtered at a young age. One exception was a very mature Saxon animal, probably one of the few animals kept for breeding purposes. Few of the other pigs survived into their fourth year, and most were culled during the second year of their lives, at least during the medieval period, whence most of the limited data was obtained.

APPENDIX 5

PLANT REMAINS. By FRANCIS J. GREEN, *Dept. of Archaeology, University of Southampton*

Because most of the botanical material (fruits and seeds) was preserved as a result of waterlogging⁴⁸ and because of the limited size of the samples (mostly less than 1,000 ml), only 500 ml of soil was examined from each context, using methods described by myself⁴⁹ and by Williams.⁵⁰

The quality of preservation within the waterlogged deposits varied, and it must be remembered that variation in botanical constituents from one deposit to the next is as much a function of differing preservation as it is of cultural activities and natural dispersal mechanisms. Some carbonized seeds were present, in particular cereal caryopses, though these formed less than 1% of the total botanical evidence. The data from the excavations have been presented by grouping the botanical material into categories as dominance diagrams (Fig. 12).⁵¹ The species categories are as follows: 'Cereals' — *Triticum aestivum/compactum* (Bread Wheat/Club Wheat), *Triticum spelta* (Spelt-Wheat), *Hordeum* sp. (Barley), *Avena sativa* (Oat) and *Secale cereale* (Rye). 'Orchard plants' include *cf. Fragaria* sp. (Strawberry), *Rubus* sp. (Raspberry and Blackberry), *Prunus* sp. (Plums, Cherries, Sloes and Bullace) and *Malus* sp. (Apple). Ubiquitous species such as *Sambucus nigra* (Elderberry) and *Corylus avellana* (Hazel Nut) are excluded from this category. 'Other arable crops' include *Vicia* sp. (Vetches and Broad Bean), *Pisum* sp. (Pea), *Linum usitatissimum* (Flax) and *Cannabis sativa* (Hemp). All the other categories such as 'plants of arable association', 'plants of calcareous habitat', 'plants of wet habitat' and 'plants of non specific habitat' consist of wild plants and weedy species.

The 'plants of non specific habitat' also include plants not identified to species level, and therefore plants that could not be put into one of the other categories. For the purpose of constructing Fig. 12 the number of seeds within a plant group was converted into a percentage of the total seeds from a deposit, to the nearest whole number. Groups containing less than 1%, but more than 0.5%, have been represented as 1%.

The samples examined came from contexts in Period 4 (9 samples), Period 5 (3 samples), and Period 6 (3 samples). A total of 83 species was identified from these samples.

Period 4, 9th century

Most of the botanical evidence from Period 4 was recovered from bulk samples removed by the excavators from a series of peat-like deposits. This provided an important sequence of material (Fig. 12).

The most important group of economic plants consisted of cereals including Bread Wheat/Club Wheat, as well as Spelt Wheat; the latter was the most dominant cereal in the samples. Oat was represented by a single caryopsis. Rye rachis fragments were also present and quantities of cereal straw and culm nodes were recovered.

Other plants of economic significance include Flax and small quantities of Hemp. The orchard plants found included Raspberry, Blackberry, Strawberry, Sloe, and Apple. As can be seen from Fig. 12, these plants formed very small percentages of the total samples. There were also small quantities of pod fragments of Pea which may have been deliberately cultivated.

The wild plants found within the sequence were dominated by 23 species of possible arable association. As can be seen from Fig. 12 this group forms between 46% and 82% of all samples with a mean of about 58%. On the basis of arable weeds little variation can be observed between samples. A small water-loving plant habitat group exists in most of the deposits and the presence of *Daucus carota* (Wild Carrot) possibly indicates a calcareous habitat.

Pit 26 contained a varied and extensive floral element comparable to the sequence described above. A small quantity of cultivated flax, including both seed and capsule fragments, was recovered from this feature. Small quantities of cereals were also present, consisting of Spelt Wheat spikelet forks, one grain of Oat, and rachis fragments of Rye. The plants of economic significance also included orchard crops such as Strawberry and Blackberry. The botanical evidence from this pit is similar to Sample 209 (Period 4). 10 species of plants of possible arable association were

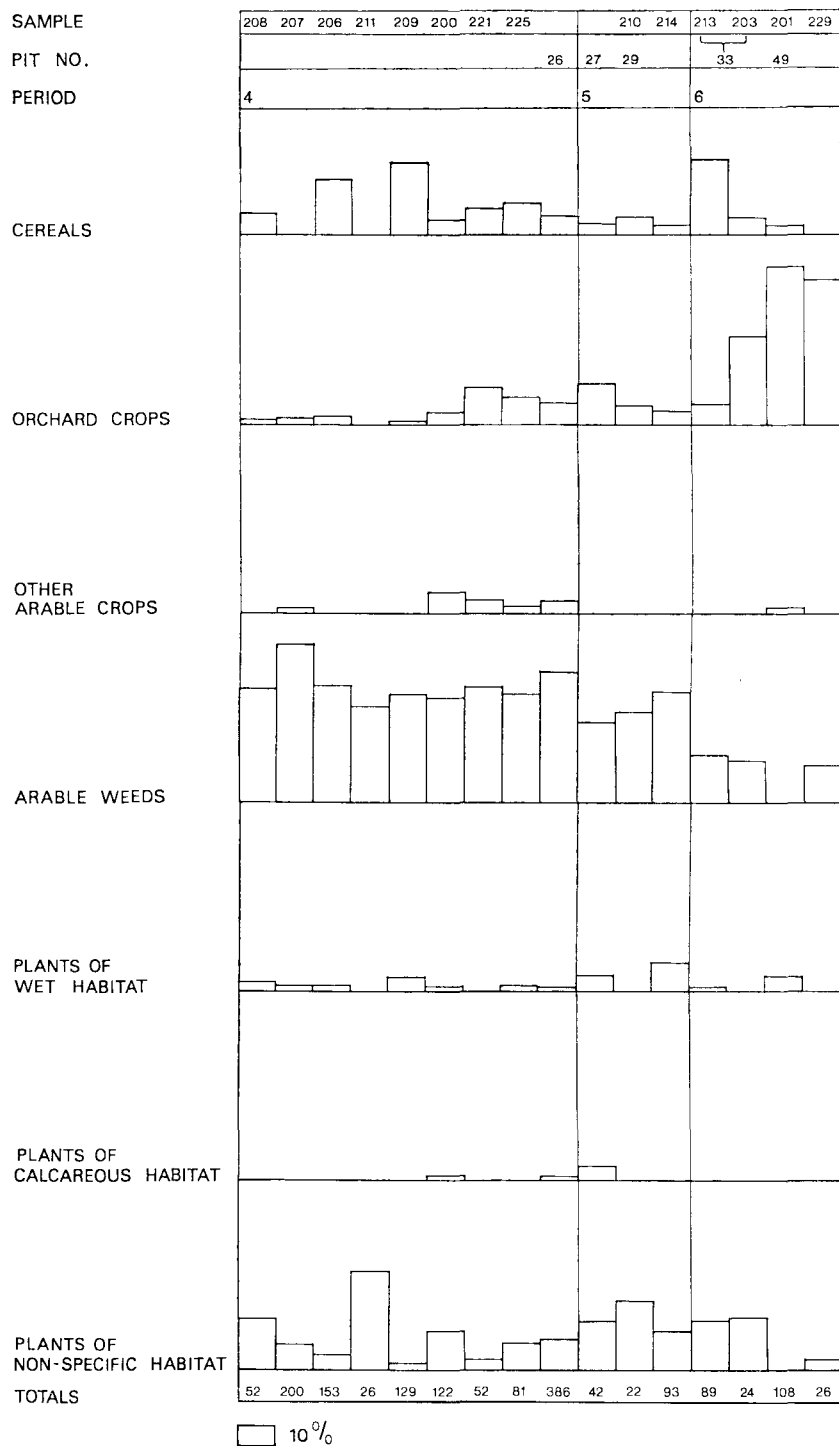


FIG. 12
Dominance diagrams of seed groups

recovered from Pit 26. The presence of *Bidens tripartita* possibly indicates a wet habitat, and *Daucus carota* (Wild Carrot) a calcareous habitat.⁵²

The cereal and straw fragments may have originated in a variety of ways (see below). If larger concentrations of botanical material such as orchard crops had originally been present, these species would have survived, because of the woody nature of their seeds. As can be seen from Fig. 12 only small quantities of orchard crops were recovered. Taking the lack of carbonized cereal evidence into consideration, it is possible to infer that domestic activities and the deposition of human faecal material were not taking place during Period 4.

Period 5, 10th century

Pit 27 contained a few carbonized grains of Spelt Wheat, and Pit 29 a few waterlogged rachis fragments of the same species. No plants of economic significance such as Hemp, Flax or legumes were recovered from these features. Apple and Blackberry seeds were present in Pit 27, and Pit 29 contained evidence of *Prunus* sp. (Bullace/Sloe) and possibly Strawberry. Possible arable weeds included *Ranunculus* sp., *Chenopodium album*, *Rumex crispus*, and *Anthemis cotula*. The hemlock in Pit 27 might indicate a damp habitat and Wild Carrot a calcareous habitat. No waterloving or calcareous plants were recovered from Pit 29. It is important to note that apart from the small quantities of cereals and orchard plants recovered, there is no specific indication of botanical refuse from a domestic context. Botanical evidence originating from faecal material, in particular large concentrations of small woody fruit seeds such as *Rubus* spp., was also absent. In this respect the Period 5 pits are similar to the Period 4 sequence.

Period 6, 11th–12th century

A wide range of species was recovered from Pits 49 and 33, though as can be seen in Fig. 12, plant group composition varies. A noticeably high concentration of cereal fragments was recovered from Pit 33 including Bread Wheat, Spelt Wheat, one grain of Oat, and one rachis fragment of Rye. Orchard crops were present, and included Strawberry, Blackberry, Bullace and Apple. The quantity and range of species in the orchard crop category is higher, particularly in Pit 33, than from other deposits. This suggests greater domestic activity utilizing these plant components; like Sample 229, such deposits may represent human faecal evidence, since the seeds of *Rubus* sp. are most commonly found in faecal deposits, such seeds readily passing through the human alimentary tract.

Other economic plants such as Flax were only found in very small quantities; economic activities using these plants may have become less important at this period. The wild plants taken to be associated with arable agriculture are present (except in Sample 214), but in reduced quantity when compared with Periods 4 and 5. The species range is comparable, but the quantity of such seeds is approximately half (Fig. 12). 14 plant species of possible arable association were recovered from this period. A waterloving habitat was indicated by *Caltha palustris*, *Conium maculatum*, and *Bidens tripartita*. No samples of this period produced any evidence of calcareous plant habitats. Plants of non-specific habitat, with the exception of Sample 201, were consistent with the quantities found from other periods.

Discussion

The most important information gained from the Saxon sequence was the evidence of Spelt and Rye. It had previously been thought that Spelt had gone out of cultivation in the post-Roman period,⁵³ and that some time between the 5th and 10th century a change occurred from the use of glume wheats such as Spelt and Emmer, commonly found on Roman sites, to the use of free threshing cereals, in particular *Triticum aestivum* types. Other sites in southern England of the post-Roman and Saxon period consistently produce evidence of *Triticum aestivum*, in particular sites such as the Saxon settlement at 'Hamwih', Southampton, and later Saxon deposits from Winchester.⁵⁴ It is therefore possible that there was local variation in wheat crops which probably resulted from different land types and climatic conditions or even from simple rural conservatism, any of which factors may have prolonged the utilization of Spelt Wheat in the Gloucester area.

The presence of Rye is also important. It had always been assumed⁵⁵ that Rye should be found on Saxon sites, since pollen evidence indicated its presence. However, there may have been an over-emphasis of its importance on early medieval sites due to

the work of Jessen and Helbaek⁵⁶ and to the evidence of historical sources. Hubbard⁵⁷ has pointed to the dichotomy between the small quantities of Rye recovered from British sites and its near-ubiquitous presence on Continental, particularly Dutch, sites. Rye is now increasingly found on sites of this period in southern England, though in large quantities⁵⁸ only in exceptional circumstances, such as the wholesale destruction of granaries, as at Lydford, Devon, and from medieval Winchester.⁵⁹ Rye is usually encountered (as at Gloucester) in small quantities that are more indicative of a weed of cultivation than of a major cereal crop, as already indicated by Lange⁶⁰ and Helbaek.⁶¹ In general the evidence from southern England is still too scant to make firm conclusions. It would seem that Rye may have been cultivated in the Saxon period, and, though never a major cereal crop, it was important on areas of dry and poor soil, as indicated by later medieval documentation.

There was a general lack of Barley from excavations at Gloucester. Barley is generally considered to have been the major cultivated cereal of the post-Roman period in southern England,⁶² used for making bread and for brewing; and some sites in southern England, particularly 'Hamwih',⁶³ show an equal dominance of Barley and Wheat over all other cereal crops. This evidence is based on carbonized material associated with domestic activities. The Gloucester deposits were waterlogged, contained a sparse carbonized botanical component, and showed little evidence of being associated with domestic activities, at least in the 9th and 10th centuries. Also, most of the existing evidence comes from sites in the vicinity of the chalk downland, an area well suited to barley-growing. From the absence of barley in Gloucester it may be possible to infer a geographical variation in its use in the 9th and 10th centuries.

