

Excavations in the Outer Precinct of Tintern Abbey

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With contributions by

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EXCAVATION REVEALED an aisled guest-hall, possibly of 13th-century date, which parallels structures at Kirkstall and Waverley abbeys. This was replaced in the 15th or early 16th century by a new guest range with indications of differing provision for high-status guests. A smithy and non-ferrous industrial activity, notably cupellation and bell founding, are also described.

The Cistercian Abbey of Tintern (Grid Ref. SO 532 998) lies in the modern Welsh border county of Gwent, formerly Monmouthshire (Fig. 1). It was founded in 1131 on the W. bank of the R. Wye, which separates Gwent from the Forest of Dean in Gloucestershire. The visible remains of the church and the main cloister date from the 13th century, while the buildings around the infirmary cloister are dated to the 14th and 15th centuries.¹

Immediately west of the church, within the outer precinct of the abbey, lies the guardianship area which formed the object of the present excavations. Prior to the excavation on the site, a great number of unrecorded wall-following trenches had been dug (shown as F1 in the figures, though not all are illustrated). In 1970–71, Mr J. K. Knight had undertaken a small excavation on the service block of the aisled hall and on the building referred to in the report as the Outer North Range. The present excavations for the Ancient Monuments Board of the Welsh Office, now Cadw: Welsh Historic Monuments, began in 1977 on a limited scale in the area later identified as the SE. corner of the aisled hall. In 1979 a larger area was topsoiled using a JCB and excavation continued in 1980 (Fig. 5). Unfortunately, a planned final season in 1981 was cut back due to financial stringencies which left excavation and recording incomplete. Levelled plans of each layer were used to reconstruct schematic sections across the site (Fig. 7). Difficulties in obtaining a laboratory to undertake archaeomagnetic sampling resulted in incomplete excavation of several of the industrial features, which sometimes had to be left on pedestals while excavation continued around them. The following abbreviations are used in this report:

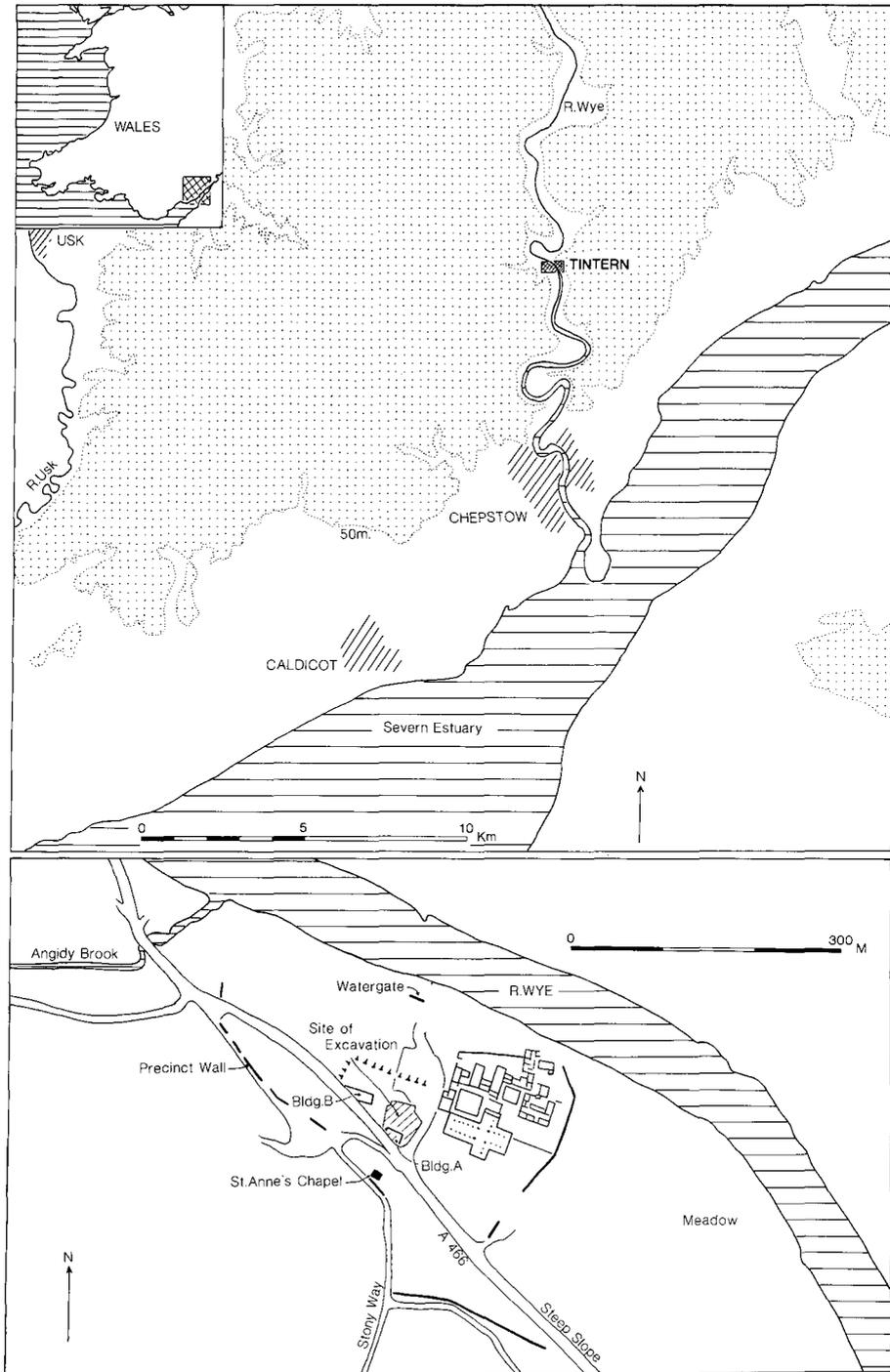


FIG. 1
Location map

L = layer, F = feature, D = drain and W = wall. Depths of cut features are given in an appendix at the end of the structural report.

THE OUTER PRECINCT: TOPOGRAPHY AND HISTORY (Fig. 2)

Fragments of the boundary wall of the outer precinct still survive despite considerable damage through building activities during recent decades. In addition a map of 1764 clearly distinguishes walls from other forms of boundary around the abbey although it is not clear how far this landscape had changed since the Dissolution (Fig. 2).² Unfortunately the map does not illustrate the lands east of the abbey as a major problem is posed by the course of the boundary wall as it runs south-east of the abbey church: all trace of this wall disappears on a steep slope running down to the floodplain of the Wye. It is uncertain if the wall fully enclosed the land east of the abbey or was merely designed to prevent access down the gentler slopes to the abbey's hay meadows.

Evidence of buildings in the outer court is restricted to the area immediately west of the abbey church. Surviving structural remains include St Anne's House, now a private residence, but formerly a gateway chapel; an original triple lancet window (Early English) still survives in its E. wall. A road presumably ran from St Anne's past the W. front of the church towards the Water Gate, whose remains stand on the river bank. Outside the precinct a medieval cobbled road (Fig. 1), called the 'Stony Way' by 1451, runs to the south-west.³

The remains of two medieval buildings survive adjacent to the excavated area, designated as Buildings A and B. In 1901 Building A was in use as a pair of cottages, adjacent to the turnpike road of 1825, now the A466.⁴ The cottages were largely demolished and partly overlain by a road-widening scheme prior to 1918.⁵ Building A's surviving medieval shell was consolidated in the 1960's, but only the E. end survived to any height (Figs. 2 and 3), revealing two square-headed windows with straight chamfers. Both windows have sockets for iron bars and rear recesses for wooden shutters but it is unclear if the lower window had a central mullion. The two windows suggest a 15th- or early 16th-century date for the building. The sockets for the iron cross-bars in the upper window do not align. Unfortunately, no record was made prior to consolidation but it seems likely that the window is original. Details of the interior are confused by spoil heaps but the W. interior wall with two doorways is almost certainly original. It divides off a small services chamber, partly occupied by the drain wall which rises a metre above floor level and probably once extended upwards to serve a garderobe, attached to a private chamber on the first floor. The other internal wall and the block of masonry on the ground floor are probably post-monastic.

Building B (Fig. 1; not shown on the 1764 map), a stone-built first-floor hall, has also been consolidated. It has three octagonal pillar bases showing that it formerly had a vaulted undercroft. Unfortunately, the hall lacks sufficient architectural detail to suggest a date of construction. The high quality of its masonry compared with the rest of the Outer Precinct supports its interpretation as a guest-house.

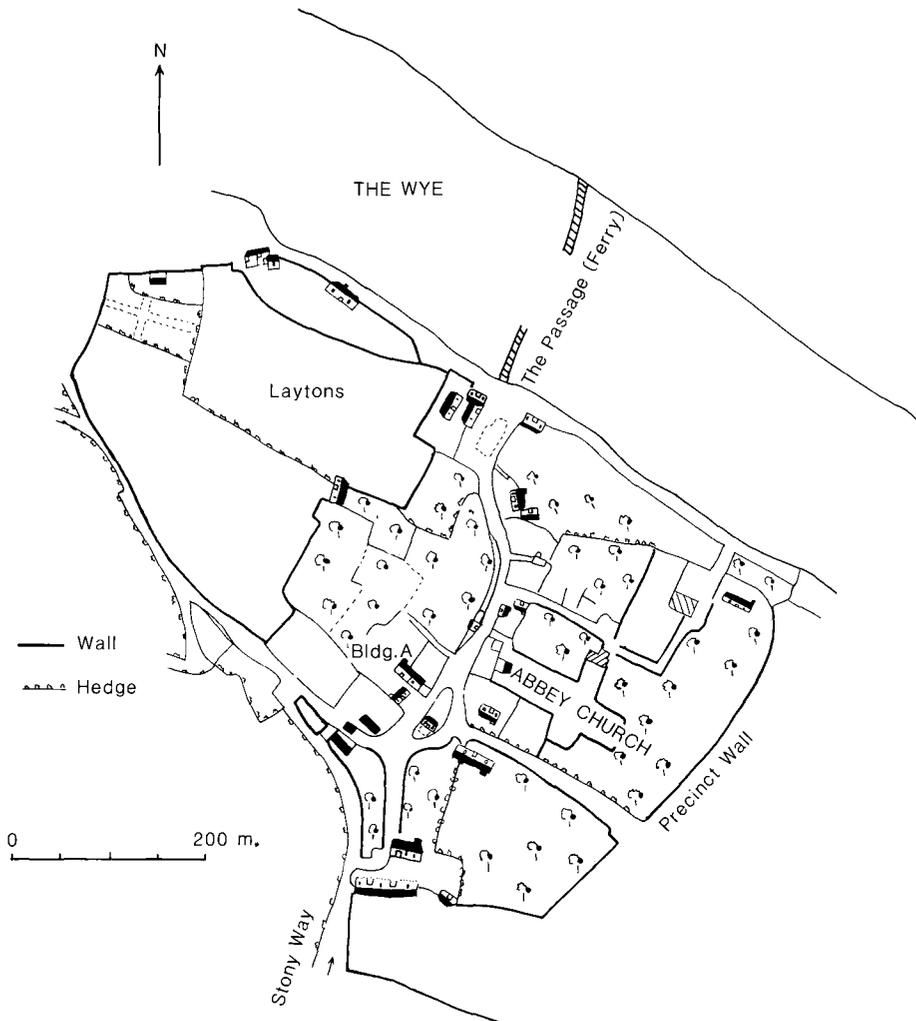
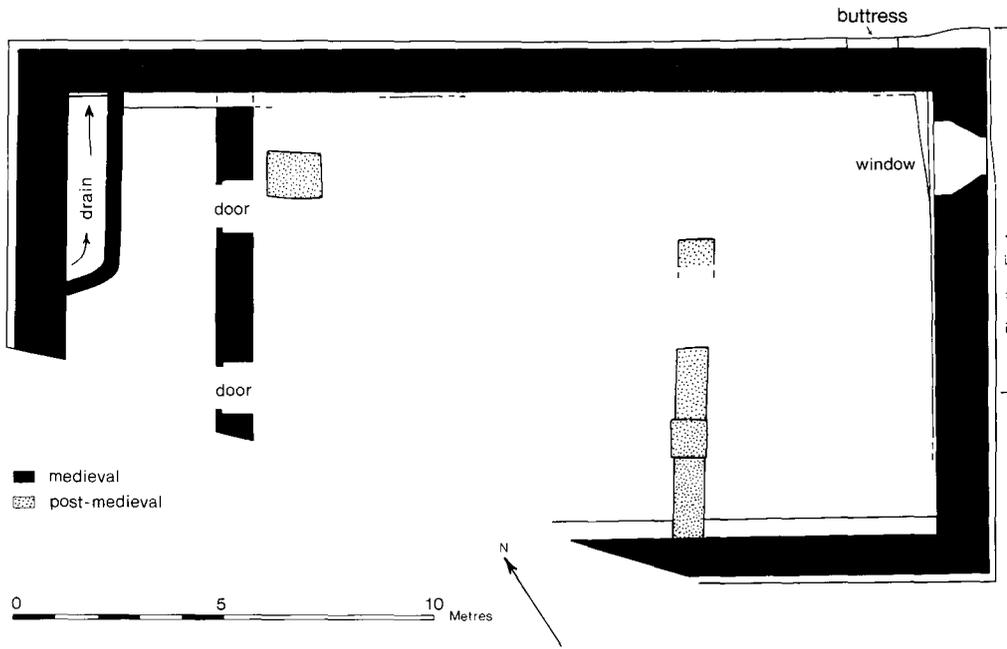


FIG. 2

The Abbey precinct in 1764 (after *NLW* Badminton maps vol. 2, map 6)

The medieval history of the abbey has been discussed recently by the Revd Dr D. H. Williams, but little or no light is shed by the documents on the plan or development of the Outer Precinct.⁶ However, it can be expected to have contained guest-houses and stables, as well as a range of structures linked to economic activities such as brewing, baking and metalworking. The abbey was suppressed in 1536 and the Earl of Worcester was granted the site of the abbey with most of its lands. Accounts for the Worcester estates survive from 1541 to 1641 and show that the abbey and its demesne were leased throughout the period.⁷ Little detail is given in the early accounts but in 1568 named tenements included the laundryhouse, the



Elevation : Fig 4

FIG. 3
Plan of Building A

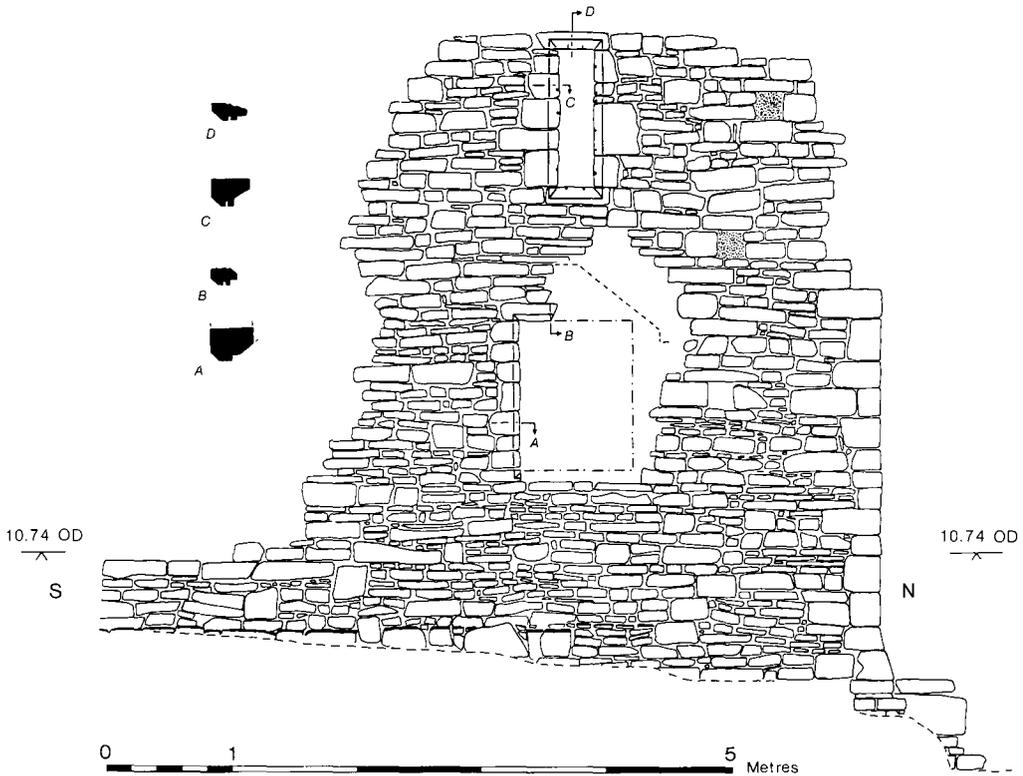


FIG. 4
Elevation of the E. end of Building A

pantryhouse and three stables, one of which was also described as an 'oste and kyllynhouse'. Unfortunately no clue was given to the location of these structures.⁸

The 1764 map, and accompanying survey, of the Duke of Beaufort's estate (Fig. 2) shows a series of cottages, gardens and orchards on the site of the outer precinct.⁹ Building A is already shown as a pair of cottages. The map also indicates that the Laytons were walled off from the outer precinct building complex immediately west of the abbey. It is uncertain if this wall was of medieval date but the complex of buildings west of the abbey does appear to form an 'inner court' within the outer precinct.

THE EXCAVATIONS (Fig. 5)

THE AISLED HALL (Figs. 6 and 7)

The hall measures approximately 21 × 15.5 m internally, and closely parallels the early 13th-century aisled guest-hall at the Cistercian Abbey of Kirkstall in West Yorkshire.¹⁰ The six aisle posts were carried on unmortared sandstone bases standing up to 70 mm proud of the hall surface. At a later stage, one of the bases, F45, was replaced by F23 which overlies it but is out of alignment with the other post bases (Pl. VII, c). F23 may therefore represent a makeshift repair as the hall decayed and perhaps changed function.

The NE. corner of the aisled hall (W47) may have been rebuilt incorporating a corner buttress, on the evidence of a butt joint between W47 and W14 (F78 is a later industrial feature). The N. end of the hall was divided off by a narrow cross-wall (W40a and b), with a central doorway, creating an ancillary chamber. In a secular manor-house this would have housed the buttery and pantry. The centre of the main body of the hall was occupied by an open hearth (F46) as at Kirkstall. The hearth comprised two firecracked millstones packed with clayey soil, ceramic roof-tile and sandstone fragments. One millstone was of conglomerate and the other of sandstone, both derived from local Devonian-age strata. A spread of lime found on top of the hearth probably belonged to secondary industrial usage, discussed later in the report.

Six small, stone-lined post-holes of *c.* 200–300 mm in diameter were probably associated with the hearth; a clearly defined post-pipe in F56 measured 110 mm in diameter. It is unclear if the post-holes represented three pairs, in several possible configurations, or two sets of three. Their function is uncertain but possibilities include spits for roasting or a secondary industrial use, perhaps as screens or bellow mounts.

The only visible entrance to the hall is via a doorway in the S. wall paved on both sides, but it is possible that this was the site of a fireplace in an earlier phase as in the Kirkstall aisled hall. A doorway must also have been located in the N. side of the service chamber to allow access to the kitchens.

PRE-HALL FEATURES (Fig. 8)

The hall was constructed over a levelling layer of brown clayey soil designated L136 in the main hall, L81 in the service chamber, L156 south of the hall, and L213

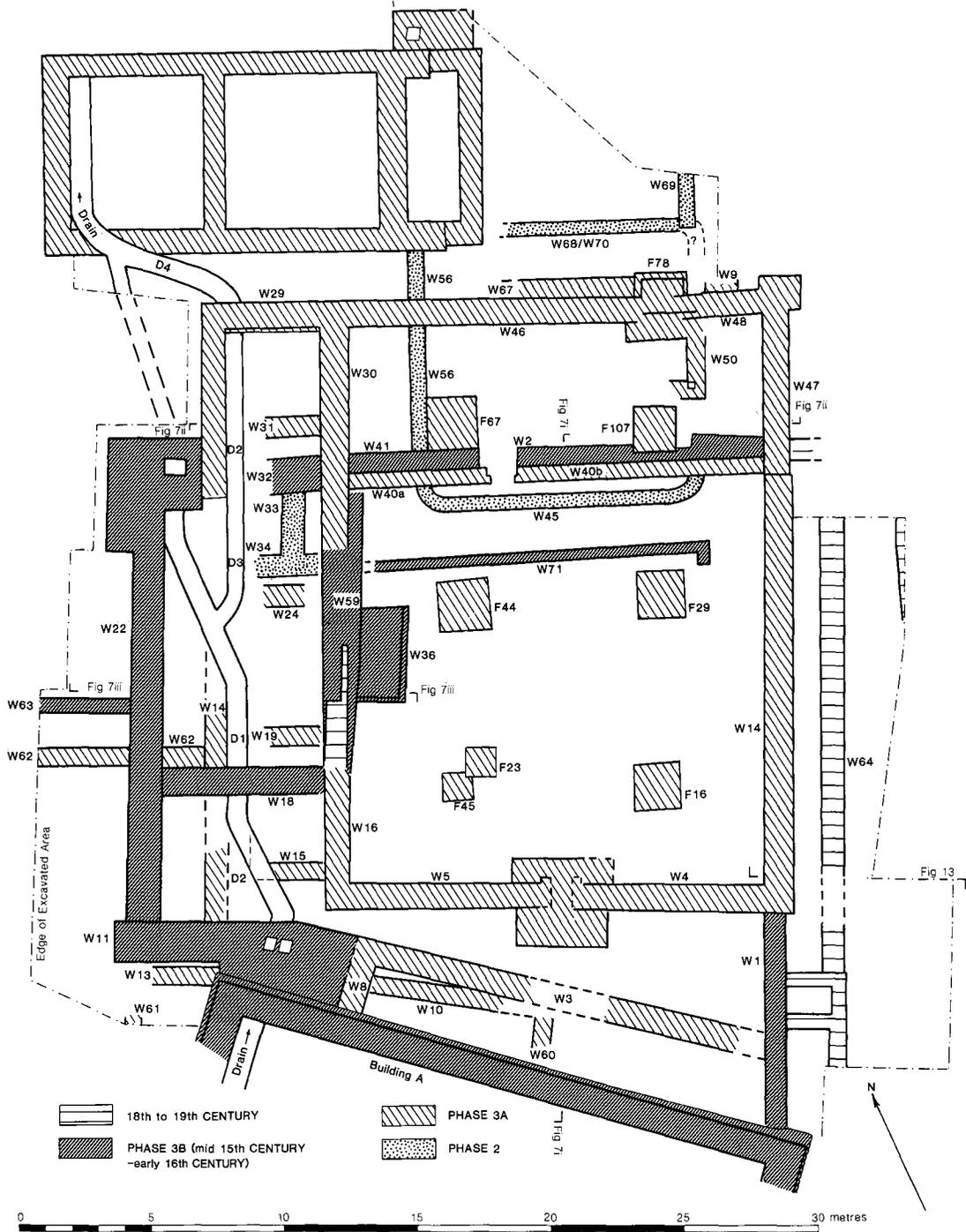


FIG. 5
Overall Phase Plan of Site

north of the hall (Fig. 7i–ii). Removal of L136/L81 revealed an earlier structure with at least one curved corner: W45 and W56 (Fig. 8). Unfortunately, the excavation of this structure was not completed, contributing to the problems of defining its N. and E. limits. North of the hall, in the area excavated by Knight, lay W68, W69 and W70, three walls of varying thickness and uncertain relationship. The latter two and possibly W68 were sealed by L213, a clayey soil probably the equivalent of L136/81, the pre-hall levelling deposit. W68 and/or W69 could represent the N. side of the enclosure or building formed by W45 and W56 but W70 could also be a continuing extension to the north. An area of paving (F216) also predates L213 (= L136/81) but its relationship to the walls is unknown.

The reconstruction of the pre-hall structure represented by W45, W56 and W68 remains difficult. No signs of any internal roof posts were found but the interior of the structure, at least within the service room of the hall, was covered with a layer of charcoal (L180), which could represent a thatched roof (Fig. 7ii). L183, a light brown sandy soil with small limestone rubble, lay to the west of W58 (a sandstone wall). This layer was not excavated but appears to have been defined by W30 and W40 (Fig. 8), and was probably a deliberate levelling.

At the S. end of the hall (Fig. 12) a series of cart ruts was revealed below L136. They were up to 80 mm deep and filled with mottled grey/brown sand. Beneath L136, and extending across the whole site, was a gingery-brown silty clay, L211 (Fig. 7i–iii). A sondage in the Outer N. Range (Fig. 8), excavated by Knight, demonstrated that L211 was about a metre deep and represents a levelling deposit. It sealed a spread of stone rubble and a wooden plank. Unfortunately plans to investigate these deposits further, and remove the plank, were thwarted by the cut-back of the planned 1981 excavation.

OUTER NORTH RANGE (Fig. 8)

To the north of the aisled hall and probably contemporary with it lay a further medieval building, excavated by Knight in 1970–71. This building consisted of three rooms with a drain running through its W. end. A blocked doorway existed in the SE. corner of the W. room of the building. The middle room had a floor of sandstone flags and a series of platforms in its NE. corner, composed of sandstone blocks and reused millstones. Signs of intense burning were evident on the platforms and the most likely explanation is that they were used for heating a cauldron, possibly for brewing. A further small platform in the SW. corner comprised a series of upended slabs with a setting within of slabs and a broken millstone. This structure might be the 'oste and kyllynhouse' of the 1568 accounts.¹¹ Outside the building were two small run-off drains (F215 and F217), both postdating L213 (= L136/81).

THE WEST RANGE (Figs. 9, 10 and 7iii)

The history of this building range on the W. side of the aisled hall can be broken down into two main phases of construction, phase A (early) and phase B (later). The phase A structure abutted the walls of the aisled hall but was probably

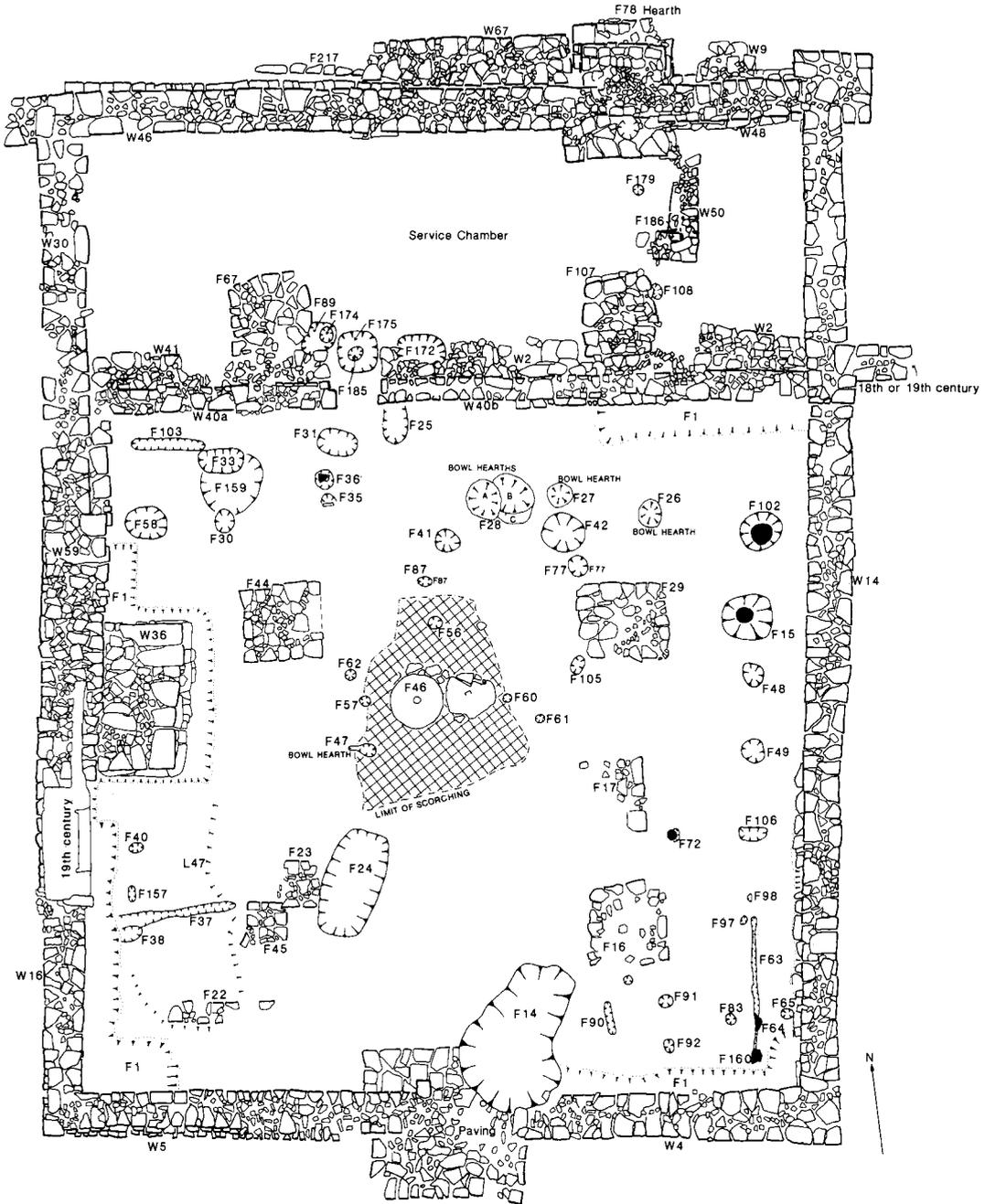
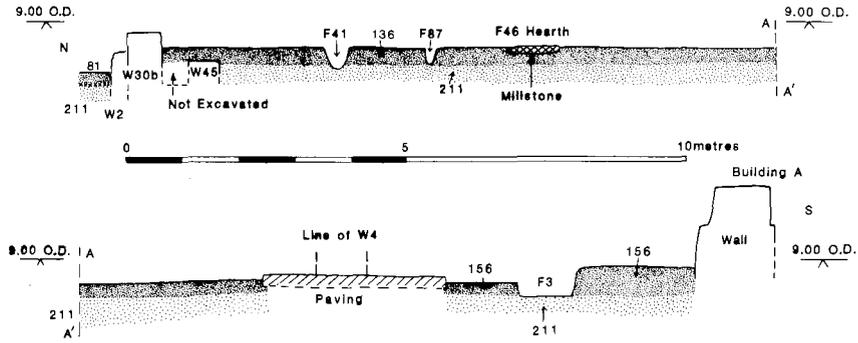
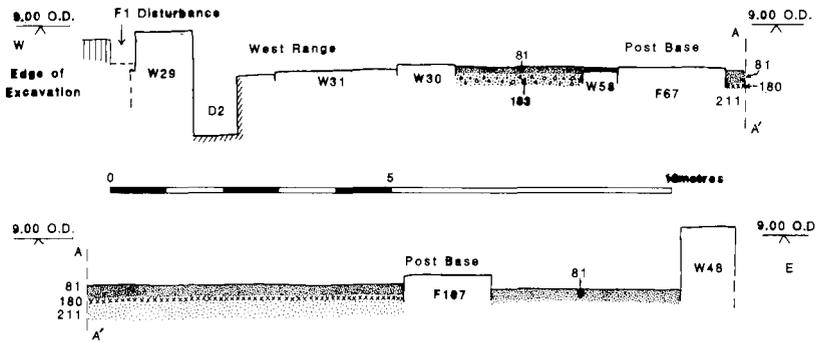


FIG. 6
The Aisled Hall

i) Schematic N-S Section through the Aisled Hall



ii) Schematic W-E Section through the Service Chamber



iii) Schematic W-E Section through the West Range

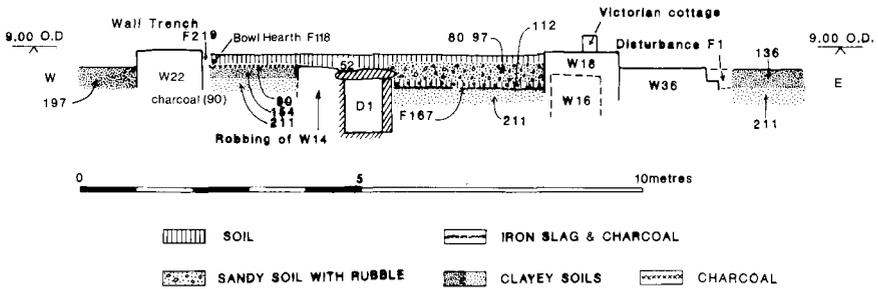


FIG. 7

Schematic Sections through the Aisled Hall and West Range: see Fig. 5 for location