Nearly all the cereal fragments were 'waterlogged' except cereal caryopses from Period 4 and from Period 5 Pit 29. It is possible that this carbonized evidence resulted from casual accidents in a domestic context, and that the 'waterlogged' material originated as floor coverings and bedding for man and/or animals. It is also possible that the cereal evidence represents discarded animal fodder, or redeposited litter including animal dung from a stable floor, or else the Wheat and Rye straw could have originated from discarded thatching materials. Such a dense layer of straw is unique in my experience.

The presence of *Pisum sativum* (Pea) pod fragments is important. This species is increasingly being found on sites of this period,⁶⁴ but is probably grossly under-represented on most medieval sites, perhaps because of the way the crop is harvested, processed and ultimately utilized. These activities would leave little evidence in the archaeological record⁶⁵ except under exceptional circumstances, such as waterlogging. It should be noted that *Pisum sativum* rarely occurs in carbonized form on urban sites of this period, and occurrences on rural sites are rare.

The presence of other economic species is also important, in particular Flax and Hemp, only recovered in small quantities from other excavations in southern England. Both these species are often found in association with Rye in pollen diagrams for the early medieval period.⁶⁶ Flax and Hemp are more commonly found on waterlogged sites, probably due to the way these plants were processed, particularly by retting,⁶⁷ which would normally have precluded carbonization. Both these species probably indicate local industrial activities such as the manufacture of cloth and rope. The oil which can be extracted from the seed of both plants may also have been used in medicines and food preparation.⁶⁸

Orchard crops were poorly represented and only consisted of indigenous species. No exotic or imported species were recovered. Species such as grape have been recovered from sites of the same period at Winchester and Southampton. Evidence of orchard crops from Periods 4 and 5 was particularly sparse, though Pits 33 and 49 from Period 6 did contain abundant evidence of this plant category. The increased quantity of such species from these later pits possibly indicates an increased domestic presence on the site with human faecal material being deposited. Orchard plants may have originated as

material collected in a hedgerow harvest, rather than being deliberately cultivated. Alternatively, where low concentrations of this plant group occur, it is possible that they may have resulted from the wild flora in the immediate vicinity of the site.

The non-economic plants recovered from this site, apart from those of very specific habitat, are similar in species range to waterlogged deposits from sites of this and other periods. Comparison with species lists from Dutch historic and prehistoric sites such as Swifterbant⁶⁹ indicates such similarities that most of the species must be considered ubiquitous to environments disturbed by man. The limitations of interpreting such groups of plants has been pointed out in the past.⁷⁰ Weeds of waterloving habitat found in waterlogged contexts can represent a local flora associated with the wet conditions prevailing on the site, although this was not the case at Gloucester (see p. 208). Alternatively these seeds may have been imported to the site in fodder, bedding, flooring, thatching materials, or even waste from crop processing.

On dominance analysis the plants of arable habitat or associated with human disturbance made up about 50% of all seeds found. Discounting the differential seeding rate of different species, it would seem that most of the evidence originated from an arable source, possibly the harvest field. It is possible to interpret the straw and peaty deposit in the Period 4 sequence as redeposited arable waste, possibly animal dung. Unfortunately, much of the botanical material was too poorly preserved to allow a detailed particle size analysis of the botanical constituents which might have solved the problem of what type of dung the deposits contained. The area may have been used as a dumping ground over a number of years, without the removal of the dung heaps for manuring. If this were the case it would be possible that many of the seeds found in the samples grew on the dung heap itself. It is, however, difficult to believe that a valuable commodity such as dung and animal litter would not have been removed and used as fertilizer.

A range of evidence indicative of plant utilization was examined. However, since the number of samples discussed is small, it is difficult to extrapolate from the information and to suggest explicit trends in agricultural practice and plant utilization in Gloucester. The lack of botanical evidence closely associated with domestic activities has not helped interpretation. It can only be emphasized that many of the species recovered here are rarely preserved by carbonization, so that the evidence from Gloucester has provided an important insight into the presence of such species during the Saxon period on an urban site in southern England.

Acknowledgements

I am indebted to Gordon Hillman for confirming the identifications of Spelt spikelet forks; and to Dr J. M. Renfrew for comments and advice during the preparation of this paper.

APPENDIX 6

THE TEXTILES AND TEXTILE EQUIPMENT. *By* JOHN W. HEDGES, *North of Scotland Archaeological Services, Orkney*

The textiles recovered from the Saxon organic layers are few in number but important on account of their size and the features of weaving technology which they illustrate. This value is enhanced by the rarity of comparative material of similar date. Between the early Saxon period, when textiles preserved in association with metal artefacts with Pagan burials are common, and medieval times, when there is a growing corpus of finds from town sites, there is a large gap for which the evidence is sparse; apart from the extraordinary St Cuthbert's vestments,⁷¹ there are two nondescript pieces of cloth from 'Hamwih', Southampton (unpublished) and Thetford, Norfolk;⁷² a silk head-dress from Lincoln, the cloth of which at least must have been imported;⁷³

and a very good collection of Anglo-Danish textiles from York.⁷⁴ It is ironic that it is precisely this period that is the most interesting in British textile production for in it the great change took place between domestically based production and craft manufacture. This transition was not absolute — manufacture for sale and export existed before it and home production continued after — nor would it have been catastrophic, but gradual. Nonetheless in this period there was a reorganization of manufacture, product, and marketing, one aspect of which was the introduction of more sophisticated implements.

Textile no. 2 was clearly woven on the warp-weighted loom⁷⁵ (reintroduced by the Saxons after the Roman occupation), for it has a tablet-woven starting border (Fig. 13, a) which would be unnecessary for any other type. The use of this loom is also indicated by the loom-weight from Period 5, 10th century (Fig. 18) and indeed such artefacts are found as late as the 11th or even 12th centuries, as at Winchester, Rochester, and Oxford,⁷⁶ by which time, however, they are rare.

From Gloucester there is evidence for the co-existence of the horizontal treadle loom — which was that used by the craft industries.⁷⁷ This loom had a rotating warp and cloth beam to facilitate the weaving of rolls of cloth of standard length which meant that in warping many yards of yarn had to be coped with. The two pieces of equipment introduced to deal with this problem were the spool rack and the warping board, both of which are first illustrated in the *Ypres Book of Trades* which dates to c. 1310 (Fig. 13, c).⁷⁸ The warping board consists of two sloping uprights with pegs protruding from them fixed together by transverse beams. The length of the warp is made up by taking the yarns backwards and forwards between the pegs of each upright. This is the most likely use for a piece of worked oak with peg holes and a sloping foot which was recovered in the excavations from a 10th-century context (Fig. 13, b, no. 14). A very similar object, much damaged, may be from a second warping board (Fig. 13, b, no. 5): this came from a 9th-century context. This does not stand alone as evidence for the early use of the horizontal loom. A piece of cloth from York of 9th–10th century date involved six sheds;⁷⁹ only a horizontal loom equipped with treadles, pulleys and harnesses could deal with this number of heddles sufficiently easily to be used in the everyday manufacture of cloth.

The textiles are too few to warrant much discussion of their spin, weave and count but the predominance of twills and mixed spinning are features they share with those from York.⁸⁰ Before this time the spinning combination found is almost exclusively ZZ whereas afterwards it became a matter of indifference, and combinations occur in unpredictable proportions; similarly the Middle and Late Saxon periods seem to have seen the height of a trend towards twills, particularly for finer cloths, which were afterwards rendered superfluous by the medieval fashion for heavy fulling and naps. It is possible that the two wefts in the selvedge of no. 1 (Fig. 13, a), which was probably a skirt, indicate that two colours had been used to create a chequered cloth, although this, and the other textiles, are now uniformly brown.

Catalogue of the textiles (Fig. 13)

All textiles were from Period 4 levels and 9th century or earlier.

1. 0.4 m² of mid-brown wool textile including, in addition to scraps, three large pieces described separately below. Predominantly an unreversed 2/2 twill. Wa/11/Z/0.8 mm (thinner and harder spun) × Wc/8/S/1.0 (thicker and softer spun). Nap raised on one side only (VI (116), Pit 26).
 - a) (600 × 450 mm) No features of interest other than that the greatest length is in the warp direction and the other in the weft.
 - b) (480 × 190 mm) In fact two pieces with a seam consisting of two side selvedges laid together and overstitched with Z2S yarns; these side selvedges, c. 10 mm wide, include a reverse with inaccurate meetings. The selvedges show that two wefts were used which may indicate coloured yarns, in turn meaning the cloth was a check. Greatest length in warp direction.
 - c) (300 × 180 mm) Cut edge hemmed in over stitch with S2S thread along greatest length in weft direction.

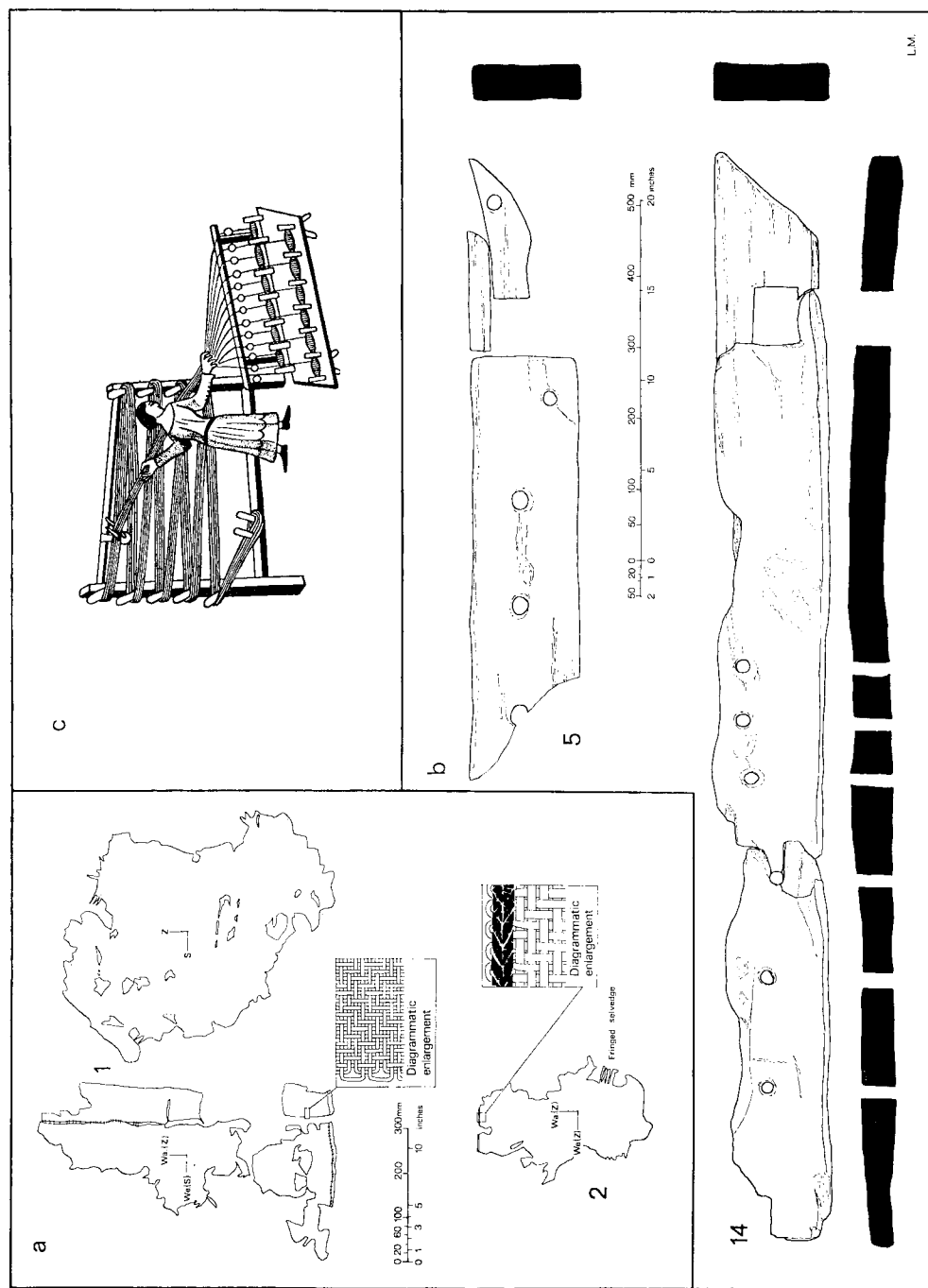


FIG. 13
Textiles: (a) 9th-century textiles. Scale 1:16. (b) possible sides of warping-boards; see Appendix 8. No. 5, Period 4; no. 14, Period 5. Scale 1:10. (c) warping board in use; from the Ypres Book of Trades, c.1310. Reproduced with permission from *History of Technology* (Oxford, 1957), 209, Fig. 176

It is not possible from the fragments preserved to say with certainty the type of garment they came from. We know, however, that it was over 600 mm deep and more than 450 mm broad, had a hemmed lower edge and a vertical seam. The seam in turn indicates the possibility that it is composed of two edges of the same cloth sewn together, and this would fit with the whole having come from a tubular skirt or dress which was quite possibly chequered.

2. An oblong piece of mid to dark brown woollen cloth 205×375 mm. An unreversed 2/2 twill. $Wa/6/Z/1.0-1.5 \times We/6/Z/1.0-1.5$. A tablet woven starting border is present in two places, one 45 mm long and the other 35 mm. The actual border is 6 mm across and consists of a single warp being bound with the use of two four-holed tablets threaded right and left to produce a chevron. The yarn used for this is $S2Z/1.2$. In one place three returns of the weft can be seen and, although most of the warp is missing here, it is unlikely that the side selvage was reinforced or tablet woven, as it would have survived; two of the returns crossed indicating that more than one weft was in use. The cloth does not appear fulled and any napping is very localized and may be just abrasion (VI (177), SF 93).

3. (Not illustrated) A mass of black brittle fragments of woollen cloth totalling approximately 0.35 m^2 . Unreversed 2/2 twill, $5/Z/0.18 \times 5/S/0.2$ (VI (162), SF 87).

4. (Not illustrated) A scrap of brown woollen cloth $c.5.00 \text{ mm}^2$. A twill with no reverse apparent but quite crude and odd in that threads in the Z spun system cross anything between one and three of the ones in the S spun system at a time. $6/Z/1.0/\text{hard spun} \times 5/S/2.0/\text{soft spun}$ (VI (112)).

5. (Not illustrated). A mass, $c.50 \times 90$ cm of wool and hair? threads $c.1.0-2.0$ mm in diameter and once part of a fabric. Some Z and some S; the latter are thicker and softly spun (VI (112), SF 61).

APPENDIX 7

THE LEATHER. *By C. E. GOUDGE, City Excavation Unit, Gloucester*

The finds are mainly shoe parts and offcuts, although a complete shoe, part of a sword scabbard, and a hairslide were also found. Most of the leather was preserved in the organic deposits of Period 4, but a few pieces came from later contexts, mainly pits in Periods 5 and 6. The context of individual pieces is indicated in the catalogue.

The condition of the leather varies from thick, well-tanned pieces, now black in colour, to thinner, delaminated fragments, some greyish-brown in colour. Delamination, the splitting of the leather into two layers, is a result of incomplete penetration by the tanning agent, assumed to be oak bark liquor. Some pieces are also poorly finished on the flesh side with loose fibres extant, while others have an even, 'suede' surface. All the leather is probably made from cattle-hide.

The shoes are of turnshoe construction, with a one-piece upper, side-seamed, and attached to a single sole either with leather thonging threaded through holes made by an awl, or sewn with thread. The thread (which did not survive) must have been either an animal fibre such as wool or a bast fibre such as flax. Even when the upper is thonged to the sole, the side seam is often sewn with thread, and the top edge of the upper finished with blind-stitching, usually regarded as evidence of a binding, or it may be simply stay-stitching.

Both slip-on shoes, and those which had some form of ankle-tie, are represented. Most of the shoes are very worn, and have been repaired.

The shoes from Period 4 have soles with rounded seats (e.g. nos. 3, 6, 25), comparable with shoes from the earliest phase at St Aldates, Oxford, dated to the late 8th to 9th century.⁸¹ Most of the shoes have thonged side seams, but there are two examples which seem to be sewn with thread (nos. 10 and 11).

A shoe from Period 5, no. 4, appears to have been repaired by adding a new sole which extends to a point to cover the back seam. The original shoe, which was probably sewn with thread, may have been similar to one from Hungate, York,⁸² and the same site produced two examples of shoes with internal heel stiffeners,⁸³ originally also a feature of no. 4. Shoes with soles with pointed backs first appear at St Aldates, Oxford, in a phase dated to the early to mid 9th century.⁸⁴ This feature also occurs on several

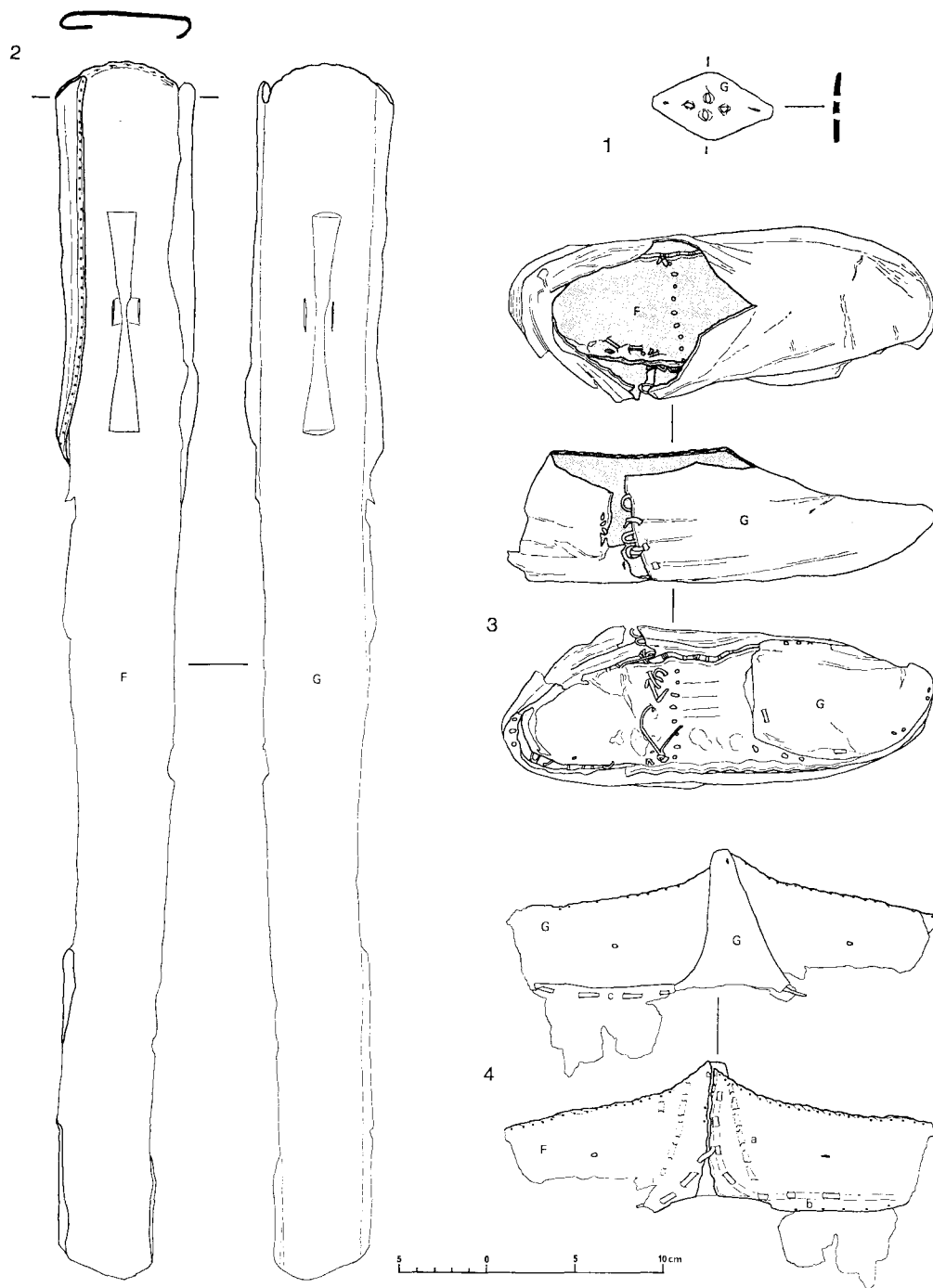


FIG. 14
Objects of leather. Scale 1:4

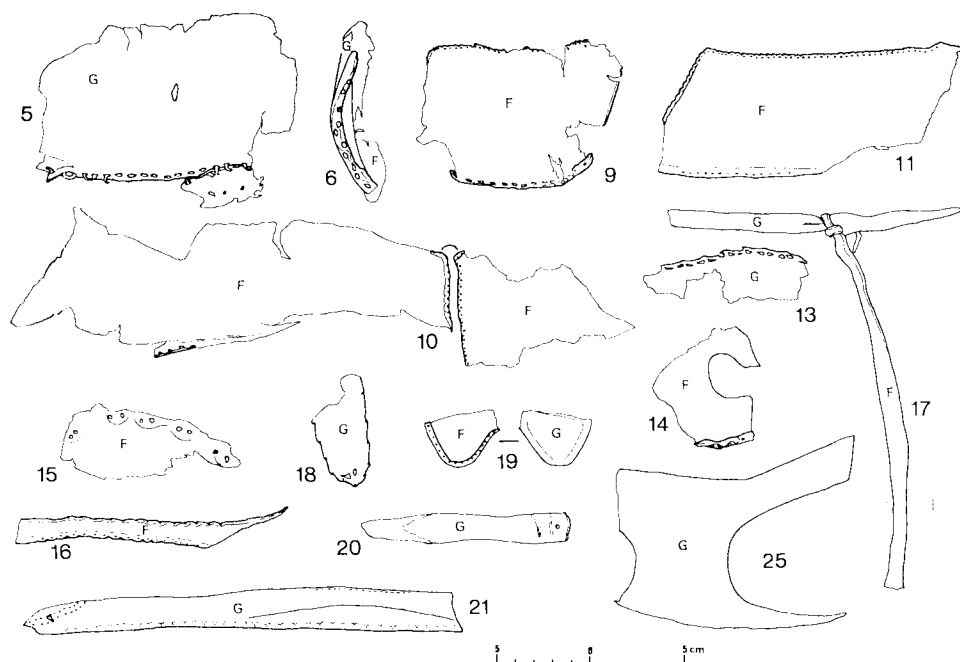


FIG. 15
Objects of leather. Scale 1:4

shoes and boots from other sites in York,⁸⁵ and on one example from 11-17 Southgate Street, Gloucester.⁸⁶

Offcuts and trimmings of new leather were found, mainly in Period 4 deposits, a roughly triangular shape being common. One piece has had a sole cut from it (no. 25). There are also a few offcuts and scraps of worn leather. The evidence suggests that there was shoe-making and repairing on or near the site during Period 4.

The most interesting leather object from the site is the scabbard (no. 2). It is incomplete, both the chape end and one side of the scabbard being missing, and was found rolled up in Pit 27, Period 4, a context which dates it to the 9th century. Mrs L. Webster, of the British Museum, writes that she sees no reason to doubt this dating, but that she can find no parallel for the method of suspension indicated here, involving a metal stiffener or brace fixed inside the scabbard at the bridge. There is, however, a lack of evidence for the late 7th century onwards and the development of the suspension mechanism in the late Saxon period is not known. The curved outline of the opening presumably mirrors the shape of the sword hilt; a curved hilt seems to be a late Saxon sword development.⁸⁷

Catalogue (Figs. 14 and 15) (SL = stitch length; i.e. average distance between centres of stitch-holes. On illustrations, G = grain, F = flesh).

1. Diamond-shaped hairslide 70 × 40 mm in thick, well-tanned leather. The four central holes are decorative, and the slits at either end have been stretched by use. Two similar pieces come from late Saxon deposits at 11-17 Southgate Street, Gloucester (SF 181, VI (55), Period 3F, but possibly intrusive from Period 4).

2. Part of sword scabbard measuring 780 mm in length before conservation. It measured 80 mm across at the opening. The leather has delaminated, and the flesh layer is worn and split. The curved edge of the opening is finished with edge/flesh stitching, giving a scalloped appearance.

The chape end is a torn edge, so the original length is unknown. The scabbard was probably made from one piece of leather with the seam to one side. The other side has been cut and torn away except for the top part of the seam which was unstitched. On the inside of the remaining part is what appears to be the sharply-defined impression of a (metal?) stiffener, the top of which is 85 mm below the opening. There are no rivet holes. On either side of this impression are two slits 15 mm long. Through these was presumably threaded a flat strip of leather or bridge, by which the scabbard was suspended. The scabbard was probably lined with a softer leather or fur to protect the sword blade (SF 192, VI (116), Pit 26, Period 4).

3. Complete turnshoe, probably left foot, present length *c.* 240 mm. The upper is cut in one piece with a crudely-thonged seam on the inside of the quarter, with stitches showing on the outside of the shoe. The vamp throat has a central cut, the edges of which, and of the quarters, are finished with edge/flesh stitching. The upper is joined to the sole by a thonged edge/flesh seam which has the typical scalloped appearance. Both upper and sole leather are delaminated, most of the grain side of the sole being missing. The sole has a rounded seat, and has been repaired on both forepart and seat with patches held in place by tunnel-stitching, using thonging. The seat piece has gone, leaving only stitch-holes across the waist. The forepart clump itself shows considerable wear. (SF 60, VI (112), Period 4).