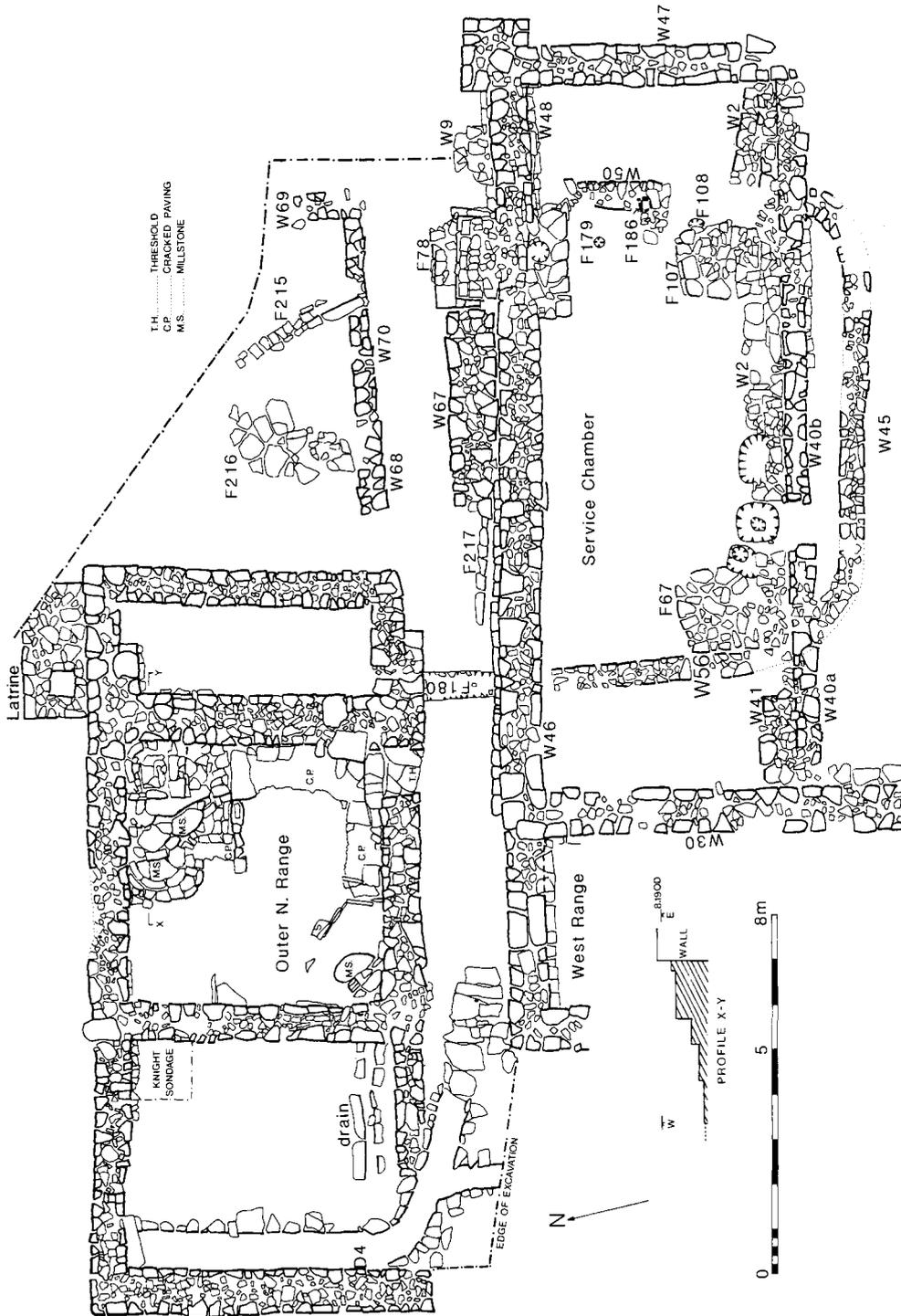


FIG. 8
Outer North Range

contemporary. Three cross-walls belonged to the primary phase: W₃₁, W₁₉ and W₁₅; while W₂₄ appears to have been a later modification. Drain D₂ also belonged to this phase, running along the inside of its W. wall.

A problem exists over W₃₄ (and a N.-S. cross-wall, W₃₃): it was cut by a phase B wall (W₃₂) but its other stratigraphic relationships had been destroyed. The crucial relationship of W₃₄/W₃₃ and the aisled hall (W₃₀) is uncertain but the proximity of W₃₃ to W₃₀ suggests that W₃₄ and W₃₃ pre-dated the construction of the phase A range.

Excavation of the deposits within the range was largely confined to the area between W₃₂ and W₁₈: the sequence of layers is shown in Fig. 7iii. The lowest level

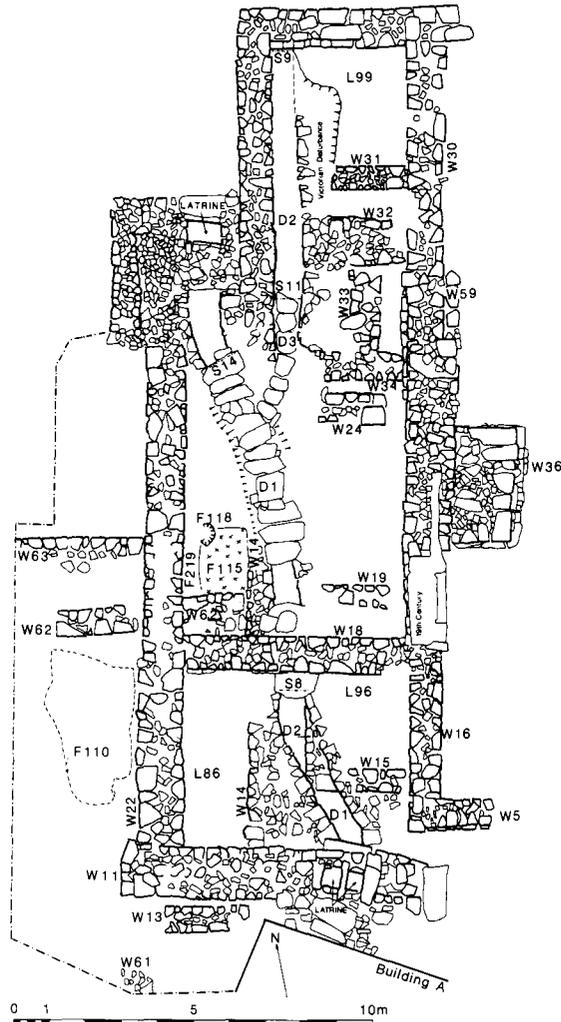


FIG. 9
Plan of West Range

revealed was L211, a gingery-brown silty clay which extended across the whole site, elsewhere underlying L136. East of D2 it was overlain by a spread of pure charcoal and iron-smithing slag (L103) up to 80 mm deep, although this layer was not excavated (Fig. 10). Running north-south through the smithing deposit was F167, a linear feature filled with the overlying deposit, L112. This band, *c.* 160 mm across, almost certainly marked the position of a horizontal timber. It seems likely from the

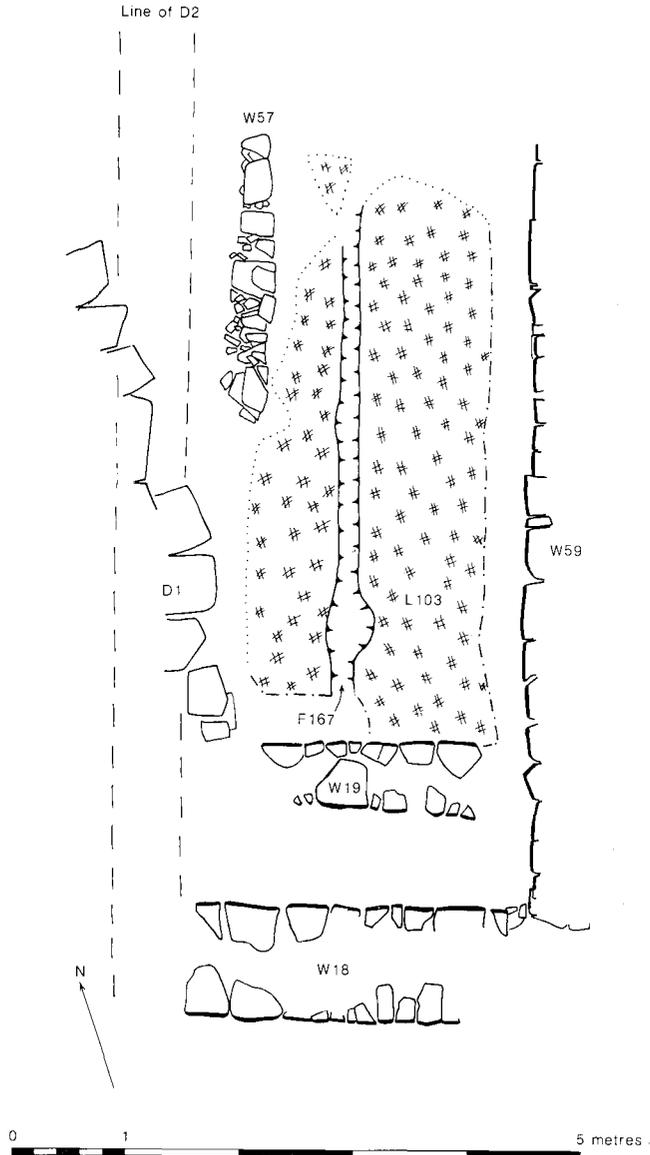


FIG. 10
The Smithy

absence of a humic deposit that the timber was removed and not left to rot. A short length of walling (W57), up to 200 mm in height, also seems to have been associated with the smithy, although its function is uncertain. Patches of the smithy deposit (L128) were also found to the west of the drain, again overlying L211. There appears to have been a drop of around 250 mm into the interior of the forge from the west and 200 mm from the south.

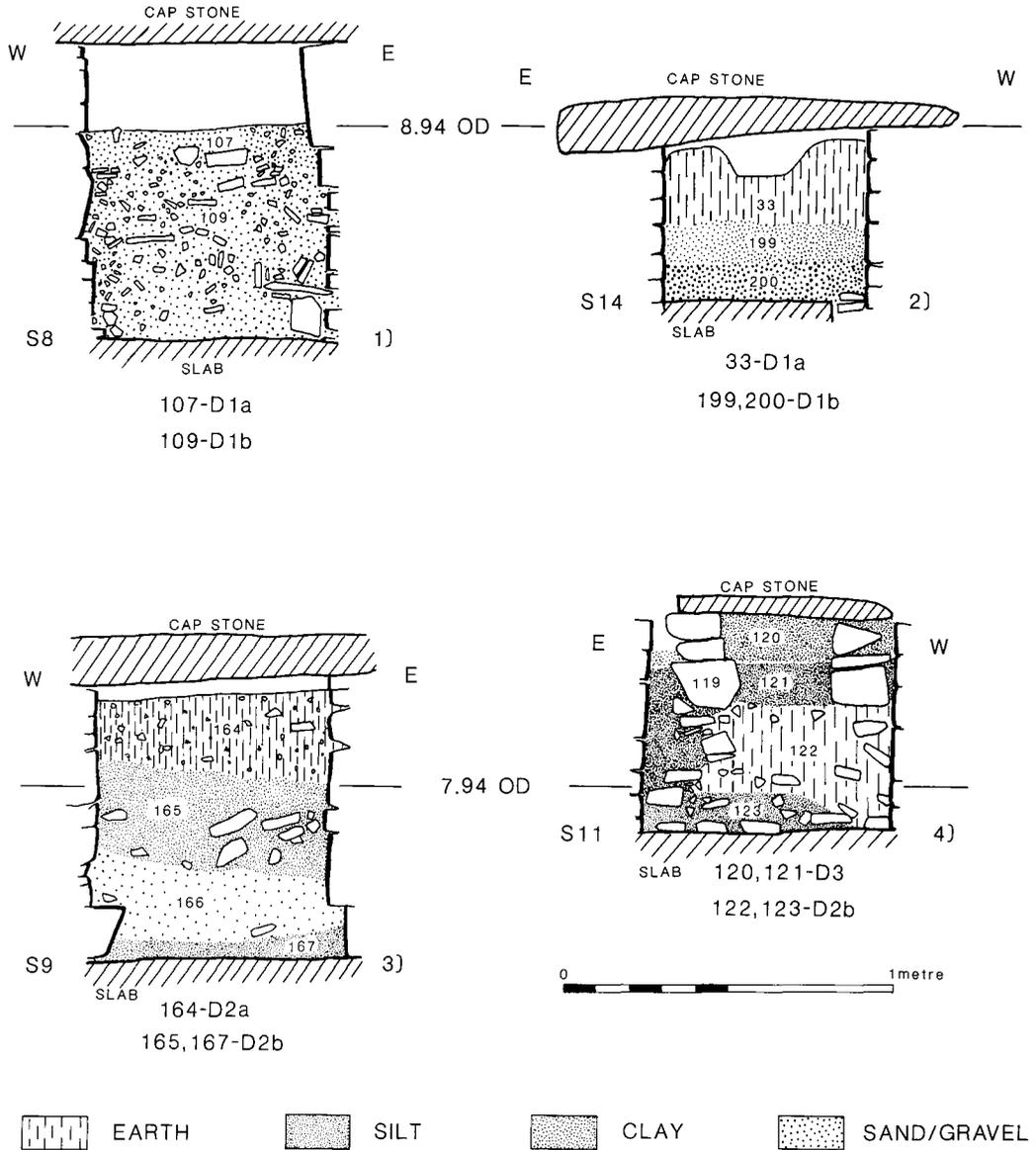


FIG. 11

The Drains in the West Range: see Fig. 9 for location

No trace of a smithing hearth was found but the rectangular extension at the S. end of F167 might mark the site of a robbed stone hearth base.¹² Alternatively, the hearth may have been merely a pit in the ground and could have been camouflaged by the smithing deposit (L103) which appears to have been raked out to form a convenient flooring surface. The horizontal timber (F167) formed a partition within the room although it is hard to visualise its usefulness; or it may have had some function as part of a bellows mount. It is also possible, though unlikely, that the forge was roofless and that F167 formed the base of a lean-to shelter. The drain (D2) running down the W. side of the room would probably have served as a bosh for cooling tools.

The floor of the smithy was subsequently raised (L112 and L154) and a new cross-wall (W24) with threshold inserted (Fig. 9). L154 was cut by a bowl-hearth (F118) and a spread of charcoal-rich soil around it (L90) was clearly cut by F219, a phase B foundation trench. The hearth seems to have originally lain in the open to the west of the phase A range. Layers 197 and 154 (Fig. 7iii) may be equivalent to L136 (the pre-hall levelling).

The interior of the phase A range was subsequently levelled up with layers 97 and 80 and the phase B range constructed (L54 is a 19th-century soil: Fig. 7iii). This later phase is distinguished by its relatively massive walls and butt joints: W22, W11, W18 and W59. W36 appears to have been an external chimney stack serving a first-floor fireplace. The block also included two latrine blocks at its N. and S. ends linked by a curving drain (D1). Drain D3 represents a modification to Drain D2 during the phase B construction. Sample flotation of the drain deposits failed to recover any organic remains but all the drain deposits were sieved (sections, Fig. 11). The drain groups are summarized in the pottery report.

Phase B appears to date to the late 15th or early 16th century as the S. latrine was clearly contemporary with Building A. A single sherd of oxidised Malvern ware from a construction deposit (L97) also supports this date.

BEYOND THE WEST RANGE (Fig. 9)

Excavation west of the phase B range revealed two east-west walls (W62 and W63), possibly retaining walls for a slight terrace as the ground rises to the south. W62 abutted the phase A range and in phase B was replaced by W63. F110, a shallow hollow filled with silt, was cut by the phase B range (W22): its interpretation is unclear.

To the south of the W. Range two fragments of wall (W13 and W61) may represent one or more structures, probably pre-dating Building A from their siting.