4. Quarters of low-cut shoe or slipper, joined with a butted seam at the back of the heel, and sloping upwards to form a point. There are tunnel stitch-holes (a) for an internal stiffener which no longer exists. Five stitch-holes (b) (SL *c.* 12 mm), on very edge of one quarter, are perhaps all that remain of original bottom seam. The smallness of the holes in all these seams suggests that the shoe was originally sewn with thread. There is a hole in the centre of each quarter through which a thong may have been threaded to tie over the instep. The top edges of the quarters have edge/flesh stitch-holes. To modify or repair the shoe, a new sole was added to the outside of the upper, using thick thonging *c.* 3 mm wide and very large stitches (SL 20 mm) with the back of the sole extended to a point to cover the back seam. This sole has completely delaminated leaving the thonging exposed on the sole (c) (SF 101, VII (23), Period 5).

5. Part of shoe upper, probably a quarter, 135 × 85 mm in worn, delaminated leather. The slit in the upper is probably for the insertion of a thong which tied around the ankle. The complete shoe may have looked like another from Hungate, York⁸⁸ (SF 200, VII (23), Period 5).

6. Very worn remains of trodden-down shoe. Illustrated is part of upper showing lasting margin (SF 190, VI (112), Period 4).

9. Two pieces of very worn and delaminated upper from shoe of which complete pattern is uncertain. Illustrated is part of quarter (SF 189, VI (104), Period 4).

10. Quarters of shoe with sloping side seam and part of vamp, trodden-down at heel. (SF 197, VI (172), Period 4).

11. Quarter of shoe 140 × 65 mm with blind-stitched top edge, and part of sloping side seam with edge/flesh stitch-holes 2 mm long (SL 4 mm), probably for thread. Both 10 and 11 have the same upper pattern with forward-sloping seam as another shoe from York⁸⁹ (SF 203, VI (112), Period 4).

13. Fragment, 85 mm long, from edge of sole (SF 101, VII (23), Period 5).

14. Fragment from sole in leather *c.* 2 mm thick, with thonging *in situ* (Unstratified).

15. Part of forepart repair patch or clump which has completely delaminated with only flesh layer extant. Small piece of thonging *in situ* (SF 198, VI (177), Period 4).

16. Strip of leather 145 × 10 mm oversewn on both long edges (SL *c.* 6 mm) (SF 191, VI (112), Period 4).

17. 2 strips of leather, or probably originally one strip, possible ankle tie from shoe (SF 187, VI (103), Period 4).

18. Tab of leather *c.* 60 × 30 mm, edge oversewn (SL 8–13 mm) (SF 101, VII (23), Period 5).

19. Triangular piece of leather. Use unknown. The latest stratified piece of worked leather (SF 199, VII (13), Period 6, F34).

20. End of strap? (SF 196, VI (171), Period 4).

21. Strip of thick, well-tanned leather *c.* 230 mm long, cut at both ends, and slashed along part of its length. Used as a strap, and cut from a larger object? (SF 195, VI (162), Period 4).

25. Offcut, 120 × 75 mm, completely delaminated. Evidently piece from which sole with a rounded seat has been cut (SF 184, VI (93), Period 4).

Acknowledgements

I am indebted to Arthur MacGregor, John Thornton, Alan Vince and Leslie Webster for all their help in preparing this report.

APPENDIX 8

WOODEN OBJECTS. By CAROLE A. MORRIS, *Dept. of Archaeology, University of Cambridge*

It is unusual for a report on a small site to include a major section on wooden finds. Sites such as Lagore Crannog⁹⁰ or towns such as York⁹¹ which have produced many well-preserved wooden objects from several excavation seasons are rare.

All the objects are, or could be, domestic in character, and would suggest that the area in which they were found was on or near a habitation site in the 9th to 12th centuries. The bowl, cup, spoon, staves, and 'churn'-lid are all objects associated with food preparation and consumption, whilst the basket base, 'furniture' and warping board are other domestic items.

The four objects from Pit 21 (nos. 15-18) all display signs of burning. The pit itself was unburnt so the objects were burned before deposition.

Nos. 2-4 of the catalogue (WS 11, 12, 35) were all similar objects of unknown purpose, but all were found in a group with no. 5 (WS 14), which may be part of a warping board.

The positions of the wood samples are, where possible, shown on the plan, Fig. 5, left, using the original Wood Sample (WS) numbers. Wood identifications are by the author in the case of no. 18, in all others by Christopher Frost; Oak is *Quercus* sp., Ash *Fraxinus* sp., Alder *Alnus* sp.

Period 4: 9th century

1. Not illustrated. Plank (Ash); L = 1.32 m, W = 110 mm, Th = 50 mm. It has two peg- or trenail-holes, 20 mm diam., c.775 mm apart. Use unknown (WS 10, Fig. 4, right).
2. Not illustrated. Plank (Oak); broken into two; L = 630 mm, W = 110 mm, Th = 20 mm. It has the remains of two peg- or trenail-holes, 20 mm, c.525 mm apart. Use unknown (WS 11, Fig. 4, right).
3. (Fig. 16). Plank (Oak); L = 648 mm, W = 155 mm, Th = 43 mm. One end has two peg-holes along the short axis, and there is another peg-hole c.525 mm from the first two. Use unknown, but the spacing of the holes suggests a similarity to no. 2 (WS 12, Fig. 4, right).
4. (Fig. 16). Plank (Oak). L = 650 mm, W = 140 mm. It has peg- or trenail-holes at each end, 20 mm diam. Use unknown (WS 35, Fig. 4, right).
5. (Fig. 13, b). Plank (Oak); broken into three pieces. L (of longest piece) = 595 mm, W = 150 mm, Th = 50 mm. The largest piece has four peg-holes, three aligned down the long axis, and one slightly offset. One of the smaller pieces has one hole. All the holes are 20-25 mm diameter. It is possibly one of the frame-sides of a warping-board or weaving frame. The surviving pieces allow a tentative reconstruction similar to no. 14 (5 and 14 are probably parts of the same frame) (WS 14, Fig. 4, right. See also Appendix 6).
6. (Fig. 16). Beam (Oak); L = 525 mm, W = 88 mm, Th = 63 mm. It has an oval hole, 19 mm wide and 60 mm long, which appears to have been the peg-hole for a pegged middle-lap joint. At right angles to this hole is a socket for the appropriate piece of wood to form the lap joint, 50 mm wide and 31 mm deep. The beam has broken in two along the peg-hole. Use unknown: it is possibly part of a piece of furniture (WS 29, Fig. 4, right).
7. (Fig. 16). Basket base (Oak); part of an elongated oval piece of wood (nos. 7 and 8 are part of the same base). L = 464 mm, W = 114 mm, Th = 15 mm. On the rounded edge are nine small circular holes, 9 mm diam., evenly spaced. These would have held the vertical stakes between which the weave was threaded. Some of the stakes, snapped off, still survived (WS 24, Fig. 4, right).
8. (Fig. 16). Basket base (Oak). Part of the same base as no. 7. L = 553 mm, W = 74 mm, Th = 15 mm (WS 25, Fig. 4, right).
9. Not illustrated. Stave (Oak); split longitudinally into two. L = 339 mm, W = 98 mm. Probably the stave of a bucket or unlidded vessel. Since one end is broken, it could be a stave from a small cask. Squared groove, 17 mm wide, 25 mm from bottom edge. The stave is more or less parallel-sided, but narrows slightly away from the groove. The latter would have taken a slotted-in base or cask-head (WS 13, Fig. 4, right).

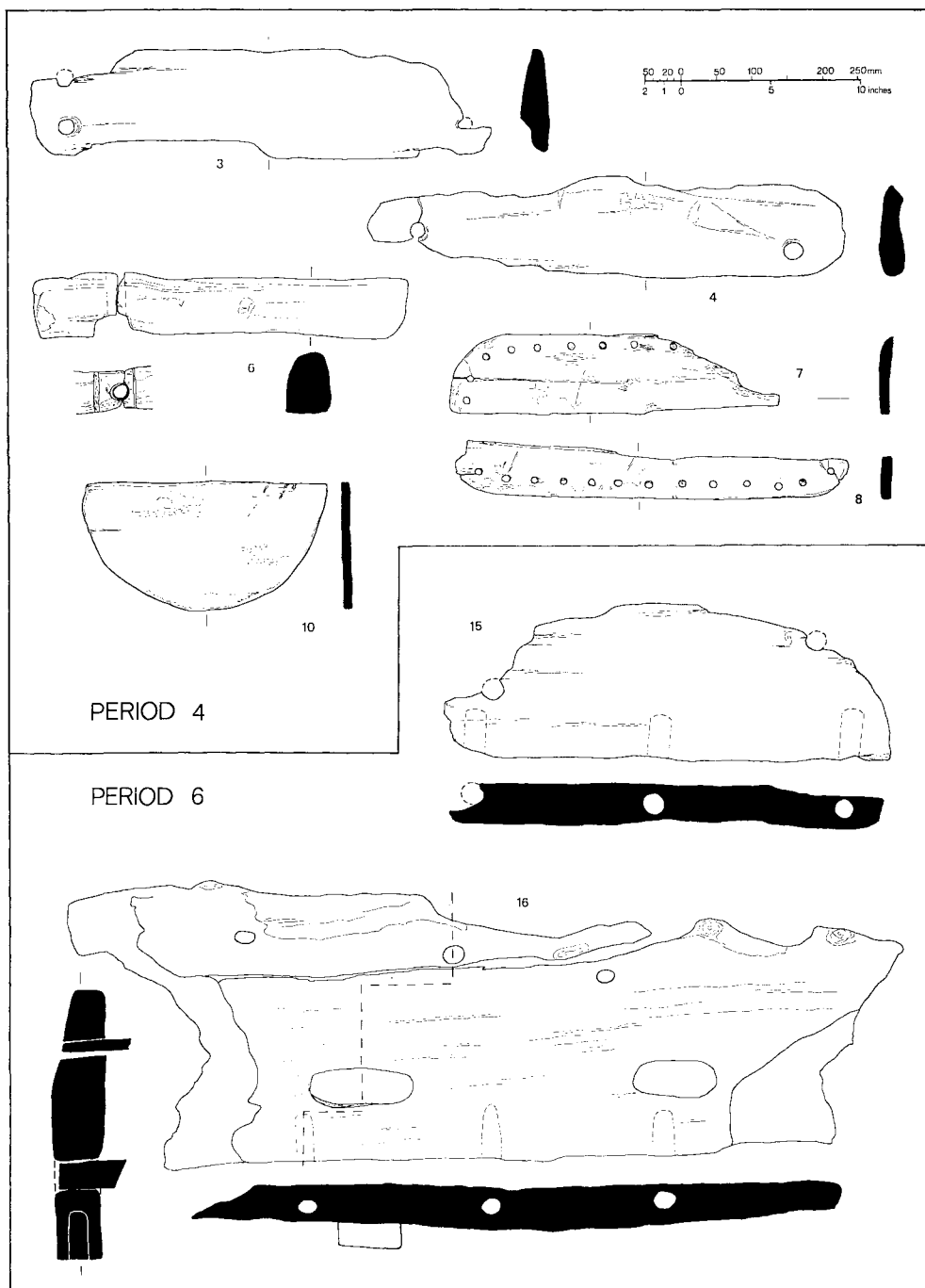


FIG. 16

Large wooden objects. Scale 1:10. Period 4: 9th century, Period 6: early 12th century

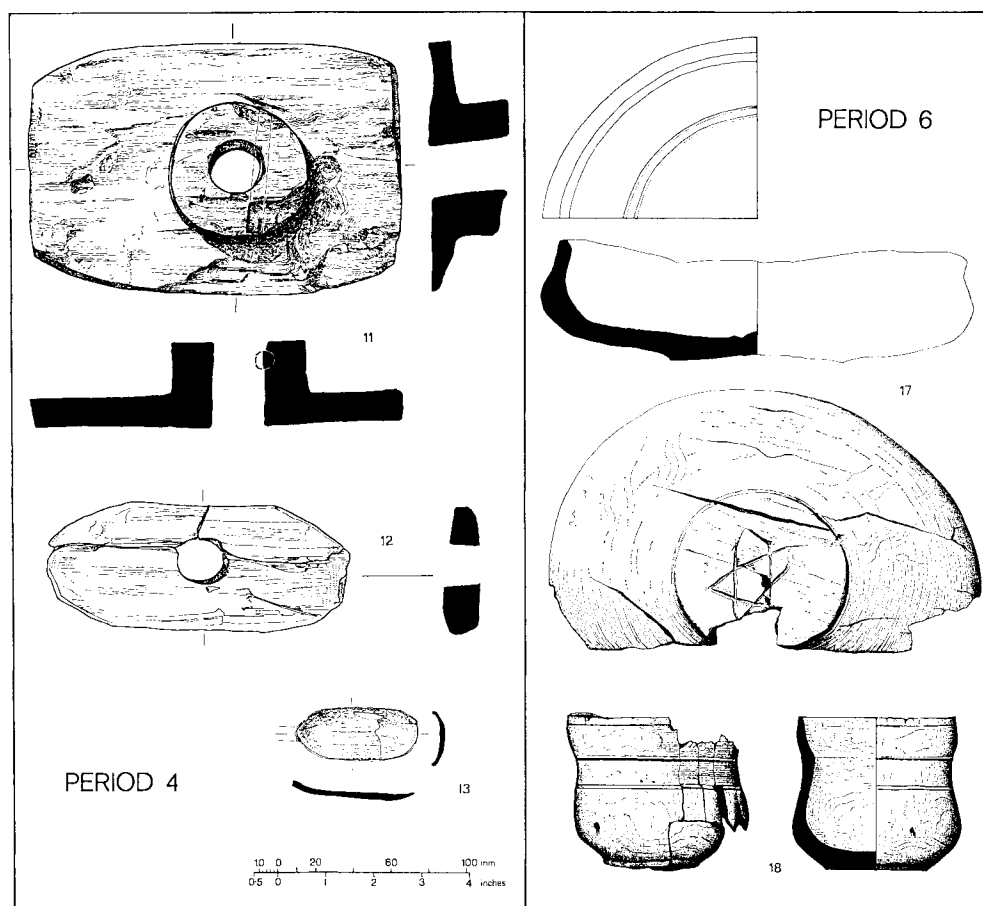


FIG. 17
Wooden objects. Scale 1:4

10. (Fig. 16). Cask-head stave (Oak); complete, semicircular; $D = 344$ mm, $Th = 11$ mm. Solid stave from a cask-head which was originally made from two semicircular staves. Some heads of this period and later are one-piece objects, e.g. from Hungate York,⁹² and that from Pevensey.⁹³ Some are composed of more than two staves, the outer two being arcs, of a circle or oval e.g. from Pavement, York.⁹⁴ The Gloucester head has no traces of pegs, dowels or battens, and has no vent-hole as has the Hungate example. A complete oak cask-head, 226 mm diam. came from 11-17 Southgate Street, Gloucester.⁹⁵ It has a vent-hole 10 mm diam. at its centre. The Westgate stave has a squared edge to fit a groove in a cask-stave similar to that in no. 9 above. There are two diagonal saw-cuts into the straight edge and traces of linear cuts in no apparent pattern or order on one flat side; the stave could have been re-used as a cutting-board (SF 95).

11. (Fig. 17). Sub-rectangular object (Oak); with slightly rounded long sides. $L = 195$ mm, $W = 133$ mm, $Th = 14$ mm (not including the 'core'). Probably the lid (or part of the lid) of a standing churn. It could also originally have been the 'dasher' used inside a churn, minus its shaft. Similar objects are illustrated by Estyn Evans in his discussion of Irish churns.⁹⁶ It is carved from a solid piece of oak, and on one flat side has an upstanding circular 'core', off-centre, through which is bored a hole 30 mm diam. On the other, flat, side, this hole is flush with the wood. Through the

side of the upstanding core is bored another hole, filled with a dowel, 10 mm diam., which presumably would originally have held a shaft in position. The dowel is visible inside the hole through the core; and both it and the hole are smooth and shiny. This appearance would fit with the interpretation as a churn lid. The shaft of the 'dasher' would smooth the hole through which it was pushed, and the upstanding 'core' would ensure vertical movement through a hole which would not quickly enlarge by wear. The core itself is very battered, and one corner of the object is thinned, apparently on purpose (SF 83, Fig. 4, right).

12. (Fig. 17). Sub-rectangular object (Oak), complete but split into three. L = 181 mm, W = 66 mm, Th = 20 mm. Truncated corners, central hole 25 mm diameter. The edges are very worn and one long side is thicker than the other. A similar object has been found in Gloucester in an 11th-century context.⁹⁷ This was oak, of similar size, and had a fragment of a 'shaft', c.95 mm long, through a hole 28 mm diam. The shaft consisted of a length of branch from which the bark had not been removed. The latter was probably birch. Another similar object was found on the All Saint's Site, King's Lynn.⁹⁸ These may be rope-woods (SF 201).

13. (Fig. 17). Spoon bowl, wood genus unknown; split in two. L = 64 mm, W = 29 mm, Th = 4 mm. The spoon bowl is very fine and thin and was originally an elongated oval with a shallow curved cross-section. There is no sign of decoration, unlike the handles of two spoons from Anglo-Scandinavian York.⁹⁹ The handle of the spoon was 8 mm wide (SF 82).

Period 5: 10th century

14. (Fig. 13, b). Plank (Oak); broken into three. L (reconstructed) = 1.52 m, W = 160 mm, Th = 58 mm. All three pieces fit together to form the frame side of a possible warping-board (or weaving frame), with six peg-holes along the long axis, and a rectangular hole near the angled end. The latter is cut at an angle of c.55°, and when set up, the frame would slope away from the weaver. The holes are all 40–42.5 mm diam., and the rectangular hole is 78 × 85 mm. This, and the corresponding hole in the other frame side, would house the bottom beam of the frame (nos. 5 and 14 are probably parts of the same frame). (Pit 27, WS 21, Fig. 5, left. See also Appendix 6.)

Period 6: 11th–12th centuries

15. (Fig. 16). Plank (Oak); charred. L = 610 mm, W = 220 mm, Th = 59 mm. There are three peg- or dowel-holes bored horizontally into one of the long sides, each 30 mm diameter, and two holes of similar diameter bored vertically through the flat side 172 mm apart. The former correspond roughly to three similar holes in no. 16, from the same context, also charred. Although there is not a close fit between the two sets of holes, it is likely that nos. 15 and 16 are parts of the same object, perhaps a piece of furniture (WS 26, Pit 21).

16. (Fig. 16). Plank (Oak); charred, and split along one long side. L = 1.17 m, W = 398 mm, Th = 75 mm. There are three peg-holes or dowel-holes bored horizontally into one long side, each 26–30 mm diam., with a surviving peg fragment 25 mm diam. Along the long axis are two oval vertical holes for the tenons of unkeyed mortise-and-tenon joints. Fragments of a squared tenon, 37.5 mm thick, survive. The horizontal holes correspond roughly to three similar holes in no. 15; both may be part of a piece of furniture (WS 23, Pit 21, Fig. 5, right).

17. (Fig. 17). Bowl (Ash); a segment comprising nearly a third of the bowl is missing, and the bowl is charred along the break. D = 213 mm, H = 64 mm, Th = 12 mm. The bowl is lathe-turned and, although it is a fine piece, it is roughly executed and displays a turner's ploy of thinning the rim to achieve an appearance of greater quality, whereas the body of the bowl is relatively thick. It is decorated with a pair of internally incised grooves 63 mm from the centre. The underside has a turner's mark, in the form of a pentangle, roughly chiselled on the base. Other turners' marks appear on bowls from medieval Southampton¹⁰⁰ and a bowl marked with a pentangle comes from Kings Lynn.¹⁰¹ Helen Clarke suggests that these marks were signs of ownership, but it is more likely that they were the turner's equivalent of the medieval mason's and cooper's marks (SF 79, Pit 21).

18. (Fig. 17). Cup (Alder); burnt and split badly on one side. The other side is intact, but squashed. D = 66 mm, H = 83 mm, Th = 4 mm (base Th = 10 mm). The cup is lathe-turned and finely executed. The base is thicker than the sides, probably to increase stability when upright. It is decorated with an incised groove 3 mm below the rim, and two pairs of grooves 12 mm apart on the 'waist'. The interior displays a 'step' 24 mm below the rim. The estimated capacity of the cup (calculated by approximating the volume as a cylinder) is 0.35 pints, or 0.2 litres (SF 88, Pit 21).

APPENDIX 9

MISCELLANEOUS SMALL FINDS (Figs. 18 and 19). *By* C. M. HEIGHWAY, *City Excavation Unit, Gloucester*

(Finds from the Periods 2–3E published with Roman Pottery.)

Period 3F (5th–8th century)

1. Half of a pair of iron shears, L = 238 mm including some shank. Roman? Similar to a pair from Portchester¹⁰² (VI (192), SF 96).

Period 4 (9th century)

Not illustrated. A lock of human hair (identified by Mrs C. Davies) (VI (162), SF 202).

2. Decorated bronze ring.¹⁰³ D = 45 mm (found embedded near surface of layer VI (54) in an area unscaled except by post-medieval levels, SF 7).

3. Iron drill, possibly Roman, similar to one from Portchester¹⁰⁴ (VI (103), SF 45).

4. Whetstone made of micaceous sandstone, possibly local (VI (123), SF 84).

Period 5 (10th century)

5. Stone spindle whorl, decorated with incised lines (V (124), SF 21).

6. Bone (femur head) spindle whorl (VI (102), SF 78).

7. Stone spindle whorl, plain (V (143), SF 64).

Nos. 5 and 7 both came from Building 3. They were made by hand of fine-grained white (lias?) limestone. Similar examples in the same stone from Hereford date to the 14th century, but are lathe-turned with metal-drilled holes.¹⁰⁵

8. Part of a clay loom-weight, hand-made. The fabric is very similar to 10th-century kiln-lining from this site, though rather coarser than 11th-century pottery in similar fabric¹⁰⁶ (V (124), B3, SF 120).

9. Bone pin with double thread-hole, point missing (VI (45), SF 171).

10. Jet handle (V (105), SF 12).

Period 6 (11th century)

Not illustrated. Fragments of Roman pewter moulds and column capital, all of oolitic limestone (SFs 132, 134).

11. Iron hook (Pit 49, SF 110).

12. Iron object (Pit 43, SF 130).

13. Bone object (VI (85), SF 27).

Period 6: Pit 21 (late 11th to early 12th century)

14–28. Collection of bone and antler awls or pins; fire-blackened. Possibly 'beating pins' used in weaving, like the similar items from King's Lynn¹⁰⁷ (SFs 77, 81, 92).

Unstratified

29. Wooden awl (VI, SF 37).

30. Bone apple corer (VI, SF 124).

Period 7F (early 13th century)

31. Tuyere, for fitting bellows to copper alloy melting hearth. Hand-made. See Appendix 11.

APPENDIX 10

THE GLASSWORKING RESIDUES. *By* JUSTINE BAYLEY, *Ancient Monuments Laboratory, Dept. of Environment*

The bulk of the material, mostly some two dozen crucible fragments, came from the floor and fill of the Period 5 cellar in building B3 (V 105–107), associated with 10th-century pottery of the same fabric (TF 41A; Appendix 1) as the crucibles. The glassy deposits on these were examined by X-ray fluorescence to determine the amount of lead present. In almost all cases lead levels were high, indicating a deliberately made glass. One piece of scrap glass from layer 106 had a density of about 5.5 which suggests