SOUTH AND EAST OF THE HALL (Figs. 12 and 13)

A limited amount of excavation took place to the east of the aisled hall, centred on an earlier unrecorded trench which was widened and deepened. A sequence of road deposits was revealed (Fig. 13). The earliest road layer of compacted gravel (L210) was not bottomed but clearly pre-dated the aisled hall. A layer of red sand

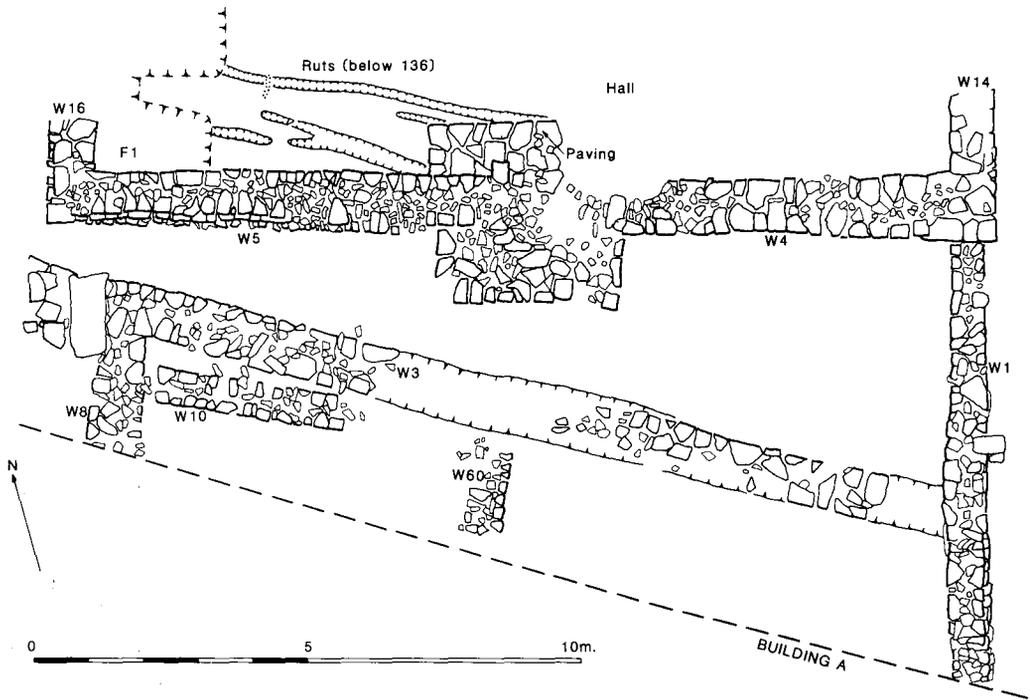


FIG. 12
South of the Aisled Hall

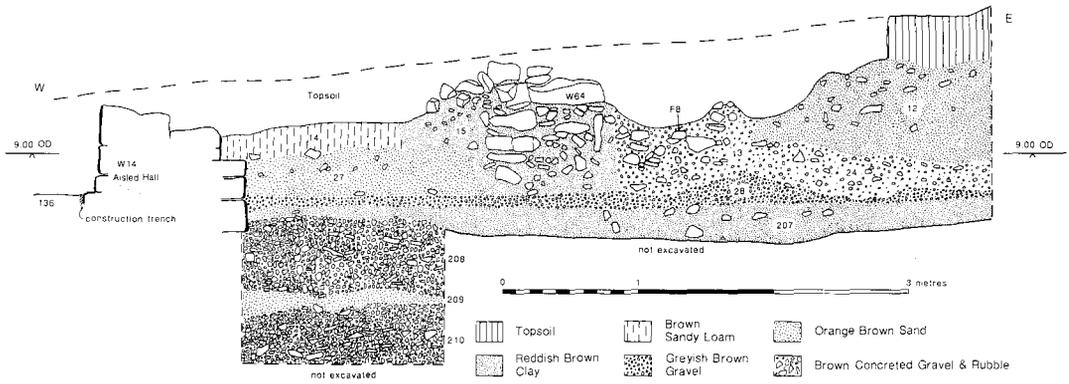


FIG. 13
Section east of Aisled Hall through roadway: see Fig. 5 for location

(L209) separated it from L208, a deposit identical to L210. It is difficult to be certain from such a limited section but the red-sand layer may represent an early road surface, subsequently raised by about 0.5 m to a level where it was in contemporary use with the aisled hall, but pre-dating its construction. This was followed by a sequence of post-medieval road deposits. Only L12 produced any pottery suggesting a date, of *c.* 1680–1780; Bristol or Staffordshire mottled ware was present but no creamware or developed white ware. W64 was a post-medieval boundary wall.

To the south of the aisled hall two structures can be shown to pre-date Building A (Fig. 12). The earliest is represented by W10 and W60 and is post-dated by W3 and W8. The latter two walls do not form a right angle and may therefore have been an enclosure rather than a building.

INDUSTRIAL USE OF THE HALL (Fig. 6)

A series of industrial features in the aisled hall reflects its demise as guest accommodation, notably several bowl hearths: F47, F27, F26 and F28a, b and c (Figs 6 and 14). A further hearth (F118) lay outside the W. wall of the phase A West Range (Fig. 9). The hearths were shallow, cut hollows. All except F47 were lined with compacted red and white ash which reacted strongly with dilute hydrochloric acid indicating the presence of CaCO_3 . The ash-lined hearths are interpreted as having been used for the extraction of silver from lead by cupellation. According to both Agricola writing in the 16th century and the 12th-century monk Theophilus, bone ash was used as the lining of cupellation hearths.¹³ However, quantitative tests showed that only small amounts of phosphate were present. It therefore seems possible that lime (CaO) was used as a refractory lining. Lime and bone ash would both have the property of not reacting with the fuel and lead charge to form glassy slags, unlike siliceous clays.¹⁴ The lead would be heated in the shallow, open hearths with a draught provided from a bellows. As a result, the lead is oxidized to litharge (PbO) which is ladled off, lost as fume or absorbed by the lining of bone ash, leaving a pellet of silver.¹⁵ Unfortunately, experimental work on early cupellation has been badly neglected.

Bowl hearth F47 was differentiated by its small size and keyhole shape (Fig. 14). Its sloping neck was probably designed for insertion of a tuyère. Its fill comprised charcoal, lumps of burnt clay coated with fuel-ash slag, and pieces of scrap copper. Copper corrosion products were also identified, intermixed with the burnt clay/slag lumps. Such debris is typical of the melting of scrap copper alloys. However, it is possible that it derives from another hearth, and was only used to fill up F47.

The remaining hearths, by contrast, all produced evidence of lead working in the form of fragments of lead and litharge (PbO). F27 was not completely excavated but seems to have comprised two phases (Fig. 14). The first phase is represented by a bun of lead *c.* 0.35 m diameter which appeared to rest directly on the soil lining of the hearth, but was not removed by the end of the excavations. Subsequently, the hearth seems to have been relined with fragments of broken tile and grey clay. Its fill, like F28 and F26, comprised grey ash with some charcoal dust.

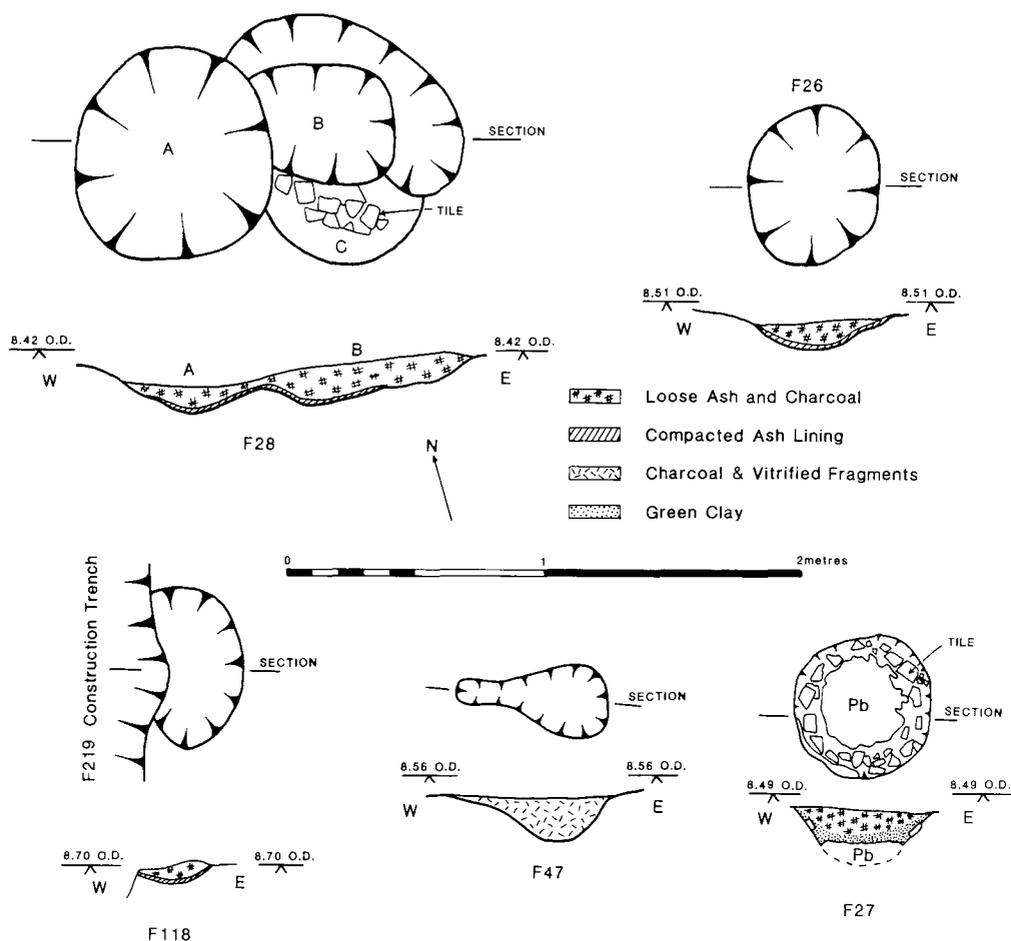


FIG. 14
The Bowl Hearths

F28 proved to be more complex and comprised at least three phases (Pl. vii, B). The edges of F28A and B merged into one another and both were filled with a black fill of charcoal dust and ash (Fig. 14). The fill of F28A was later than that of B, but this might reflect the phasing of their infilling rather than use, if both were open at the same time. At the eastern end of F28B a bulging hollow might reflect a further hearth, but the lack of burning argues against this. A third hearth, F28C, pre-dated and was cut by F28B, but this remained unexcavated. F217, a small group of tile fragments overlying F28C, was possibly a rest for a bellows.

A more substantial cupellation hearth (F78) was inserted into the N. wall of the range (Pl. viii, A). It comprised a low platform with a central bowl lined with ashy clay (Figs. 15 and 16). Intermixed with the lining, but distinct from it, was about 4.7 kg of lead slag; while the clay reacted strongly with dilute acid, showing the presence of CaCO_3 . Behind the platform was a solid chimney stack finished in

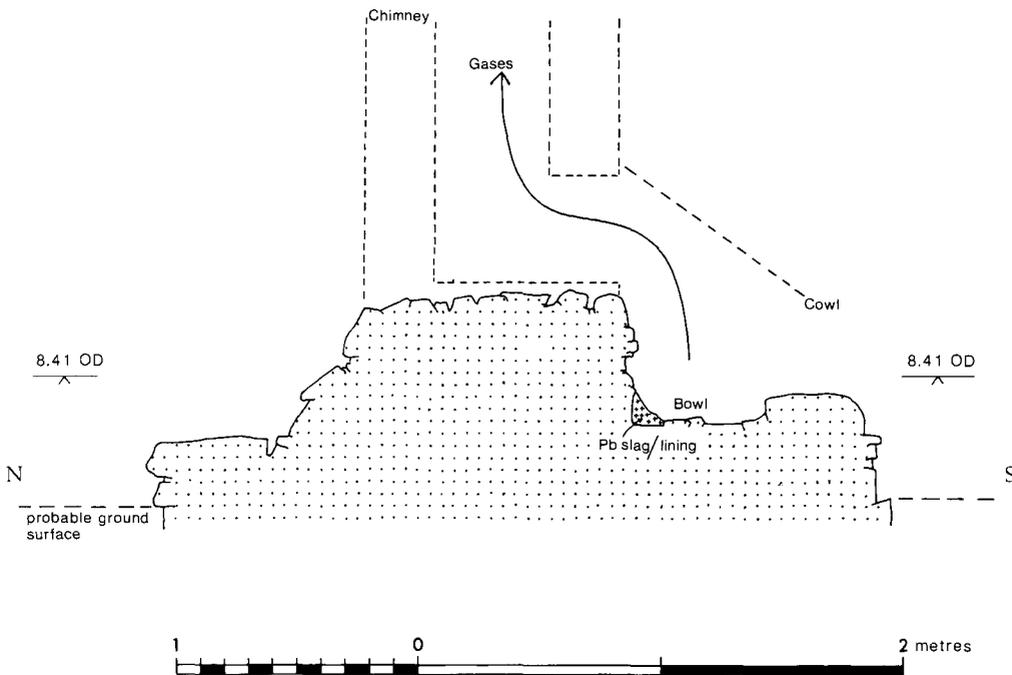


FIG. 15
Section of Hearth F78

chamfered tufa blocks at the rear, contrasting with the sandstone of the rest of the hearth. The chimney stack would have possessed a cowl, probably in wicker and daub, whose position is reflected in the stack's frontal stonework; this would have carried away noxious gases. An L-shaped wall (W50) with a rectangular post-socket in the angle (F186) is probably associated with the hearth, although no stratigraphic relationship survives. A post-hole (F179) directly in front of the hearth, and cut into L81 (= L136), may have been a setting for a bellows mount. W67 and W9, two short stretches of walling on the N. side of the hall, may have been added to act as buttress supports for F78.

A spread of lime was found over the E. millstone in the hall's hearth (F46). It is possible that the hearth was used for producing lime to be used for lining the cupellation hearths. Archaeomagnetic samples from it, the hall bowl-hearths (F28 and F26) and a kiln/bell pit (F113: Fig. 17) gave highly consistent results suggesting a date of final use in the middle of the 15th century. It seems probable, though unproven, that the rebuilding of the W. Range post-dates the industrial phase on this dating evidence. Certainly the W. Range rebuild can be shown to post-date the similar bowl hearth outside the phase A range (F118).

THE BELL PIT (Figs. 17 and 18; Pl. VIII, B)

Excavation in the SE. corner of the hall revealed a small 'kiln' (F113) which had been marginally damaged by earlier wall-following trenches and the timber screen,

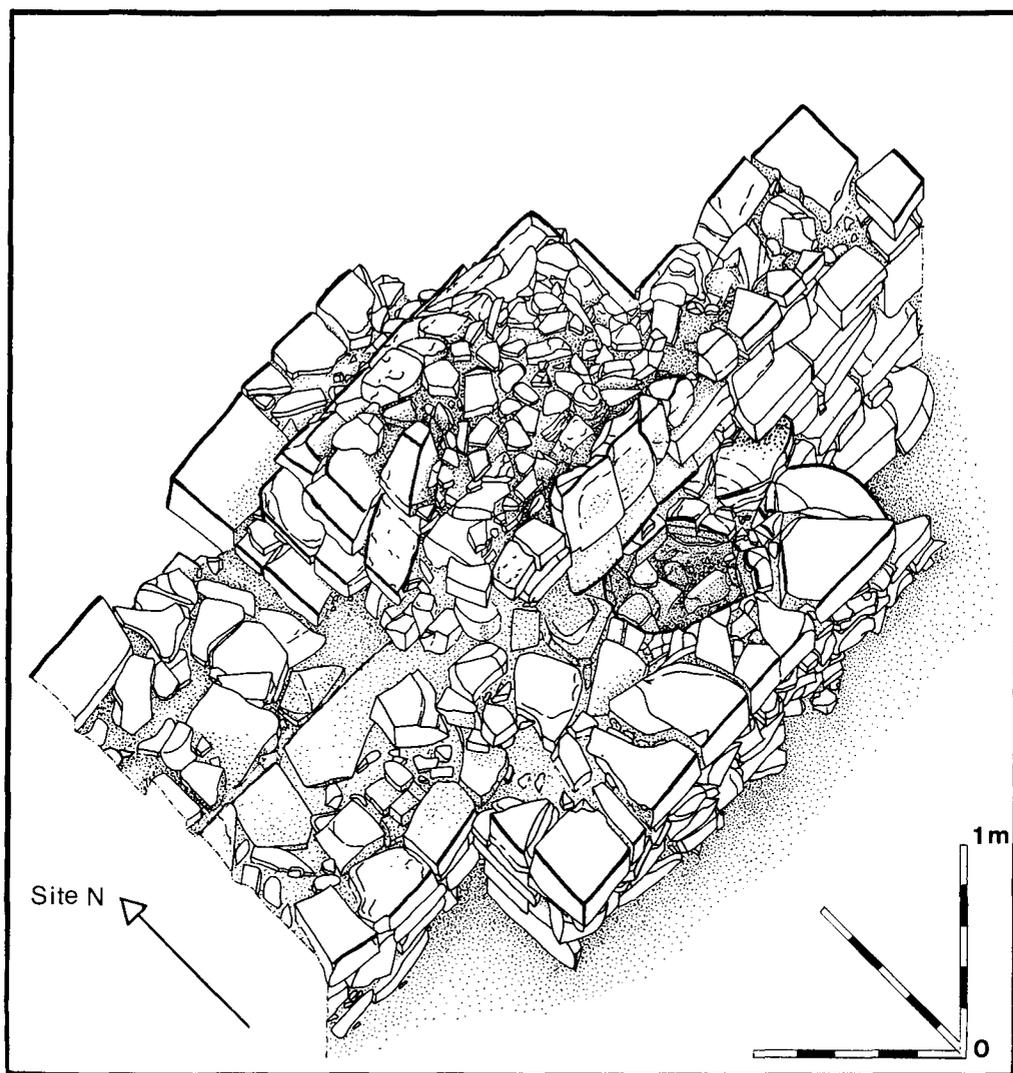
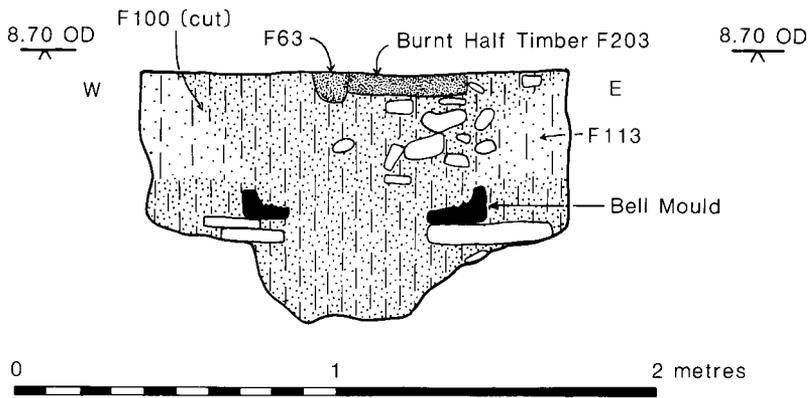
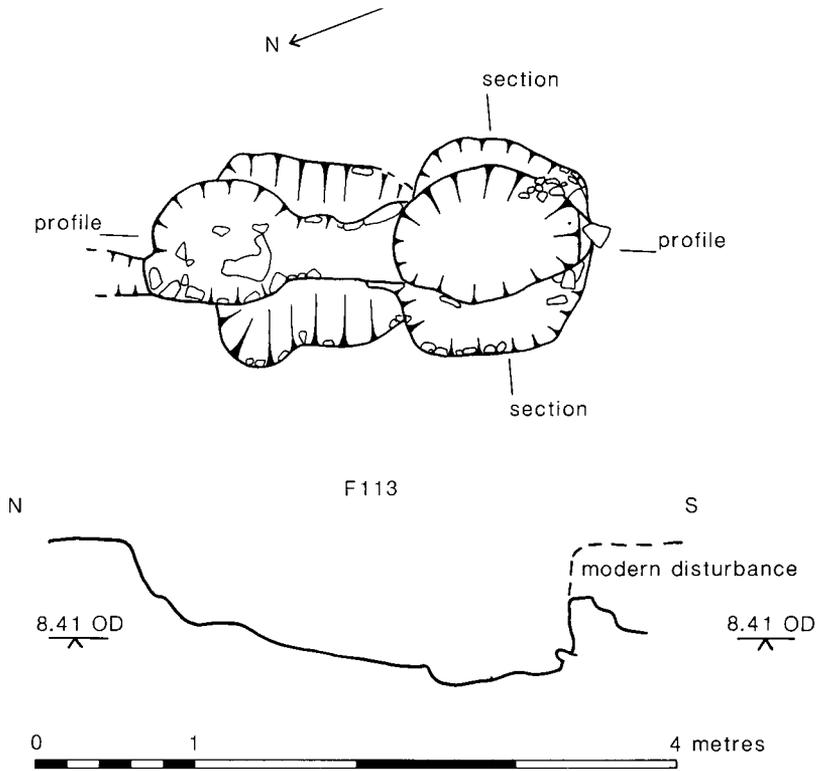