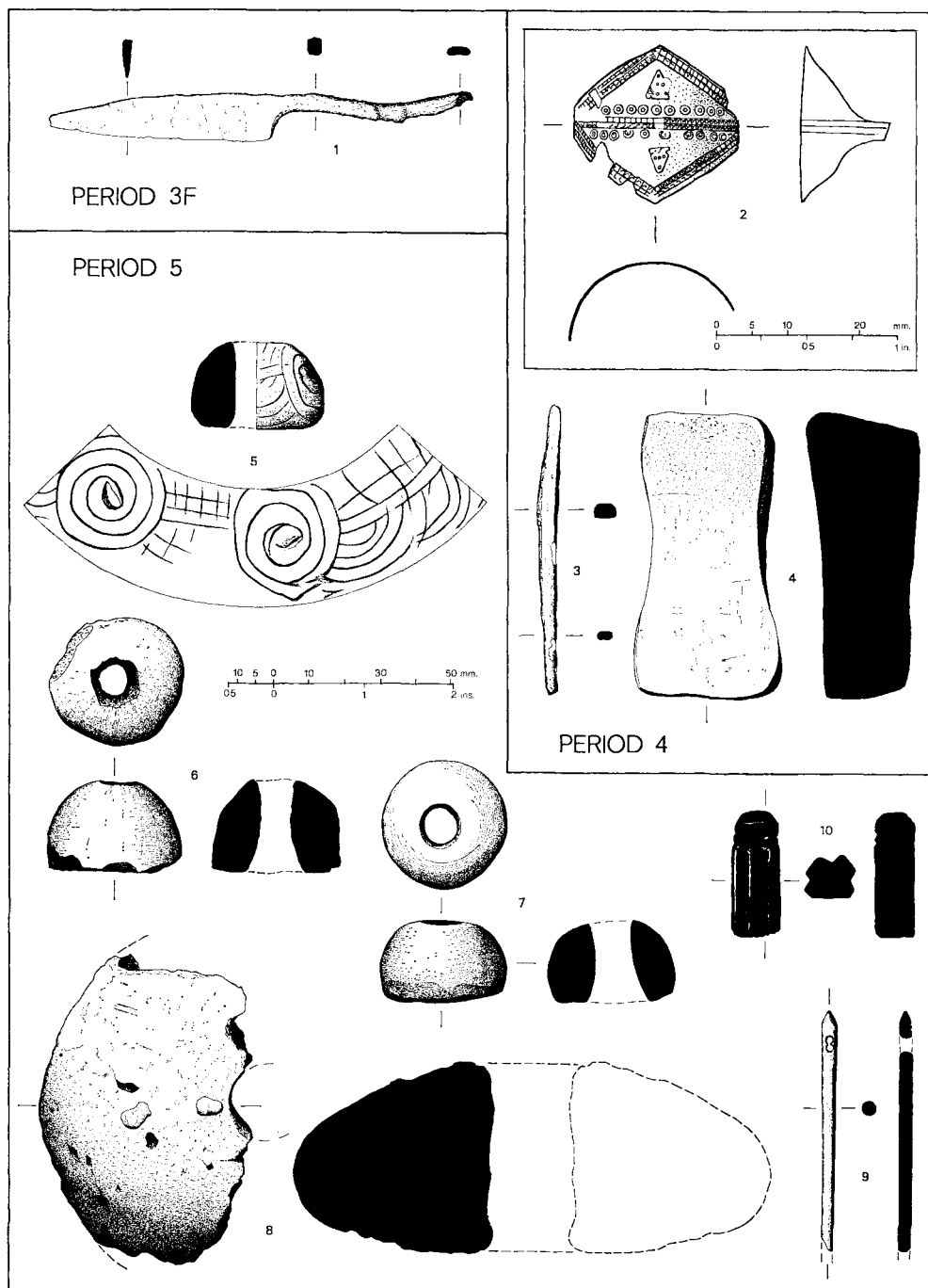


FIG. 18
Small finds. Periods 3F, 4 and 5. Scale 1:2, except for no. 2; 1:1

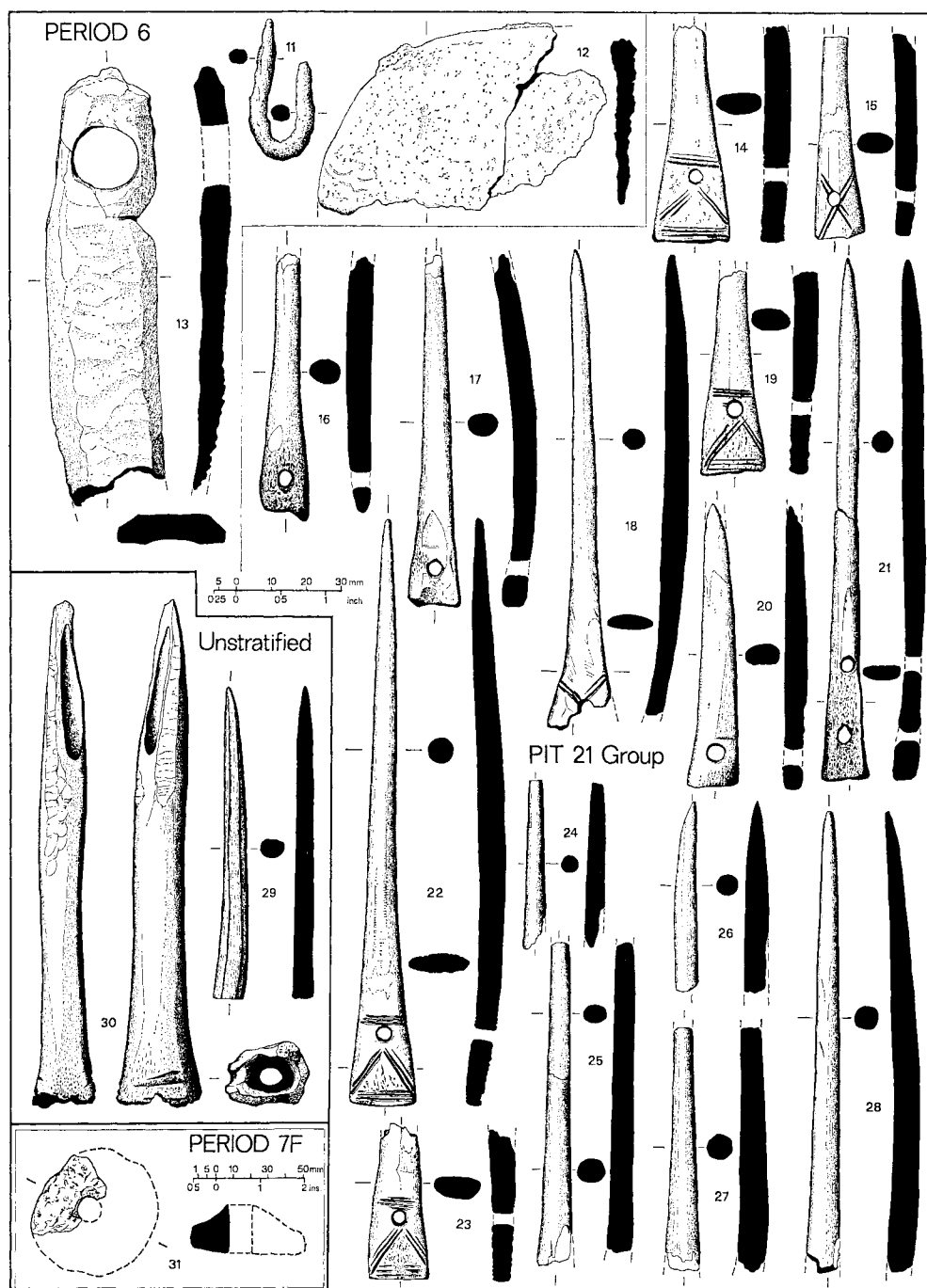


FIG. 19

Small finds. Periods 6, 7F, and unstratified. Scale 1:2 except for no. 31, scale 1:4

a lead oxide content of around 70%. This agrees well with glass from other 10th-century deposits,¹⁰⁸ e.g. at Lincoln and Hereford.¹⁰⁹ From the same layer came two lumps of highly vesicular vitreous material. They had a high lead content and would also seem to be deliberately made glass, perhaps at an intermediate stage of manufacture. The red coloration on one side appears to be a layer of adhering crucible fabric.

Most of the glass seems to be of the pale, translucent yellow to amber variety. These colours are produced by traces of iron in the glass, probably entering it accidentally in one or more of the raw materials. The glass has weathered so that much of its surface now appears an opaque white. There are also a few fragments of crucible coated with opaque lemon-yellow glass which contains amounts of lead similar to those found in the translucent glass. X-ray diffraction analysis carried out by S. Wyles at the Laboratory of the Government Chemist gave only weak patterns which included that of silver arsenic sulphide ($\text{Ag}_2\text{As}_2\text{S}_4$), but neither silver nor antimony nor tin could be detected by him under the analytical S.E.M. Silver in trace quantities has been used certainly since early medieval times in decorating window glass but its presence here is unexpected; no alternative 'colorant' is immediately obvious, however. In this connexion it is interesting that a sherd of an entirely different type of vessel, bearing *metallic* silver, was found nearby (V 138, see Appendix 11); but the context is also different and its use could be quite unrelated to glass. Two small areas of clear yellowish glaze on a rough piece of fired daub from layer 124, on the other hand, are probably accidental splashes from glass working.

Two specimens from Period 6 were also examined. One (VI 77) appears to be a piece of re-fired black-burnished ware and carries a very heterogeneous glass deposit. The intended colour would seem to have been an opaque red (due to cuprous oxide or copper metal) although there are also patches of yellow, green and black. These latter colours are produced by insufficiently reducing conditions in the melting fire.¹¹⁰ It is possible that the sherd was being used as a 'palette' to test the colour of a batch of molten glass, although no other glass of this type was found. The other specimen (V 98) was quite different from all the rest. It contained no detectable amounts of lead and was very deeply and characteristically weathered, having a columnar 'crystalline' surface appearance. It is clearly 'forest' (potash) glass — made in northwest Europe after c.A.D. 1000 — possibly a vessel fragment.

APPENDIX 11

METALWORKING RESIDUES. By LEO BIEK, *Ancient Monuments Laboratory* and R. F. TYLECOTE, *Institute of Archaeology, University of London*

The evidence from this limited area is sparse and diffuse. All the material separated by the excavators into this category is clearly random rubbish and no metallurgical significance can be ascribed to any of the excavated features. In the circumstances no general conclusions are possible. Altogether only c.4 kg of 'slag' had been found and no attempt at quantification has thus been made, particularly as c.40% of the total weight was contributed by one large piece of smithing slag (Period 3D), and because much of the rest contained fragmentary metallic iron 'objects' whose state and association with charcoal etc. could not be firmly interpreted. No definite concentrations of material were noted.

Nevertheless, some specifically valid inferences are possible and a few of the finds are of particular interest. From the rich organic deposits in Period 4 there is not a single specimen. There is some indication of smithing from Roman levels, but the most consistent evidence comes from the multiple 13th-century deposits in trench VIII, and especially Pit 37 (Period 7B), Wall 19 (7D) and the building in Period 7G. The material

is mainly smithing slag but also contains some iron-bearing fuel ash slag, as well as hearth lining and ferrous debris (all with charcoal) such as are found associated with smithing. The presence of some coal in 7G is noteworthy.

The same deposits also produced (in Period 7F), amongst the same kind of iron-working residue, a fragment of a small fired clay tuyere, or bellows nozzle (Fig. 19, no. 31), which had evidently been used in a crucible hearth to melt copper alloy. Its body is highly vitrified right through and there has been some softening around the narrow end. The whole of the surface is glazed or glost and some areas are deep red from pick-up of cuprous oxide. Spots of characteristic pale green copper corrosion product appear over much of the surface and there is one larger area round the mouth where metal has been molten. The fragment indicates medium-scale activity.

Another fired clay fragment of special interest is evidently part of a small narrow-mouthed wheelthrown pot with beaded rim (Fig. 7, no. 67; Appendix 1). Despite its abundant quartz temper, the fabric would seem to be very porous. On the inside surface there is a patchy, thin but substantial deposit of blackish-brown, soft waxy-looking material: S. Wyles (Lab. of Govt. Chemist) obtained well-defined X-ray patterns for metallic silver and silver chloride (cerargyrite) from this.

The pot is described as a 'crucible', and compared to a similar one (Appendix 1). However, the disposition of the silver, the fabric and shape of the vessel, and the absence of any sign of heating in a fire, all combine to suggest that the silver was never melted in this vessel, but was accidentally splashed onto it, most probably when it was already broken. Similar considerations may well apply to many other so-called 'crucibles' possibly including the parallel cited in Appendix 1.

This is the first recognition of this type of silver residue in that kind of context. Subsequent examination of (genuine) crucible material from Cheddar¹¹ and other sites (cited in the Cheddar report) suddenly showed such corroded silver residues to be extremely common.

APPENDIX 12

A NOTE ON PRESERVATION. *By* LEO BIEK

The site was constricted and small, and the information is inevitably incomplete, so that any generalizations can only be tentative. Yet certain aspects are clear and call for comment against a wider background. Despite the limitations of both overall scientific cover and specific data, it would seem that preservation (particularly) of the various (organic) materials described above has been due, in the main, to one or other of two different sets of conditions, and that one of these is a variant of previously known factors but has not hitherto been described, while the other could have been guessed at but has not been so clearly recognizable before.

In Table 5 most levels in which metalwork and preserved organic materials were found are collated with period and approximately with relative depth. The quality of preservation varied (see especially Appendix 5), and it is probable that there was a complete gradation, but there was no opportunity to monitor this in any detail. One can thus only accept that the recovery of organic structure was limited and consider the available evidence on its own merits — but with that in mind. The state of associated metal objects is sometimes a good indicator of conditions of burial, and this can clearly be used here but there are too few objects to permit an overall view.