FIG. 16
Isometric of F78 (after original by R. Magnusson)

F63 and F100. It comprised a main bowl and a sloping subsidiary hollow on the N. side which is interpreted as a bellows setting rather than as a stoke-hole. It was noted that all evidence of burning and traces of charcoal were confined to the main bowl.

The evidence of burning on the 'kiln' floor and a charcoal residue demonstrated that the 'kiln' had been used before being partly filled with a mid-brown clayey soil (F113b). It is therefore unclear if F113 was constructed specifically as a bell pit or converted from some older use. The base of the bell mould was found resting on two small flags with a small amount of charcoal but very little sign of burning. Two



-  Mid Brown Clayey Soil
-  Dark Brown Clayey Soil
-  Very Dark Brown Clay/Soil

FIG. 17
The Bell Pit

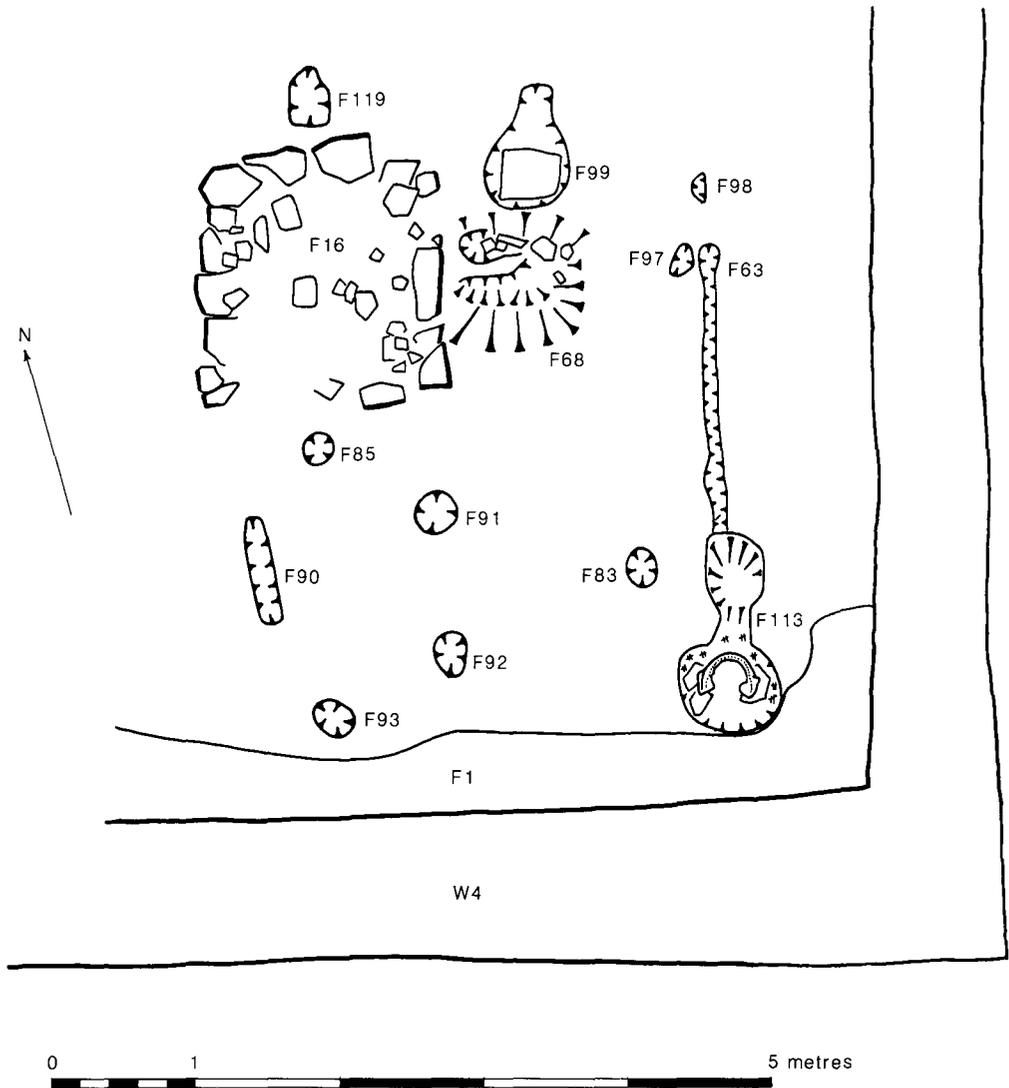


FIG. 18
The SE. Corner of the Aisled Hall

similar bell pits and mould fragments were excavated at Kirkstall Abbey in the kitchen area and hall, respectively. Other excavated monastic bell pits include Norton Priory, Cheshire and Ludlow Friary, Shropshire.¹⁶

The bell mould would have started off as an inner loam core built upon a wooden framework. The bell was then modelled in wax upon this and an outer cope mould built up using loam and then an outer covering of clay applied. Subsequently, the mould was heated within a pit to drain off the wax and harden the mould, then

buried in earth before casting. Afterwards the mould was dug out and broken to remove the bell leaving the bottom of the mould (Fig. 20 and Pl. VIII, B).

The Tintern example would have produced a bell with a rim diameter of about 0.34 m. A 'lip'-like feature in the Tintern example may have resulted from the presence of a metal strengthening-rod as in the Kirkstall examples: it seems a bit high to have served as a run-off channel for the melted wax.

F113a and F113b, mid- and dark-brown clayey soils respectively, presumably represent the backfilling of the kiln prior to the casting of the bell. F100 can, therefore, be interpreted as a hole dug to recover the bell after casting; its fill was identical to F113b. F203, a burnt split timber, overlay F100 but the stone content of the section shows that it can never have extended downwards for more than a few centimetres. It is uncertain if any of the post-holes illustrated in Fig. 18 were associated with the bell pit.

LATE FEATURES IN THE HALL (Fig. 19)

It seems likely, though not proven, that the industrial activity took place while the aisled hall was still roofed. There are, however, a number of features in the hall which suggest that it was an open courtyard in its final monastic phase. All the features discussed in this section are sealed by L29, a post-dissolution soil accumulation, but are otherwise poorly dated.

In the SW. corner of the hall a layer of clay and rubble (L47) formed a platform about 0.30 m above the rest of the hall surface. A short length of wall foundation (F22) ran east-west on the S. edge of the platform, possibly supporting a 'lean-to' structure against the main wall of the hall.

A further possible lean-to was formed by a series of post-holes parallel to the E. wall of the hall. At the N. end of the alignment lay two post-pits (F102 and F15) with pipes of 350 × 400 and 340 × 320 mm diameter. The line was continued by three post-holes (F48, F49 and F106) and a slot (F63), which cut the infilling of the bell pit (F113). Two charred split logs of beech (F97 and F98), both c. 380 mm diameter and 70 mm deep, lay *in situ* alongside F63; it seems likely that they held a barrier of horizontal planking, probably covered. Some of the cut features illustrated in Fig. 17 may also indicate a lean-to in the SE. corner of the hall but their interpretation is uncertain.

The presumed lean-to along the E. wall of the hall may have been continued by W71, a wall foundation running east-west across the hall and possessing no cut foundations. It overlay a spread of gravel and clay make-up (L49 and L50), which sealed a number of earlier courtyard features (F28, F42, F27, F77, F41 and F84). The cross-wall (W40) forming the service chamber was modified by being thickened on its N. side by W41 and W2. This may have taken place while the hall was still roofed. It is possible, however, that the thickening was intended to support a lean-to roof, either to the north or fronted by W71 on the S. side.

Various pits, post-holes and hollows within the aisled hall may also belong to the last monastic phase of activity. The only ceramic dating evidence came from F108 (Fig. 6), a post-hole, in the service chamber. A sherd from a bowl (Fig. 26, no.

35) joins a sherd found in L87 (not illustrated), a layer to the west of, and post-dating, Building A, a late 15th- or early 16th-century structure. A number of probably late features in the north-west of the main hall had a high content of charcoal and smithing slag in their fill (F25, F33, F34, F30 and F31).

Several of the features discussed above seem to indicate lean-to structures in an open courtyard. One possible context for the deroofting of the aisled hall is provided by the construction of the phase B West Range which involved demolition of the hall's W. wall (W16). No clear evidence of function for the courtyard phase and lean-tos is forthcoming. One possibility is that W71 formed a stable range with an open-fronted ancillary structure running along the E. wall of the former hall.

POST-DISSOLUTION (Fig. 19)

L29 (not illustrated), a layer of brown loam and rubble, extended across the aisled hall at a depth of 50 to 100 mm, with a few sherds of 16th-/17th-century pottery, seems to represent a phase of post-Dissolution abandonment. Documentary evidence suggests that Building A continued to be occupied into the early 20th century. A few traces of a post-medieval cottage were evident in the W. range but were too disturbed to suggest any chronology beyond a 19th-century occupation. In the aisled hall two rectangular pits (F14 and F24) cutting L29 were excavated; their profiles suggest that they originally possessed wooden linings. These features were possibly post-medieval saw-pits (Pl. VII, c).¹⁷ The finds indicate that they were backfilled in the last decade of the 17th or early in the 18th century.

DEPTH OF POST-HOLES, ETC.

F15:520mm, F25:70mm, F30:320mm, F31:150mm, F33:70mm, F34:70mm, F41:360mm, F48:410mm, F49:400mm, F56:300mm, F57:300mm, F58:120mm, F60:160mm, F61:160mm, F62:150mm, F63:40 to 150mm, F66:220mm, F68:200mm, F72:110mm, F77:350mm, F83:770mm, F85:80mm, F87:390mm, F89:170mm, F90:90mm, F91:120mm, F92:140mm, F93:160mm, F97:50mm, F98:50mm, F99:70mm, F103:40mm, F105:270mm, F102:510mm, F106:280mm, F108:140mm, F119:70mm, F181:80mm, F182:220mm, F184:120mm.

SUMMARY AND DISCUSSION

The main structural phases can be summarised as follows:

Phase 1: This is represented by the rubble and plank at the bottom of the Knight sondage in the Outer North Range (Fig. 8). These deposits could be interpreted as a construction or destruction deposit and they need not imply the presence of buildings in the Outer Precinct, as the W. front of the abbey church is only about 50 m away. The suggested early road surface east of the aisled hall (L210: Fig. 13) could also belong to this phase though no certainty can be expressed from such limited excavation.

Phase 2: This phase is initiated by the deposition of L211, a clayey soil extending across the whole site (Fig. 7i-iii). The Knight sondage suggests that this deposit was about a metre deep. It was possibly intended as a flood barrier and its extent is probably marked by the modern terracing to the north and west of the excavated

area, indicated by hachuring in Fig. 1. The 1764 Badminton map shows that the boundary separating the building complex from the Laytons field was marked by a wall, although it is uncertain if it is medieval in origin (Fig. 2).

The only structure which can certainly be assigned to this phase is the enclosure or building represented by W₄₅ and W₅₆. W₆₈, W₆₉, W₇₀ and the paving, F₂₁₆, also probably belong to this phase though their interpretation is problematic (Fig. 8). W₃₃ in the West Range (Fig. 9) potentially belongs to the same phase although its stratigraphic relationships have been destroyed by earlier clearance work. The ruts in the South Hall, though, can definitely be assigned to phase 2 (Fig. 12) as they were sealed by L₁₃₆, a subsequent levelling deposit.

Phase 3: This phase is marked by the deposition of L₁₃₆, a clayey soil, to a depth of about 0.30 m over the dismantled phase 2 structures (Fig. 7). The aisled hall was built at the same time as the phase A West Range. The close parallel of the Kirkstall aisled guest-hall, dated to the early 13th century, suggests an approximate date for its construction.¹⁸ A similar hall, suggested to be 13th century, was excavated at the turn of the century by Brakspear at Waverley Abbey in Surrey.¹⁹

The absence of Bristol Redcliffe ware from L₁₃₆ tends to support a 13th-century date but unfortunately the group (eleven vessels) is far too small to support any firm conclusions. In addition one of the aisle-post bases (F₄₄) incorporated a Ham Green jug sherd (c. 1170–1300). The buttress in the NE. corner of the Tintern hall appears to belong to a rebuild (W₄₇) but its relation to the insertion of an industrial chimney (F₇₈) is uncertain.

It is uncertain whether the walls of the aisled halls at Tintern and Kirkstall extended in stone to the roof or whether they had timbered upper stages. The hall would have been open to the roof and it is unlikely that the phase A West Range was more than one storey high. The only evidence for function in the West Range comes from the Smithy room. It is probable that the Outer North Range also belongs to this phase. One room of this building was possibly a brewery. At Kirkstall, a bakehouse and a building interpreted as a possible kitchen were found in a similar position beyond the service chamber of the hall. At Waverley a brewhouse was identified to the south of the guest-hall on a different alignment and believed to be late 12th century in origin by Brakspear. The later histories of the Kirkstall and Tintern aisled halls differ although both show modifications and changes of function as the Outer Precinct areas of the two abbeys developed: at Kirkstall a two-storey chamber block was added to the end of the hall opposite the services and a second aisled hall was built to one side. The evidence seems to suggest that the early uniformity of Cistercian planning slowly disintegrated under the exigencies of local circumstance.

Brakspear suggested that a first-floor hall at Waverley Abbey, which he dated to c. 1200, was reserved for high-status guests while the 13th century, presumably aisled, hall was for inferior visitors.²⁰ It has already been suggested that Building B at Tintern (Fig. 1), a first-floor hall, was also a guest-house, but unfortunately its date of construction is uncertain. It is possible to follow Brakspear in suggesting that it functioned alongside the aisled hall as a superior guest-house; although the guest function of the Waverley and Tintern first-floor halls may have been supplanted by the construction of the larger aisled halls.

The possibility of differing provision for guests of varying status remains a complex and largely unexplored problem. Giraldus Cambrensis, Archdeacon of Brecon, complained bitterly (*c.* 1200) at being 'harboured in the public hall among the common guests and the noise of the people' at Strata Florida;²¹ but he may have expected to have been housed in the abbot's lodging rather than in separate accommodation within the outer precinct. The pattern of hospitality, however, may have varied between individual monasteries as well as between different orders and through time. It is to be hoped that increased interest in excavating monastic outer precincts will shed further light and help place the evidence of the standing remains, the result of piecemeal survival, into a clearer context.

The non-ferrous industrial activity is dated by the archaeomagnetic samples to the mid 15th century. Apart from bell casting the main activity recognized is cupellation, the extraction of silver from lead. The life of this industrial phase is uncertain as is the source of the lead. It is possible that the monks were desilvering lead used for a rebuilding. The infirmary hall is the only new building dated to the mid 15th century but it is possible that existing buildings were being reroofed. If this were the case the litharge would have had to be extracted from the cupellation hearths and the lead recovered by reduction. One might expect a structure similar to lead smelting 'bores' allowing the litharge and fuel to be heated together in bulk and the lead to be collected in a hollow.²² The excavations produced no evidence for the reduction of litharge but remains may have lain elsewhere or been lost.

Tintern lay on a navigable river so a source for the lead in the known mining areas of the Mendips, N. Devon or Glamorgan is possible. Only N. Devon is known to have possessed sufficiently argentiferous ores to stimulate cupellation in either the medieval or early modern period.²³ It seems unlikely, though, that the crown or other lords would not have been prepared to desilver their own lead if it possessed an economically attractive silver content. Another possibility is that the monks were mining lead deposits in the Carboniferous limestones on their Gwent lands. Lead deposits were exploited at Piercefield, 2.5 miles south of the abbey in the 1690s and only a little further away at Gallery Hill, near Chepstow, in 1789, though no mention is made of silver extraction.²⁴

It is therefore just possible that the monks worked a nearby lead deposit although it is difficult to believe that it could have had an economically viable silver content by normal criteria. Alternatively they may have been extracting silver from a large import of lead for reroofing. In either case it is unclear if this was done for commercial gain or merely to obtain silver for their own use. Certainly the construction of a stone-built hearth with a chimney (F78: Fig. 16) points to a cupellation programme on some scale although the length of its lifespan is uncertain. Further light may be shed on the source of the lead by progress in provenancing of lead by radioactive isotopes.

The rebuilding of the phase B West Range probably saw the demise of the aisled hall as a roofed building. The construction certainly necessitated the demolition of the W. wall of the aisled hall. The new West Range was provided with an exterior chimney (W36), lying within the old hall, and it seems likely to have served a fireplace at first-floor level. This range seems likely to have been a residence for

guests — Building A, a small residential block, was clearly constructed at the same time as the phase B range. It possibly provided accommodation for persons of higher status.

The window mouldings in Building A point to a 15th- or early 16th-century date. A single body sherd of late Malvern flatware, probably a conical bowl, came from L97, a floor make-up level for the phase B range (Fig. 7iii). This would suggest a late 15th- or 16th-century date, given current views on the arrival of late Malvern wares in the littoral of the Severn estuary.²⁵ A single sherd could, however, be intrusive into this layer.

A crucial problem is the relationship of the industrial phase of activity to the phase B rebuilding of the West Range. This rebuilding certainly post-dates F118, a bowl hearth in the West Range (Fig. 9). It seems likely that this is of the same date as those in the main body of the hall which were also used for cupellation. This remains, however, an unproven assumption.

The last monastic years of the hall are difficult to interpret as the lack of vertical stratigraphy makes the phasing of the many intrusive features there uncertain. Certainly the supposed lean-to structure represented by W71 and the post-holes along the E. wall of the hall make most sense in a roofless phase. It is also unclear if the service chamber, which at some stage had its walls crudely thickened, carried a roof in this period. As suggested earlier, one possible interpretation of the courtyard use in this phase is as stables although there is a lack of positive evidence for function.

SCIENTIFIC ANALYSES

X-RAY FLUORESCENCE. *By G. McDONNELL*

Sample 1 (F47. Bowl hearth fill: Fig. 14). The sample is furnace lining with adhering slag. Copper-alloy corrosion products are present in the slag. X-ray fluorescence (XRF) shows the presence of Cu, Sn, Pb and Fe. A small metal prill was extracted from the slag and subjected to X-ray analysis. It is a high tin-bronze (tin content Sn 10–20%). There is no lead or zinc present. This could, therefore, be bell metal.

Sample 2 (F47). External appearance suggested a part of a metal bar of some form (30 mm max. length, 20 mm diameter). XRF analysis shows that the bar is virtually pure copper, with perhaps 1–2% tin, and of the order of 0.1% lead. No other elements were detected, except for a small iron content.

Sample 3 (F47). A piece of copper waste, in sheet form. XRF analysis shows that it also has a high copper content, with low tin but a reasonable lead content (about 1%). A small iron content was also detected.

Sample 4 (F78, waist-level hearth in N. range, from bowl lining: Figs. 6 and 15–16). This is a lead slag. The XRF showed a high lead content, with a small percentage of copper and tin. Calcium is also present. Two samples of the slag differing on visual grounds were subjected to X-ray diffraction analysis. The first was a typical slag matrix with fayalite (iron silicate) and some wustite (iron oxide) principally lead oxide; two forms of the oxide were present, litharge (red) and massicot (yellow), both with the formula PbO.

The XRD results have not been fully analysed, and there may be other components of lead present.

Summary. Samples 1–3 are the residues of bronze working and the analysis of the prill suggests that this could have been bell founding, especially in the light of the bell mould found in F113. Sample 4 is a lead slag.

ARCHAEOMAGNETISM

The kiln F113, open hearth F46 and bowl hearths F28 and F26 were sampled by the Ancient Monuments Laboratory. Results were extremely consistent and indicate a date in the mid 15th century for their final use.²⁶ Unfortunately it was not possible to obtain a detailed report.

PHOSPHATE ANALYSIS. *By* C. HERON

	% phosphate by weight
Sample 1, F78, hearth lining (Figs 15-16)	0.35
Sample 2, F118, bowl hearth fill (Fig. 14)	0.15
Sample 3, F28, bowl hearth lining (Fig. 14)	0.10
Sample 4, F46, 'lime' spread on open hearth (Fig. 6)	0.10
Sample 5, L136, levelling deposit (Fig. 7i)	0.03

If the courtyard soil sample (No. 5) can be assumed to represent a background phosphate level at Tintern, then the samples derived from the hearths indicate elevated concentrations of phosphate. The levels in samples 1-4 range from 3-12 times higher than sample 5, but are not as substantial as would be expected if bone ash was present in any quantity. Possibly the elevated levels are due to phosphate from the charcoal fuel. Samples 1-4 all reacted vigorously with dilute HCl, suggesting that lime may have been used as a lining instead of bone ash, predominantly calcium phosphate.

THE BELL MOULD (Fig. 20)

The mould comprised an inner core of black loam. Its outer casing comprised soft, poorly fired clay ranging from buff to red in colour. The fabric was hackly with many air inclusions and a tendency to laminate, suggesting it had been subjected to little preparation. Inclusions comprised sparse, rounded quartz up to 0.5 mm and moderate muscovite mica plates under 0.1 mm. A nearby riverine source for the clay seems likely.

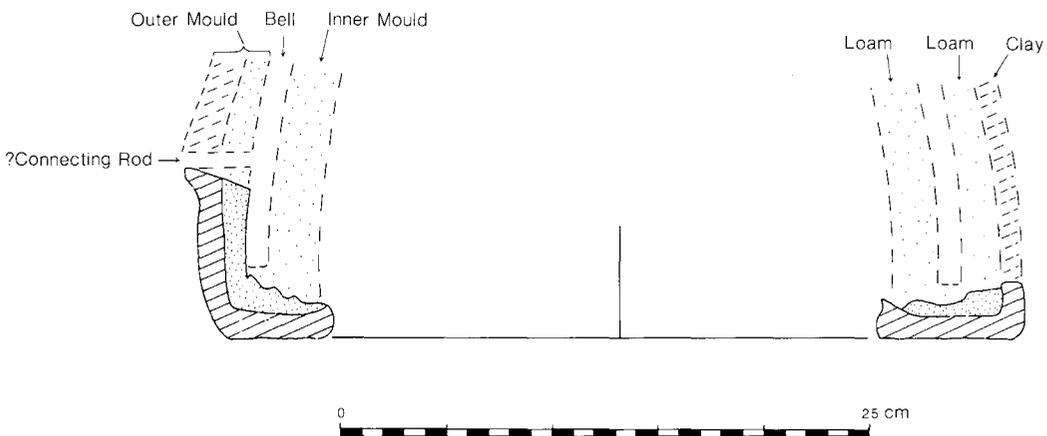


FIG. 20
The Bell Mould

ARTEFACTS

BUILDING MATERIALS (Fig. 21)

All the buildings in the excavated areas were constructed of Old Red Sandstone and were clay-bonded. The phase B West Range produced fragments of lime from its joints suggesting either mortar pointing or lime washing in addition to the use of clay to bond its core.

Large quantities of flat ceramic roofing-tile debris were recovered from all phases post-dating L211, but no chronological development in form or fabric could be distinguished. It is uncertain which building phases utilised these tiles. The form appears to have been standard and is illustrated by a nearly complete example (Fig. 21, 1). They occur in sandy fabrics, usually with a reduced core and oxidized buff or orange exterior. A number of wasters were recovered, with the earliest stratified example from L136. Five examples of cat prints, three of dog prints and one of young goat or sheep, as well as a human print, were found in the upper surfaces of tiles.

A number of stone flags in well-bedded micaceous sandstone were also recovered with the seven stratified medieval examples concentrated in the W. Range: L80, L97 (2), D1b (3) (Figs. 7iii and 11), as well as from L47 (Fig. 19), and are all possibly associated with the phase A West Range but could have been brought in from elsewhere.

A minimum of 48 ceramic ridge tiles (98 sherds) were recovered from all contexts but could not be tied to specific building phases. The majority were in sandy fabrics, almost certainly of local manufacture. Exceptions were a ridge tile in a Bristol fabric from a 19th-century context and one unstratified Malvernian ridge tile. Only one floor tile was found in a medieval context (Fig. 21, 2), a wedge-shaped unglazed example in a fine red fabric from L80 in the W Range (Fig. 7iii).

SMALL FINDS

Stone (Fig. 21)

3. SF18, L12 (16th to 18th Cent: Fig. 13). Mortar of micaceous Devonian sandstone.
4. SF78, L103 (medieval: Fig. 11). Disc of micaceous Devonian sandstone. Six other examples were found in unstratified or 19th-century contexts ranging from 50 to 130 mm in diameter. One unstratified example was rounded and polished but the others were roughly finished. Not illustrated: SF201, L136 (medieval: Fig. 7i). Fragment of whetstone of fine sandstone, probably Devonian. SF204, D1a (16th Cent.: Fig. 11). Fragments of whetstone, with perforation, of schist.

Lead (Fig. 22)

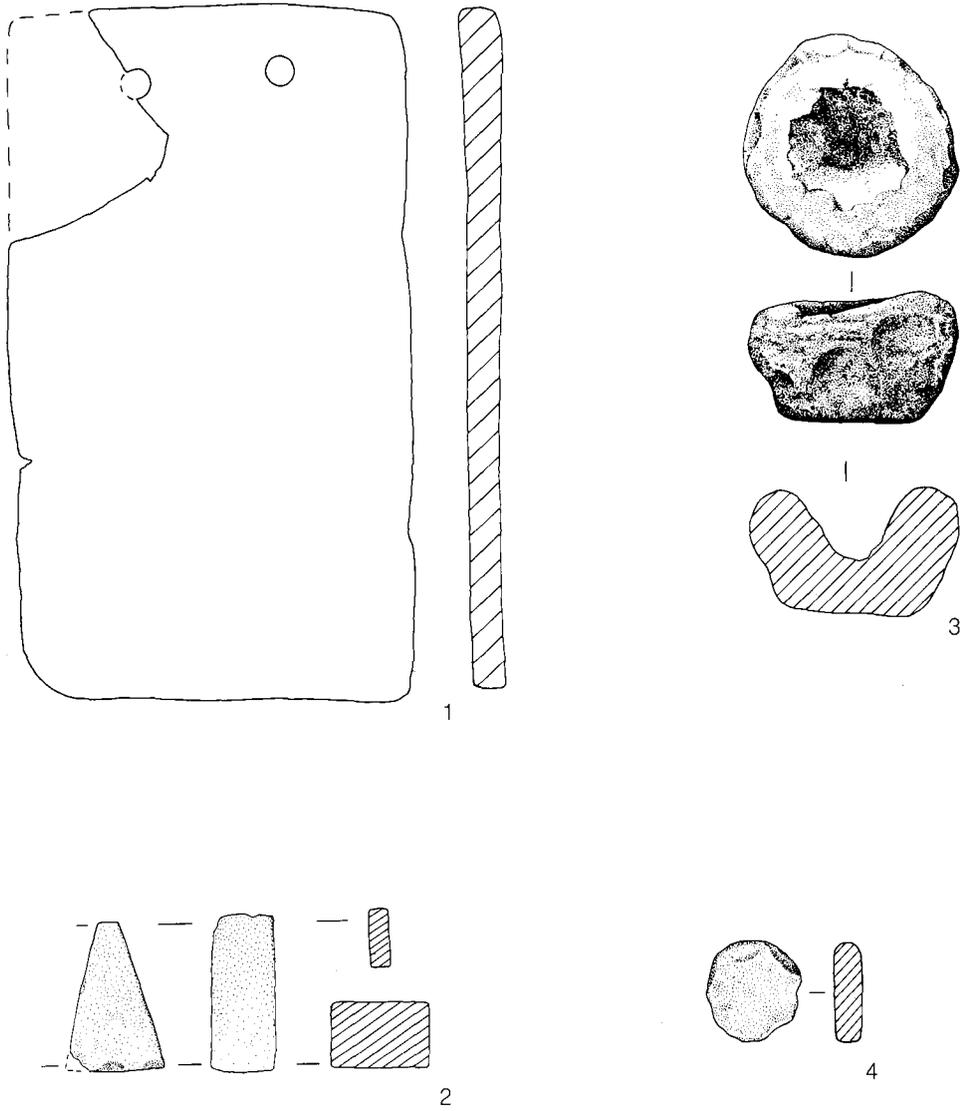
1. SF80, D1b (medieval: Fig. 11). Terminal from staff with one rivet hole.
2. SF92, F89 (medieval, hall services: Fig. 19). Fitting.
3. SF58, F24 (c. 1690-1750: Fig. 19). Medieval stylus with grooved shaft of a type paralleled on several monastic sites.²⁷

Copper Alloy (Fig. 22)

4. SF36, L64 (19th cent.: W. Range). Medieval belt fitting.
5. SF82, L103 (medieval: Fig. 7iii). Hoop of wire.
6. SF104, L87 (?medieval: context not illustrated, W. of Building A). Chain. Not illustrated. (1) SF54, L29 (post-dissolution soil in hall). Coil of wire about 600 mm in length and 0.57 mm in diameter. (2) Five pins of Cagle Type B: partly smoothed heads of twisted wire with coils still visible.²⁸

THE POTTERY

Much of the medieval pottery appeared to be residual and mostly occurred in levelling-up deposits. Most vessels were represented by only one or two small sherds and only