Central Gloucester is apparently sited on a gravel capping consisting of 'reddish quartzose sand with a considerable admixture of clay'.¹¹² The general texture of the subsoil is thus heterogeneous and drainage is likely to have been uneven. This would have been reflected in a fluctuating and irregular water table, of which there are some

TABLE 5
DISTRIBUTION OF FINDS RELATED TO STRATIFICATION

| C O N T E X T | | | | M A T E R I A L | | | | | | | |
|----------------------------|-------|--------|-------------------------|----------------------------|-----------------|-------------|-----------------|---------|---------------|------------------------------|--------------------|
| Layer ^{Tr} no. | Type | Period | Date (cent.) | Iron | Copper alloy | Lead | Wood | Plants | Bone | Leather | Fibre ^A |
| 95 | Pit | 6 | late 11th early 12th | | | | | nut | X | X | |
| 111 | Pit | | | | | | wattle T & O | | X | | |
| 152 | Pit | | | | | | T | | pins & X | | |
| 153 | Pit | | | | | | O | | X | | |
| 161 | Pit | | | | | | | | | | |
| VII F 33 | Pit | 6 | 11th | | | | T | X | | | |
| F 43 | Pit | | | object (130) hook (110) | | | | X | | | |
| VII F 49 | Pit | | | | | | | | | | |
| 51 | Pit | | | slag ^v | | 'red' waste | | X | X | O & X | |
| 85 | (L) | | | | | | | | | | |
| 45 ⁺ | L | 5 | 10th | | | 'clean' | | | pin & X | | |
| 80 ⁺ | Pit/L | | | | | | T | X | XX | | |
| 144 | L | | | | | | | | | | |
| 102 | Pit | | | | | | | | spindle whorl | | |
| 114 | Pit | | | | | | T | | | X | heel |
| 139 ^p | Pit | | | | | | T | X | X | | |
| 140 | Pit | | | | | | T | | | | |
| 141 | Pit | | | | | | T & O | | | | |
| V 240 | P/H | | | | | | T | | | | |
| VII 30 | (L) | | | | | | | X | | | |
| 54 ⁺ | L | 4 | 9th | strip ^v | ring | | T | X | X | | |
| 83 ⁺ | L | | | | | | | | | | |
| 93 ⁺ | L | | | | | | T | X | X | shoe frs. | |
| 148 | L | | | hobnail ^v (44) | | | mat | | | | |
| 162 | L | | | | | | | X | X | strap, thonged shoe frag. | human hair |
| 103 ⁺ | L | | | drill ^v (45) | | | T | X/straw | X | shoe frags. | |
| 104 | L | | | | | | T & O | | | shoe frags. | |
| 105 | L | | | | | | bark | | | | |
| 106 | L | | | | | | T, bark | X | | | |
| 109 | L | | | | | | T | | | | |

indications remaining, here as elsewhere,¹¹³ in descriptions of 'mottling' (gleying) and 'iron pans'. In addition, at this site, the Roman metalling (3E) and its subsequent subsidence and silting (3F) would have further impeded drainage. The pattern is finally complicated by the digging of a number of pits — from the Roman, Saxon and medieval living surfaces, as well as later — and their subsequent filling with a variety of mixed materials.

In the circumstances the evidence is both remarkably even and yet clearly defined. On the one hand, such pH values and calcium levels as are available¹⁵ show that the deposits are all more or less calcareous and mostly well on the alkaline side of neutrality. On the other hand, despite this large measure of equilibration over the past millennium, at least, there are several significant, if small, distinctions — and these hint at larger ones in the past — which can be utilized to make some inferences in detail.

It is customary to equate 'good preservation', especially of organic materials, with waterlogging but the main function of the water is to provide a seal against oxygen. Current knowledge has recently been reviewed¹¹⁴ with particular reference to iron; although metals are more sensitive to oxygen¹¹⁵ it is clear that anaerobic — or, strictly, anoxic — conditions are necessary also for the persistence of organic structure. As one might expect, there seems to be no threshold — rather, one finds gradual changes over a fairly wide range of conditions both from site to site and even quite locally within a single deposit. Pending systematic investigation one can only record and tentatively place the overall conditions here within the general framework of previous experience. As always, the precise state of worked items and residues at the time they were buried must remain in doubt.

Where found, organic materials were in the condition normally associated with waterlogged, stagnant environments:¹¹⁵ the wood relatively soft yet firm in outline, with working and other marks preserved in the surface (Excavation report and Appendix 8); leather pliable, with sharp edges on off-cuts, and the grain, where present, more or less clear (Appendix 7); seeds, straw and other plant remains variably softened but identifiable to the extent described in Appendix 5. All were somewhat discoloured — wood and leather darkened, but the straw only slightly greener, its original 'golden' hue conspicuous even in the section.

The iron objects were scattered throughout various levels and periods and finds from late Roman contexts are here for completeness and comparison included although they are to be fully published elsewhere.⁴ It will be seen from Table 5 that three objects found in an overall rusty, 'normal' flaky state, came from levels that were in late features or were relatively 'high and dry': F43, an unsealed pit; F49, sunk into a robbed Roman wall space possibly as late as the 12th century; and layer VI (98), one of several 'hard stony loam deposits with iron panning', of Period 3G (5th–10th century) but relatively high (equivalent to layers VI (63) and (65) in the published section (Fig. 9)) — the similarly placed, adjacent layer (92) contained a 'normally' corroded piece of cast lead waste.

The rest of the iron objects came from lower levels and/or earlier periods in Trench VI and were all in pit fills or deposits rich in organic matter. Though by no means perfectly preserved, their surfaces carried little or no rust — even when examined some years after excavation — but instead showed pale to royal blue, grey and black colours characteristic (again) of burial in waterlogged, anoxic mud with much organic matter. The blue colour, due to *vivianite*, a ferrous phosphate, $\text{Fe}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$, is particularly striking and present also on other materials — including a piece of slag (shown in Table 5). It is a curious coincidence that all these iron objects, even those from 9th-century levels, are clearly Roman (with the possible exception of the indeterminate strip from (54)).

Lead fragments were found in a 'good, clean' condition, consistent with 'water-logging', in organic layer (45), at a relatively high and late (10th-century) level but well sealed by a thick layer of stones. Two Roman 'bronzes' were well-preserved and

well-buried in lower organic levels. Both were coated with a relatively thin black sulphide skin, and in one case, the pin from layer (123), pyritic crystals were noted by the conservator.

By contrast, the bronze ring from layer (54) showed 'normal' multicoloured pitting corrosion, though with relatively little green. The level is nominally the same as that in which structural wood and an iron strip were found, preserved quite as well as similar objects in other organic levels. However, the ring is described as being 'embedded near the surface' of the layer, 'in an area unsealed except by post-medieval levels'.

Similarly, a fragment of waste cast lead from organic layer (85) was smoothly yet considerably corroded, but again found within the surface of what is in effect the uppermost of the organic deposits near its highest level. The condition of this piece, which had an unusually bright red tinge to its 'normal-whitish' surface, prompted an examination on which the Associated Lead Manufacturers' Research Laboratory kindly reports as follows: 'Analysis by infrared spectroscopy showed the surface to contain tetragonal litharge, PbO (major constituent), lead phosphate (minor amounts), lead carbonates in very minor quantities, and a trace of calcium carbonate.' The formation of litharge in these circumstances is normally associated with mildly alkaline media which are damp or wet and from which carbon dioxide is excluded — in effect, this also covers absence of air, the oxygen being taken from the water. I am grateful to Hector Campbell, of the Metal Users' Consultancy Service, for helpful discussion.

But perhaps the most interesting, unusual and significant aspect of these corrosion products is the presence of lead phosphate. Phosphate is clearly a most pervasive and important factor in the overall consideration of such preservative deposits. Concentrations of the order of 5% were found by John Evans, at the North-East London Polytechnic, in samples taken from layers (112): organic deposit; and (136) and (139): pits. Its presence is reflected in the characteristic and ubiquitous *vivianite* blue colour, as well as in the many bones and other animal residues, and it would seem to be quite considerably, if surprisingly, accumulated also from vegetable matter.

The bone objects examined showed a little, only, of the greyish-brown staining that is sometimes seen in such deposits, but were otherwise in perfect condition, noticeable especially on the polished surfaces and even in the pitch-coated areas that had been burnt.

The fragments of locks of hair deserve special mention. One has been specifically identified as human (layer (162)), the others (from (112)) await further study. Human hair, especially, is rarely recorded; but all kinds are probably far more common than would appear. Where examined,¹¹⁶ it is well-preserved, being even in its natural state the animal tissue most resistant to decay, especially under these conditions.

Overall on this site, the states of preservation normally due to 'these conditions' are most reminiscent of those at Hungate, York,¹¹⁷ but there, the pH was decidedly on the acid side of neutrality (mostly between 6.2 and 6.8). At St Neots,¹¹⁸ on the other hand, pH values were very similar to those found here (7.2–7.5) but protection of iron (by phosphate) was complete. Perhaps the nearest in state, though not in superficial appearance, was the iron found at Denton¹¹⁹ where, however, conditions were dominated by a highly calcareous medium (pH 8.1–8.9) and considerably affected by the presence of sulphur. In all these three cases, totally waterlogged conditions had also preserved botanical microstructure to a remarkable degree.

So far there is only one scientifically documented case where such preservation has occurred evidently in the absence of a water-seal. At Vindolanda¹²⁰ it was suggested that the necessary environment was provided by tightly compressed layers of vegetable material, largely well-preserved bracken with some recognizable straw, with which was found a clay-like matrix very rich in leather fragments and various other, mainly occupational, residues — and containing well-preserved metal objects. It was further suggested that this might represent essentially animal bedding material which had nevertheless also come to incorporate some human excreta.

To sum up, the overall pattern of preservation of and in the organic levels on this site is in many ways similar to that which has been met elsewhere under comparably anoxic conditions of burial, except for the absence of clear evidence for complete and continuous waterlogging which has hitherto been regarded as essential for such preservation. But bearing in mind the Late Roman metalling and levelling up of the area, the existence of suitably preservative conditions even in the overlying 'sterile' silt (3F), and the iron-panning in 3G above that — it is on the face of it quite possible for *surface* water to have provided an adequate seal, at least in the initial and crucial stages. This could apply equally to the St Michael's site¹¹³ but there is no reason to postulate marshy conditions in either area.

While evidence in 'preservation' could support both of the hypothetical origins for the deposits — 'stable manure' and (human) cess — this distinction is not reflected in that evidence. It is reasonable to expect the ingredients of cess to produce a suitable medium especially in view of the high concentration of phosphate. But it is important to establish and maintain anoxic conditions, somehow; and that may be why, in F49, though seeds are still identifiable, the iron hook is badly corroded. On the other hand, stable litter would seem less likely from its texture to provide the necessary seal. However, associated manure could do this, especially when compressed; and in addition fairly rapid burial, as suggested for example in the case of the wattle fence W49, would clearly reinforce it.

In this way, and to that extent, the preservation evidence might be used to support the suggestion, based on the animal bone report and circumstantial factors, that the area of the site continued to be used for market stalls, or at least cattle byres, following the Late Roman reorganization, though the subsequent Saxon deposits changed from butchers' rubbish into food remains. It is known from documentary evidence that 'stable waste generated by the substantial animal population was often responsible for fouling and blocking streets and lanes',¹²¹ and it is therefore both likely, and important to establish in this way, that the organic deposits here represent such a residue. More specific interpretation must await the results of scientific investigation at more extensive sites, as for instance at Winchester¹²² and York.¹²³

NOTE

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NOTES

¹ See H. Hurst, 'Excavations at Gloucester 1968–71: First Interim Report', *Antiq. J.*, LII (1972), 24–69; H. Hurst, 'Excavations at Gloucester 1971–1973: Second Interim Report', *ibid.*, LIV (1974), 8–52.

² The main Roman E.–W. street line was conjectured by Hurst (op. cit. note 1, 1974, 21, Fig. 6) and is confirmed by excavations reported here.

³ Hurst, op. cit. note 1, 1972, 66–68.

⁴ 'Roman finds from 1 Westgate St., Gloucester', *Britannia*, in preparation.

⁵ The northern limit of the forum is conjectured from the line of the E.–W. street; see note 2.

⁶ A report on the coins by Richard Reece will be published with the Roman finds; see note 4.

⁷ M. H. Medland, 'An account of Roman and medieval remains found on the site of the Tolsey at Gloucester in 1893–4', *Trans. Bristol Glos. Archaeol. Soc.*, XIX (1894–95), 142–58.

⁸ A. G. Hunter, 'The Westminster Bank, Westgate Street, Gloucester, 1959', *Trans. Bristol Glos. Archaeol. Soc.*, LXXXI (1968), 56–64.

⁹ Hurst, op. cit. note 1, 1972, 63. One of the columns is in the foyer of the City Museum.

¹⁰ The dating of the late Roman city wall is discussed in Hurst, op. cit. note 1, 1972, 31; and in C. Heighway, et al., *The North and East Gates of Gloucester* (CRAAGS, forthcoming).

¹¹ Hurst, op. cit. note 1, 1972, 57.

¹² *Ibid.*, 62–63.

¹³ See Appendix 12. I am also grateful to Miss Susan Limbrey and Mr C. Frost for discussion of this point.

- ¹⁴ Gloucester Museum site 41/75, unpublished; note in *Medieval Archaeol.*, xxii (1978), 'Medieval Britain in 1977'.
- ¹⁵ C. Frost, *Chemical Analysis of soil samples from 1 Westgate Street*, MS on file at Gloucester Excavation Unit.
- ¹⁶ M. D. Cra'ster, 'St. Michael's Gloucester 1956', *Trans. Bristol Glos. Archaeol. Soc.*, LXXXI (1961), 59-64. The species list from this excavation, limited though the seed analysis was, duplicates species from 1 Westgate Street (Appendix 5).
- ¹⁷ Hurst, op. cit. note 1, 1972, 58-62.
- ¹⁸ Radiocarbon dates were all 8th century. A commentary by Hurst is forthcoming.
- ¹⁹ Hurst, op. cit. note 1, 66-68. Re-used Roman stone has been found built into St Oswald's Priory, built c.900: C. M. Heighway, 'Excavations at Gloucester, Fourth Interim Report: St. Oswald's Priory 1975-76', *Antiq. J.*, LVIII (1978), 107-108.
- ²⁰ A surviving column in the City Museum stands 2.5 m high: another recently found at 30 Westgate Street (site 57/77) was avoided by 12th- and 13th-century cellars and only truncated in the 19th century. The S. side of this colonnade is probably under the S. half of Westgate Street.
- ²¹ Hurst, op. cit. note 1, 1974, 23.
- ²² Hurst, op. cit. note 1, 1972, 60-61.
- ²³ *Ibid.*, 44.
- ²⁴ Gloucester Excavation Unit, unpublished; see note 20.
- ²⁵ Compare W. Boyne, *Trade Tokens issued in the Seventeenth Century* (ed. G. C. Williamson, London, 1889-91), 245, no. 84.
- ²⁶ A. Vince, 'The Roman Pottery', op. cit. note 4.
- ²⁷ A. Vince, 'The Pottery' in Heighway, op. cit. note 10.
- ²⁸ The fabrics are described according to the system recommended by D. P. S. Peacock, 'Ceramics in Roman and Medieval Archaeology', D. P. S. Peacock (ed.), *Pottery and Early Commerce* (London, 1977), 21-33. Colours are described using *Munsell Soil Colour Charts* (Baltimore, U.S.A., 1954 edn).
- ²⁹ D. F. Williams, 'The Romano-British Black-Burnished Industry: An Essay on Characterisation by Heavy Mineral Analysis', Peacock, op. cit. note 28, 204-207.
- ³⁰ M. Hassall and J. Rhodes, 'Excavations at the New Market Hall, Gloucester', *Trans. Bristol Glos. Archaeol. Soc.*, xciii (1974), Horizon 14, 87-88.
- ³¹ P. J. Fowler in H. S. Gracie, 'Frocester Court Roman Villa, Gloucestershire; First Report 1961-7', *Trans. Bristol Glos. Archaeol. Soc.*, xc (1971), 50-52.
- ³² Rye describes experiments to determine the conditions under which limestone inclusions will decompose in firing: O. S. Rye, 'Keeping your temper under control: materials and the manufacture of Papuan pottery', 'Archaeology and Physical Anthropology' in *Oceania*, xi, 2 (1976), 106-37.
- ³³ For a crucible of similar form, see S. S. Frere, *Verulamium Excavations* (Soc. Antiqs. London Res. Report xxviii, Oxford, 1972), 1, Fig. 141, no. 15.
- ³⁴ Vince, in Heighway, op. cit. note 10, no. 416.
- ³⁵ Oxford Fabric B: information from M. Mellor.
- ³⁶ Information from E. Morris in advance of her publication of these pit groups in the *Trans. Worcs. Archaeol. Soc.*
- ³⁷ Described in a forthcoming report on the medieval pottery from St John's Hospital, Cirencester. A fuller description and details of the distribution of the ware is included in a forthcoming thesis by the author for Southampton University.
- ³⁸ Vince, op. cit. note 26.
- ³⁹ M. Parrington and C. Balkwill, 'Excavations at Broad Street, Abingdon', *Oxoniensia*, xl (1975), 52-58.
- ⁴⁰ Vince, op. cit. note 26.
- ⁴¹ K. Kilmurry, 'The Production of red-painted pottery at Stamford, Lincolnshire', *Medieval Archaeol.*, xxi (1977), 180-86.
- ⁴² J. G. Hurst, 'The Pottery', D. Wilson (ed.), *The Archaeology of Anglo-Saxon England* (London, 1976), 283-348.
- ⁴³ Vince, op. cit. note 10. The earliest dated context is beneath the Abbey Wall, site 27/73.
- ⁴⁴ K. J. Barton, 'A Medieval pottery kiln at Ham Green, Bristol', *Trans. Bristol Glos. Archaeol. Soc.*, LXXXII (1963), 95-127.
- ⁴⁵ M. Biddle and K. Barclay, 'Winchester Ware', V. I. Evison, H. Hodges and J. G. Hurst (eds.), *Medieval Pottery from Excavations* (London, 1974), 138.
- ⁴⁶ J. M. Maltby, 'The Animal Bones', in Heighway, op. cit. note 10.
- ⁴⁷ H. H. Carter, 'A guide to the rates of toothwear in English lowland sheep', *J. Archaeol. Science*, ii (1975), 231-33.
- ⁴⁸ See note 13 and p. 208.
- ⁴⁹ F. J. Green in J. M. Renfrew, et al., *Winchester Studies*, x (forthcoming).
- ⁵⁰ D. Williams, 'Bryophytes in Archaeology', *Science and Archaeology*, xviii (1976), 12-14.
- ⁵¹ The full range of species recovered with measurements and illustrations are included in a forthcoming thesis by F. J. Green for Southampton University. A species list is available at the Gloucester Excavation Unit, and at the Department of the Environment.
- ⁵² A. R. Clapham, T. G. Tutin and E. F. Warburg, *Flora of the British Isles* (Cambridge, 1962).
- ⁵³ H. Godwin, *The History of the British Flora* (Cambridge, 1975), 415.

- ⁵⁴ Green, op. cit. note 49.
⁵⁵ Godwin, op. cit. note 53.
⁵⁶ K. Jessen and H. Helbaek, *Cereals in Great Britain and Ireland in Prehistoric and Early Historic Times* (Kongelige Danske Vetenskabernes Selskab, Biologiske Skrifter 3.2, Copenhagen, 1944).
⁵⁷ R. N. L. B. Hubbard, 'Crops and Climate in Prehistoric Europe', *World Archaeol.*, viii, 2 (1976), 163.
⁵⁸ Green, op. cit. note 49.
⁵⁹ Ibid.
⁶⁰ E. Lange, 'The Development of Agriculture during the First Millennium A.D.', *Geologiska Foreningens i Stockholm Forhandlingar*, xcvi (1975), 120.
⁶¹ H. Helbaek, *Da Rugen Kom til Danmark* (K.U.M.L., 1971), 296.
⁶² Godwin, op. cit. note 53, 497; R. N. L. B. Hubbard, 'Assessing the Botanical Component of Human Palaeo-Economies', *Bull. Inst. Arch. London*, xii (1975), 199.
⁶³ Green, unpublished data, and personal communication from M. Monk.
⁶⁴ Green, op. cit. note 49.
⁶⁵ R. W. Dennell, 'The interpretation of plant remains: Bulgaria', E. S. Higgs (ed.), *Papers in Economic History* (Cambridge, 1972), 151.
⁶⁶ Godwin, op. cit. note 53, 414-15.
⁶⁷ W. N. Boase, 'Flax and Flax Fibre Cultivation', *Scottish J. Agriculture*, i (1918), 140-47.
⁶⁸ Godwin, op. cit. note 53, 167.
⁶⁹ W. A. Casparie, B. Mook-Kamps, R. M. Palfenier-Vegter, P. C. Struijk and W. van Zeist, 'The Palaeobotany of Swifterbant: a preliminary report', *Helenium*, xvii (1977), 47-49.
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⁷¹ C. F. Battiscombe (ed.), *The Relics of Saint Cuthbert* (Oxford, 1956).
⁷² G. M. Knocker and C. Wells, 'Excavations at Red Castle, Thetford', *Norfolk Archaeol.*, xxxiv (1967), 119-86, Pl. IV.
⁷³ E. Crowfoot, personal communication.
⁷⁴ J. W. Hedges, 'The Textiles', A. MacGregor, '9th to 11th century finds from Lloyds Bank, Pavement and other sites', P. V. Addyman (ed.), *The Archaeology of York*, xvii, forthcoming.
⁷⁵ M. Hoffman, *The Warp-Weighted Loom* (Studia Norvegica 14, Norsk, 1964).
⁷⁶ J. W. Hedges, 'The loom-weights from Back Street, St. Cross, Winchester' (forthcoming); A. C. Harrison, 'Rochester East Gate 1969', *Archaeol. Cantiana*, lxxxvii (1972), 156; E. M. Jope, 'The Clarendon Hotel, Oxford. Part 1. The site', *Oxoniensia*, xxiii (1958), 14.
⁷⁷ Hoffman, op. cit. note 75, 197, 257-58.
⁷⁸ C. Singer, E. J. Holmyard, A. R. Hall and T. I. Williams, *A History of Technology*, II (Oxford, 1957), 209.
⁷⁹ Hedges, op. cit. note 74.
⁸⁰ Ibid.
⁸¹ J. H. Thornton, 'Leatherwork', B. Durham, 'Archaeological Investigations in St. Aldates, Oxford', *Oxoniensia*, xlii (1977), 157, Fig. 36, nos. 16 and 17.
⁸² K. M. Richardson, 'Excavations in Hungate, York', *Archaeol. J.*, cxvi (1959), 87, no. 5.
⁸³ Ibid., 89-90, nos. 6, 7.
⁸⁴ Thornton, op. cit. note 81, 156, Fig. 35, nos. 10, 11 and 13.
⁸⁵ J. H. Thornton and A. V. Goodfellow, 'Leather Shoes', I. M. Stead, 'Excavations at the South Corner Tower of the Roman Fortress at York, 1956', *Yorks. Archaeol. J.*, xxxix (1958), 526, no. 4; A. V. Goodfellow and J. H. Thornton, 'Leather Shoe Parts', P. Wenham, 'Excavations in Low Petergate, York, 1957-58', *Yorks. Archaeol. J.*, xlii (1972), 99, Fig. 23, no. 6: 101, Fig. 24, no. 7; A. MacGregor, op. cit. note 74. Leather in Anglo-Scandinavian York is discussed generally in A. MacGregor, 'Industry and Commerce in Anglo-Scandinavian York', R. A. Hall (ed.), *Viking Age York and the North* (C.B.A. Research Report 27, London, 1978), 37-57.
⁸⁶ Site reported in Hurst, op. cit. note 1, 1972, 52-62; a list of the leather is in preparation by C. Goudge.
⁸⁷ For example the Abingdon sword: D. A. Hinton, *Catalogue of the Anglo-Saxon Ornamental Metalwork in . . . the Ashmolean Museum* (Oxford, 1974), no. 1.
⁸⁸ Op. cit. note 82, 87, no. 3.
⁸⁹ Thornton and Goodfellow, op. cit. note 85, 1958, 526, no. 3.
⁹⁰ H. O'N. Hencken, 'Lagore Crannog; an Irish royal residence of the 7th to 10th centuries A.D.', *Proc. Royal Irish Academy*, liii (1950), 151-70.
⁹¹ A. MacGregor, op. cit. note 85, 1978, 48-52.
⁹² Richardson, op. cit. note 82, 86.
⁹³ G. C. Dunning, 'A Norman pit at Pevensey Castle', *Antiq. J.*, xxxviii (1958), 213-15.
⁹⁴ A. MacGregor, op. cit. note 85, 1978, 50.
⁹⁵ Unpublished: site described in Hurst, op. cit. note 1, 1972.
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⁹⁷ Site 33/76, SF 3. Unpublished.
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- ¹⁰² B. Cunliffe, *Excavations at Portchester Castle, i: Roman* (Society of Antiquaries Research Report, xxxii, 1975), 239, no. 204.
- ¹⁰³ The punched decoration occurs widely in the 9th-11th centuries, e.g. Cuerdale, Lancs., hoard: J. D. A. Thompson, *Inventory of British Coin Hoards A.D. 600-1500* (Royal Numismatic Society, 1956), Pl. xii, A; Chester: ibid., Pl. x, A; Soberton, Hants.: H. Shetelig, *Viking Antiquities in Great Britain and Ireland*, iv (Oslo, 1940), 29. For a distribution map of gold and silver rings with punched stamps in England and Wales, see D. A. Hinton, 'Late Saxon treasure and bullion', D. Hill, *Ethelred the Unready* (Oxford, B.A.R., 59, 1978), 157. The bezel shape has a parallel from Icklingham, Norfolk: ibid., 158.
- ¹⁰⁴ Cunliffe, op. cit. note 102, 241, no. 216.
- ¹⁰⁵ A. G. Vince, in R. Shoesmith *Saxon and Medieval Hereford* (forthcoming).
- ¹⁰⁶ Identified by A. G. Vince, see above, Appendix 1, TF 43.
- ¹⁰⁷ Clarke and Carter, op. cit. note 98, 311-12, nos. 1-5.
- ¹⁰⁸ L. Biek and J. Bayley, 'Glass and other vitreous materials', *World Archaeology*, 11, 1 (1979), 1-25.
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- ¹¹¹ L. Biek, 'Metalworking residues', P. A. Rahtz, *The Saxon and Medieval Palaces at Cheddar*, B.A.R. 65 (1979), 252-58, Fig. 87, Pl. XIX. See also J. Bayley and L. Biek in S. R. Bassett et al., 'Saffron Walden — Excavations and Research 1972-78', *Essex Archaeol. Hist.* (1979), forthcoming.
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- ¹¹⁵ T. W. Farrer et al., 'The well deposits', P. A. Rahtz and E. Greenfield, *Excavations at Chew Valley Lake, Somerset* (H.M.S.O., 1977), 346-47. Also see 363-75, esp. 364-65, 369, 371 and 375.
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