0 10 cms

FIG. 21

Building Materials and Stone Objects. Scale 1:4

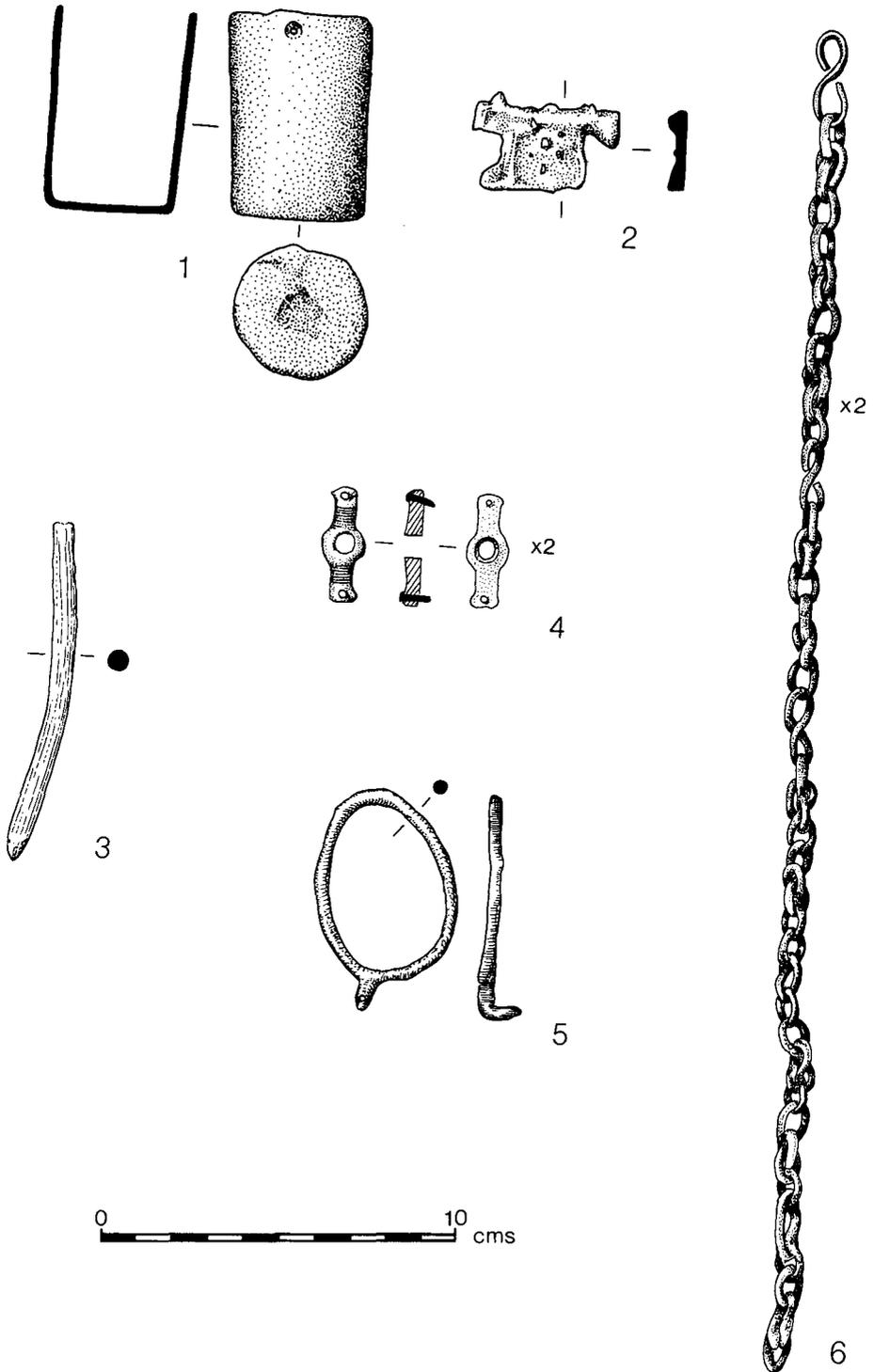


FIG. 22

The Small Finds. Scale 1:2, except nos. 4 and 6 at scale 1:1

one example (no. 15) comprised as much as 10–20 per cent of a vessel. The taphonomic study of individual vessels did not therefore prove generally instructive. No sooting or other residue deposits were identified. The change from coil-made Ham Green to wheel-made Bristol Redcliffe wares in the second half of the 13th century offered a potential chronological marker. However, in practice, the pottery proved of little help in dating the building phases or *vice versa*. No dating sequence could be established for the local micaceous (muscovite) wares and drain group D1b (phase B, W. Range) may suggest that they continued into the 15th century. Unfortunately, good 15th-century groups are generally lacking in SE. Wales.²⁹ The range of forms in Fabrics 1 to 15 is analysed below. It is noticeable that jugs dominate the assemblage. The low number of cooking-pots/jars and lack of sooting possibly reflects the importance of roasting and metal cauldrons in preparing meals for large numbers. No drip pans, often associated with roasting, were identified, however.

FORM ANALYSIS: FABRICS 1 TO 15

Form	Min. Vessels	%
Jugs/Pitchers	209	(82.9)
C. Pots/Jars	36	(14.3)
Int. Glazed	5	(2.0)
Bowl	1	(0.4)
Uncertain	1	(0.4)
Total	252	(100)

Recognizable sources in the pre-Dissolution groups include Ham Green near Pill (Somerset), Bristol, N. Wiltshire and the Saintonge, reflecting the Bristol trading connections of the Abbey.³⁰ The remainder of the pottery before the 16th century is likely to be local, from either Gwent or the Forest of Dean. No evidence was forthcoming to parallel the

	Layer	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15a	15c	16	17	18	19	20	21	22	23	24	Fabric
Fig 7iii	80								2	1				1													
	97		1					1	1	3			1							1							
	154	1	2					2	1						1	1											
Fig 11	D1a	1	3					2	2					1		1			3								
	D2a									1									3	3					1		
	D3										2								2	7		1					
	D1b	1						7	3	4				1	1												
	D2b		1						2	3																	
Fig 7i	136	2			1	1			1	1																	
	156								2						1												
	81							1	1																		

FIG. 23

The Main Pottery Groups, quantified by minimum vessels

situation at Kirkstall Abbey guest-house, where some ceramics appear to have arrived by baggage train from distant manors of the Lacy family, founders and patrons of the abbey. Possibly this reflects the strategic siting of Kirkstall on the route from the Lacy manors in the SW. Midlands to their castle at Pontefract.³¹ In contrast, Tintern Abbey was probably visited by its founders and patrons, the Clares, only after sojourns at their nearby castle of Chepstow (Fig. 1).

The micaceous fabrics can be ascribed to the Devonian (Old Red Sandstone) marls, or boulder clays derived from them, and are typical of the pottery found in Gwent, Herefordshire and the Forest of Dean. At present the only known kiln sites producing this ware are at Weobley in NW. Herefordshire and at Penhow in S. Gwent, nine miles from Tintern.³² None of the Tintern material, however, could be ascribed to the latter. The Devonian-derived wares, Vince's 'Herefordshire' micaceous type, all had similar inclusions: abundant rounded to sub-angular quartz mostly under 0.5 mm but up to 1 mm, muscovite mica plates up to 0.1 mm, as well as sparse to moderate iron-ore inclusions and rounded sandstone fragments up to 1 mm. All fabrics listed below have finely irregular fractures unless otherwise specified.

The more significant groups are summarised in Fig. 23. Drain groups D3, D1a, D1b and D2a all date to the life of the phase B West Range, late 15th or early 16th century. Group D2b dates to the phase A range, probably constructed in the 13th century (Fig. 11).

Fabric Series (Figs. 24–26)

Fabric 1. Ham Green Jugs.³³ Coil-made vessels in a hard fabric with frequent rounded to sub-angular quartz and rounded limestone up to 0.3 mm, as well as clay pellets up to 3 mm. The vessels are crudely finished in the interior and grey in colour with or without cream margins. Glazes are dull and the rouletted, incised or applied decoration is distinctive. This ware was made at Ham Green near Pill outside Bristol from the late 12th century to c. 1300. Minimum of 33 vessels (54 sherds).

1. Jug, pale green glaze on ext. F44 (hall post base: Fig. 6).
2. Jug handle, pale green glaze. U/S.
3. Jug handle, pale green glaze. U/S.

Fabric 2. Bristol Redcliffe Ware.³⁴ Wheel-thrown, predominantly light-coloured jugs in combinations of cream, orange and grey. The fabric is hard with rounded quartz and quartzite under 0.3 mm, and clay pellets and sandstone fragments up to 1 mm. Glazes are glossy and decoration is applied, sometimes using dark-firing slips to give colour contrast. These wares date from the mid 13th century to the 15th century. Wasters have been found in the Redcliffe area of Bristol. Minimum of 34 vessels (106 sherds).

4. Jug, black applied strips and green glaze. U/S.
5. Jug, black stamped strips and green glaze. 19th-century context.
6. Jug handle, glossy green glaze. L82: unillustrated, ?medieval layer west of, and post-dating, Building A.
7. Rim, yellow-green glaze on ext. L154, W. Range: Fig. 7iii.

Fabric 3. Bristol St Peter's Ware.³⁵ Highly fired, very hard version of Redcliffe ware, variable in colour with dark glazes. Jugs with narrow, slightly splayed bases are paralleled by 14th-century wasters from St Peter's church in Bristol. This ware is now thought to be a mid 14th-/15th-century product of the Redcliffe potters. Minimum of three vessels (3 sherds).

8. Jug base, overfired dull brown glaze on ext. L99: Fig. 9, medieval clayey soil in W. Range of uncertain date or phase, lying north of W31.
9. Jug base, green glaze with black flecks on int. U/S.

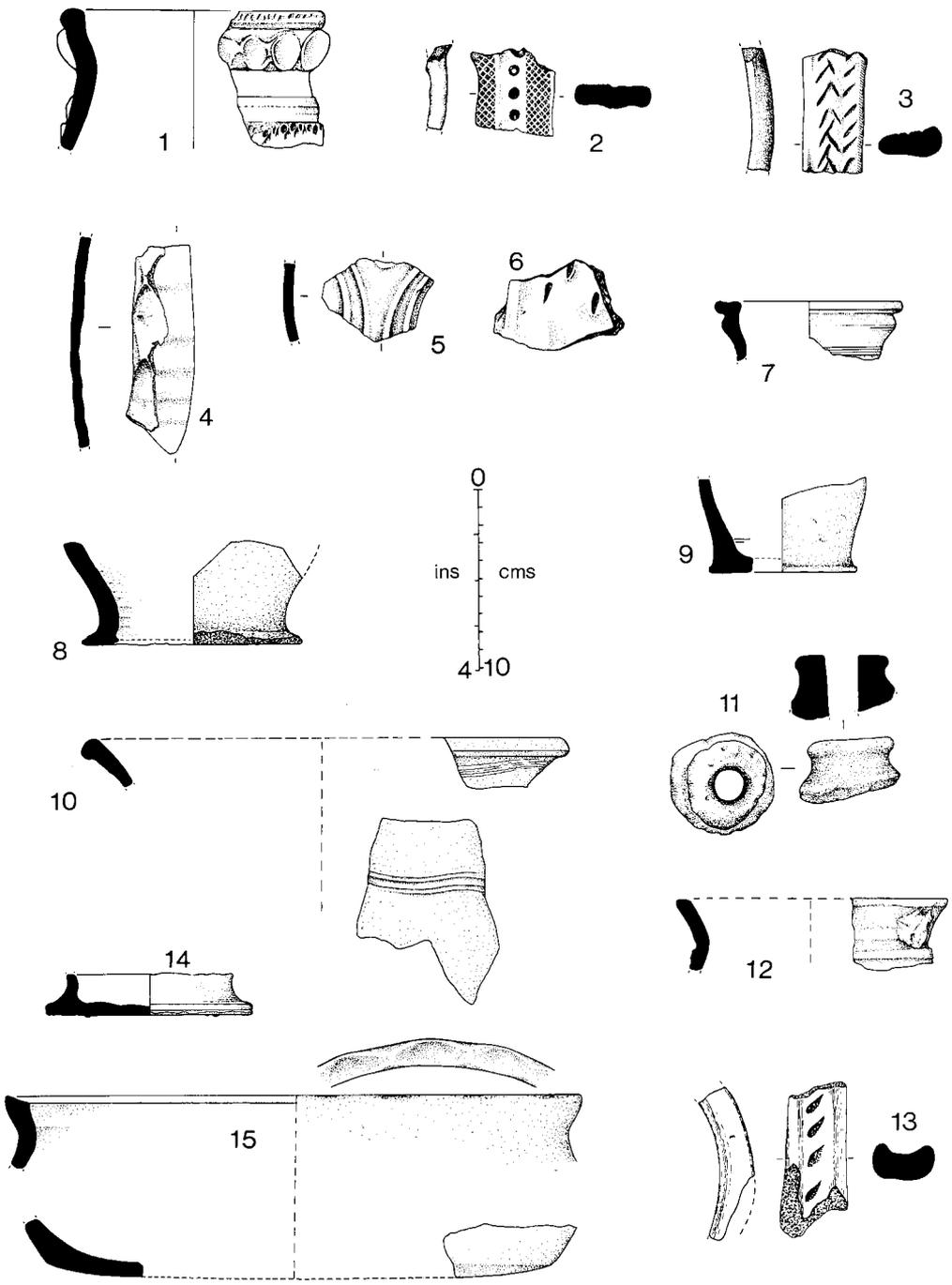


FIG. 24
The Pottery. Scale 1:4

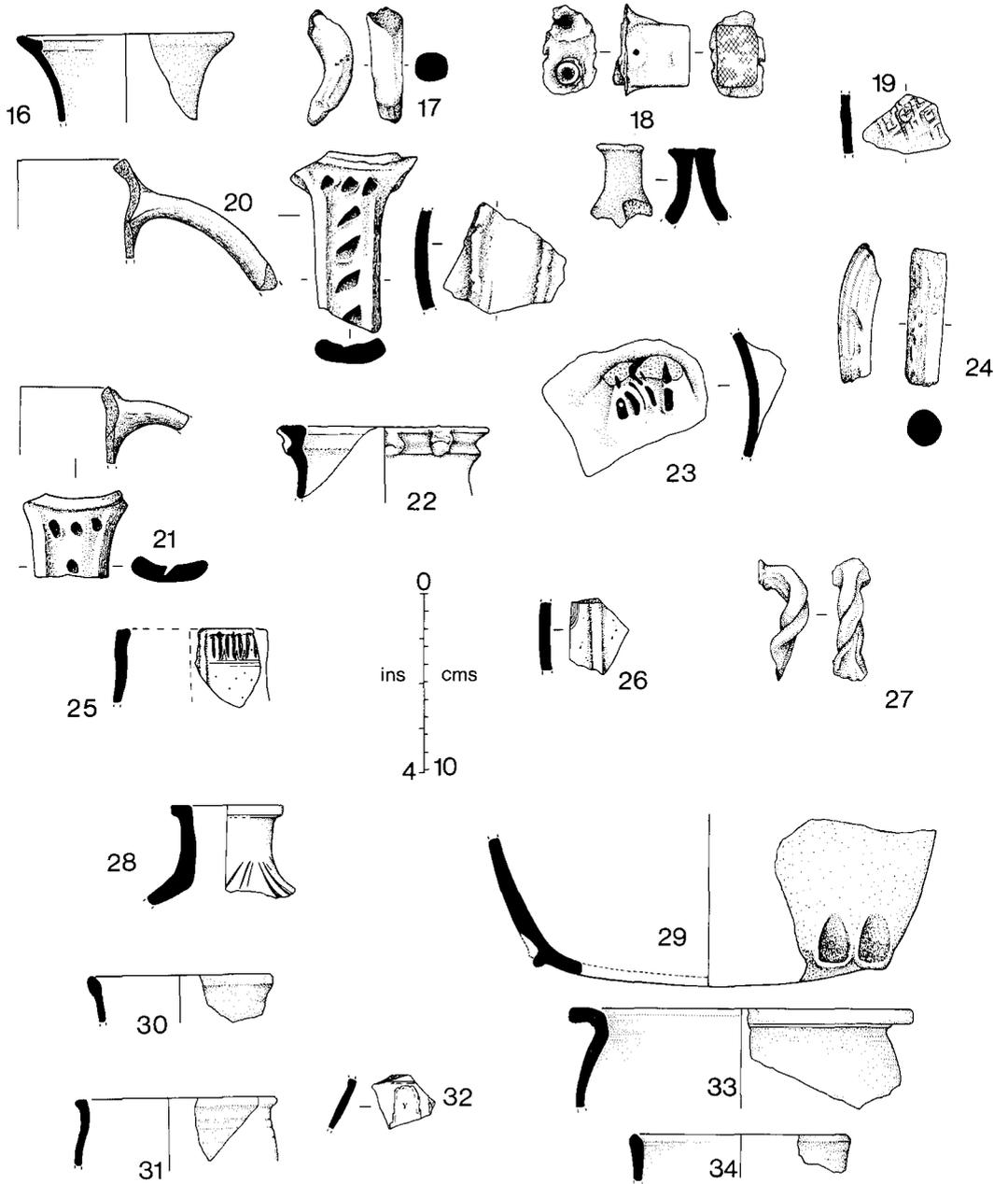


FIG. 25
The Pottery. Scale 1:4

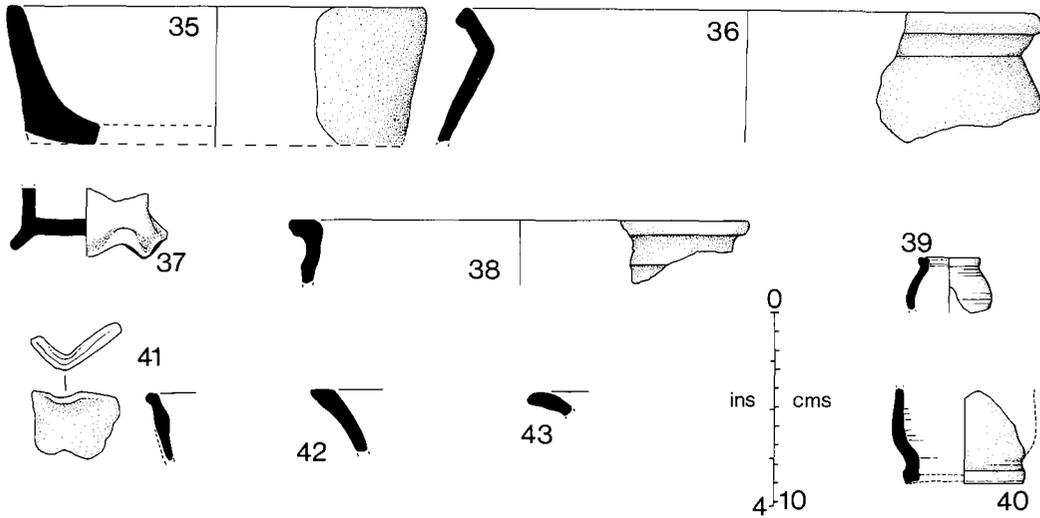


FIG. 26
The Pottery. Scale 1:4

Fabric 4. Ham Green cooking-pots.³⁶ Coil-made vessels with wavy combed decoration in a hard fabric with rounded and sub-angular quartz, chert, limestone and sandstone fragments mostly under 0.3 mm. The date range is probably the same as the jugs. Minimum of one vessel (12 sherds).

10. Cooking-pot with combed decoration, L136 and L81 (= L136): Figs. 7i-ii.
11. Spout of tripod pitcher, badly weathered with no glaze. U/S.
12. Rim, unglazed with applied piece (? handle), L160, unillustrated, charcoal patch below L136 (no other finds).
13. Handle of jug or tripod pitcher, pale green glaze. F33, post-hole in hall: Fig. 19.

Fabric 5. Minety-type ware.³⁷ Coil-made tripod pitchers with slashed handles, combed wavy decoration and light green glazes. Limestone inclusions up to 1 mm. Usually leached to give a pitted effect. These wares were made in the Forest of Braydon in N. Wiltshire. Similar tripod pitchers occur in late 12th- to mid 13th-century contexts in Bristol. Minimum of 21 vessels (22 sherds).

Fabric 6. One wheel-thrown jug base in a fine, smooth, white fabric imitating Saintonge but with flecks of iron staining in its light green glaze. Probably a Bristol product and found there in late 13th- and early 14th-century contexts.³⁸ Minimum of one vessel (1 sherd).

14. Jug base, yellow-green glaze on ext. U/S.

Fabric 7. Hard, sandy, finely micaceous fabric with Devonian inclusions and normally grey or buff in colour but sometimes partly oxidised. Wheel-thrown cooking-pots with infolded rims except for two internally glazed vessels of uncertain form and one narrow-necked jar (Fig. 24:15). Minimum of 30 vessels (108 sherds: 67 from a single vessel).

15. Cooking-pot, 67 sherds. L81 and F89: Figs. 7ii and 19.
16. Rim, narrow-necked vessel, unglazed. U/S.
17. Pipkin handle, very worn. L106; Drain Group D1a: Fig. 11.

Fabric 8. Jugs in soft to hard, sandy and finely micaceous fabric with Devonian inclusions. Glazes are light green sometimes with white slips on exterior and/or interior. Various fabric colorations but mostly reduced cores with oxidised margins. These vessels are wheel-thrown with stabbed or slashed strap handles and thumbled bases. Minimum of 65 vessels (82 sherds).

18. Handle and ?foot, uncertain form (?pipkin), buff fabric with yellow glaze and impressed decoration. U/S.
19. Body sherd, unglazed, impressed decoration. U/S.
20. Jug handle and body sherd, green glaze on ext. and black applied strips. L82: see no. 6.
21. Jug handle, green glaze. L96: W. Range, ?medieval layer in southernmost room of W. Range (Fig. 9).
22. Jug, patchy dark green glaze on ext. and applied decoration. U/S.
23. Jug handle, green glaze on ext. L109, Drain Group D1b: Fig. 11.
24. Jug handle, green glaze. L154, W. Range: Fig. 7iii.
25. Jug rim, applied black strip, incised decoration and green glaze on ext. L109, Drain Group D1b: Fig. 11.
26. Body sherd (jug), green glaze on ext., combed decoration and applied black strip. L82: see no. 6.
27. Twisted jug handle, mottled green glaze with added copper. U/S.
28. Jug rim, pitted yellow-green glaze on ext., incised decoration. 19th-century context.
29. Jug base, patchy green glaze on ext. L153 (robber trench of W3): Fig. 12.

Fabric 9. Wheel-thrown jugs in a soft to hard finely micaceous fabric but lacking sand or other inclusions over 0.1 mm; otherwise identical in fabric and form to Fabric 8. Minimum of 38 vessels (48 sherds).

30. Jug rim, patchy green glaze on ext. L82: see no. 6.
31. Jug rim, yellow-green glaze on ext. L99, W. Range: see no. 6.
32. Jug body sherd, brown glaze and applied white slip appearing yellow under glaze (Y in drawing). F68 (hollow in hall): Fig. 19.

Fabric 10. Hard, off-white/pink fabric with hackly fracture, rounded to subangular quartz up to 0.5 mm, sparse mica under 1 mm and a single fragment of ferruginous sandstone. Possibly from a Coal Measure-derived clay source. Two cooking-pots and a jug: all wheel-thrown. Minimum of three vessels (3 sherds).

33. Cooking-pot, wheel thrown. L99, W. Range: see no. 8.

Fabric 11. Two internally glazed wheel-thrown vessels in a hard, sandy pink to buff fabric with rounded non-calcareous, soft to hard white and red inclusions up to 1 mm. Possibly a Coal Measure clay source. Minimum of two vessels (2 sherds), one from F113, the 15th-century pit.

34. Jug, internal yellow-glaze. L99, W. Range: see no. 8.

Fabric 12. Hard, orange to buff fabric in finely micaceous Devonian fabric but with sand up to 1 mm. One unglazed body sherd of uncertain form and a glazed bowl. Form of manufacture uncertain. Minimum number of two vessels (3 sherds).

35. Bowl, brown glaze on int. and ext. (orange fabric). L87: not illustrated, ?medieval layer west of, and post-dating, Building A and F108 (post-hole in hall services): Fig. 19.

Fabric 13. Hard, buff, sandy and finely micaceous Devonian fabric with hackly fracture. All the vessels were wheel-thrown cooking-pots with everted rims except for one internally glazed vessel of uncertain form. Minimum of six vessels (6 sherds).

36. Cooking-pot. 19th-century context.

Fabric 14. Two wheel-thrown jugs in a hard fabric with rounded to sub-angular quartz up to 0.5 mm, sandstone and iron-ore inclusions. One vessel is in a cream fabric and the other orange. Both have copper-stained lead glazes varying from green to dark brown in colour. The fabric suggests a Coal Measure clay, possibly from the Forest of Dean, but there is a lack of known parallels.³⁹ Minimum of two vessels (3 sherds).

37. Jug Base. Copper-stained mottled-green glaze (orange fabric). L156 (= L136): Fig. 9. This vessel came from the surface of L156 adjacent to Building A. Its baluster-like form suggests that it is intrusive into L156, possibly associated with disturbance of the layer during construction of this building.

Fabric 15. Saintonge. (a) angular grey quartz temper (to 2 mm) with thick dark green mottled glazes: Minimum of one vessel (2 sherds), (b) 'all over green' fineware: Minimum of one vessel (1 sherd), (c) mottled green or unglazed wares: Minimum of six vessels (8 sherds), (d) polychrome: Minimum of one vessel (1 sherd). These wares are 13th/14th century while the polychrome sherd is *c.* 1280–1320.

Late 15th-/ early 16th-Century Pottery

The drains in the W. Range produced a small group of rather fragmentary sherds which presumably date to the final years of the monastery. These and the more residual finds add a number of imports to the Merida flask and two Malvern jugs found during clearance of the main drain in the inner precinct.⁴⁰ The lack of local coarsewares is noticeable, although such wares have been recognised at Abergavenny (N. Gwent) in a group of *c.* 1550–60.⁴¹

Fabric 16. Merida. One storage vessel, a form also found at Benton Castle in Dyfed.⁴²

38. Storage vessel. U/S.

Fabric 17. Cistercian Ware. Drinking vessels and one ink-pot. Minimum of eight vessels (8 sherds).

39. Ink-pot, dark green all-over glaze. L106, Drain Group D1a: Fig. 11.

40. Base of drinking vessel, all-over purple to black glaze. Drain Group D3: Fig. 11.

Fabric 18. Malvern Ware. The fragmentary sherds of oxidised Malvern vessels include at least one jug and a bowl. The contexts of this ware at Penhow and Caerleon suggest that late Malvern ware vessels first reached S. Gwent in the late 15th or early 16th century.⁴³ Minimum of thirteen vessels (20 sherds).

41. Jug rim, very worn and no signs of glaze. L163, Drain Group D3: Fig. 11.

42. Bowl rim, yellow-brown glaze on int. L163, Drain Group D3: Fig. 11.

Fabric 19. Tudor Green. Drinking vessels. Minimum of three vessels (4 sherds).

Fabric 20. French Earthenware. Cream/buff fine earthenwares with glossy green glazes on the exterior and interior. Minimum of two vessels (3 sherds).

Fabric 21. Martincamp Type 1 flask. Minimum of two vessels (2 sherds).

Fabric 22. Raeren. One mug base (1 sherd).

Fabric 23. Maiolica. One hollow ware body sherd *c.* 25 × 18 mm in a buff fabric with white interior tin glaze and all over cobalt-blue exterior. This is probably a fragment from a S. Netherlands vase but it could also be Italian (not illustrated: Drain Group D1a: Fig. 13). One

rim sherd from a dish in a buff fabric with a white tin glaze on the exterior and interior (Fig. 26:43).

43. Dish rim, white glaze and soft yellow-buff fabric. L155, Drain Group D1a: Fig. 11.

Post-medieval Pottery

Most of the early-modern pottery was recovered from residual 19th- or 20th-century contexts. F14 and F24 in the hall produced two pot groups of *c.* 1690–1760, and probably the first half of this period, which are published elsewhere.⁴⁴ In addition, the following groups were recovered:

L29 (not illustrated); post-dissolution layer in hall. Tin-glazed earthenware, minimum of two vessels. Local lead-glazed earthenware (post-medieval), minimum of five vessels.

L12 (Fig. 13): 'Cistercian' type ware (16th or 17th century), minimum of two vessels; Frechen/English 'Tigerskin' stoneware (17th or early 18th century), minimum of one vessel; local lead-glazed earthenware (post-medieval), minimum of eight vessels; Bristol/Staffordshire mottled ware (*c.* 1690–1760), minimum of one vessel.

Romano-British Pottery

The excavations of 1970–71 and 1977–80 in the outer precinct produced a number of sherds of Romano-British pottery, but these are likely to have been brought onto site with levelling deposits from elsewhere. They suggest settlement in at least the 3rd century and possibly the 2nd to 4th centuries.⁴⁵

ENVIRONMENTAL ANALYSES

THE ANIMAL BONES. *By* G. G. JONES

The 13th-century Layers

Layer 136 (Fig. 7i–ii) and related layers, a clayey levelling deposit mixed with midden material, occurred over most of the site, and pre-dates the construction of the hall. The bones were generally very fragmented, with only 31% of bones being identified, and half the cattle and nearly half the sheep bones being classified as fragments. Bones from cattle were the commonest in layer 136, and the low number of identified horse and red deer bones at the site means that most of the large-species unidentified bones are doubtless from cattle: 62% of the unidentified were large. These include 133 ribs, many of them surviving in quite long sections (100–200 mm).

Layer 81 (Fig. 7i–ii) was stratigraphically equivalent to L136 but differed in having a relatively higher proportion of sheep to cattle bones. Comparison of large- and sheep/pig-size unidentified fragments shows a similar pattern, so there appears to be a real difference in disposal, with the larger bones of cattle tending to be deposited in the courtyard. Cattle, sheep and pig bones from L81 include bones from most parts of the skeleton, but the high meat-bearing vertebrae and upper limb bones formed the major proportion. This would be the type of deposit to be expected near a midden with waste from kitchen, guest-house or refectory.

The minimum number is given in parentheses in Table 1. It is probably a great under-estimate of the number of individuals whose remains were excavated. The bones rarely appeared to be related to each other, either as clear left/right pairs or articulated joints, e.g. no layers included an astragalus and distal tibia which fitted together.

In comparison with L81, L136 seems of a more general character, with more bones of the head and foot of cattle, and the bones somewhat more fragmented. However, the L136 sheep bones also show low proportions of skull and foot waste, so that the general character of the 13th-century bone sample as a whole suggests proximity to areas of domestic activity.

TABLE I
SUMMARY OF ANIMAL BONES

	Cattle		Sheep		Pig		Other mammal/bird		Fowl	Fish	Ige	Unident. med	Total
	BN	MN	BN	MN	BN	MN							
<i>13th cent.</i>													
L136	104	(4)	81	(6)	22	(3)	cf. red deer 2a roc 2 crow 1 horse 2 duck 1	1		246	150	609	
L81	56	(2)	89	(6)	36	(3)	comorant 1 Other 4 bird 3 1% 1%	1	P	214	268	658	
Total (398 identified)	160 40%		170 43%		58 15%			2	P	460	430	1267	
<i>W. Range Phase A</i>													
L112, L154	8	(1)	18	(2)	7	(1)	cat 1	1		8	12	55	
<i>Mid 15th/early 16th cent.</i>													
W. Range constr., Phase B	16	(2)	21	(2)	15	(3)	red d. 3, roc 1 rabbit 7 (1)	13(3)	P	12	22	110	
Drain 1 fill	120	(9)	37	(5)	25	(4)	horse 1 Other 12 5%	13	P	76	62	320	
Drain 2a	136		48		40			5%		88	84	1	
Total (249 identified)	55%		19%		16%			5%				431	

Notes

BN — number of bones; MN — minimum number of individuals; Ige — unidentified bone from large species; med — medium (sheep/pig-size) and small (3 unidentified small mammal and 7 bird bone fragments); a — antler; p — present.

Butchery marks were common, either from choppers or knives. Vertebrae were usually in a fragmented state, but none were clearly chopped sagittally which would indicate dividing of the carcass down the midline.

Some bones seem scarce, notably horncores, with only three of cattle and none of sheep or goat, and only three cattle metapodials, the bone most often used for bone-working, against 23 cattle phalanges. Horn- and bone-working therefore probably took place elsewhere.

Bones from species other than cattle, sheep and pig were few but included roe deer, represented by bone and not antler. Two antler pieces, probably from red deer, had been chopped through, not sawn as is more usual. Horse was represented by two teeth. Only four bones of fowl were found, and one of duck, which may be domestic or wild mallard (*Anas platyrhynchos*). Two other bird specimens were found, a crow bone (*Corvus corone*) and a cormorant bone (*Phalacrocorax carbo*) (see discussion).

The 15th-/ early 16th-century Bone

The small group of pre-mid 15th-century bones (phase A) produced bones from cattle, sheep, pig and fowl, plus the only record from the site of cat (a mandible from layer 154, Fig. 7iii).

The mid 15th-/ to early 16th-century bones (phase B) came from the West Range and Drains 1 and 2a (Figs. 7iii and 11). As a whole the bones were less fragmented than the earlier material, 53% being identified and a smaller proportion (one third) being classed as fragments.

The bones from the West Range construction were well preserved, including bones from red and roe deer, rabbit, fowl and fish, and the proportion identified was high (70%). Pig and fowl bones were both nearly as numerous as cattle (and more numerous by minimum number count). As with the earlier bone group, red deer and roe were both present, with apparently no fallow deer. The deer remains were all bone, indicating food waste not antler-working. The rabbit bones were examined for butchery marks without success, which means they could be intrusive. However, the presence of a rabbit Warren would not be unexpected. The bones from these layers suggest that a fine and varied table could still be served at the Abbey at this late date.

The higher percentage of cattle shown for the later group in Table 1 is affected by the deposits from Drain 1, where cattle formed 66% of the identified bone. The deposit was unusual, with numerous remains from cattle skulls and feet. The 120 bones comprised 81 from the head (49 of them loose teeth), fourteen from the main part of the body and 25 from the foot. Similarly, 77% of the sheep and pig bones were from the head or foot. The bones, although not highly fragmented when deposited, were badly eroded. Seventeen cattle metapodial bones were found, most of which were probably complete originally, but they were too eroded for any measurements to be taken, even of shaft widths.

Interestingly, there were of these cattle metapodia a good deal more from the left than the right side: two right and six left metacarpals and two right and seven left metatarsals. Bones from the main body were too few for significant comparison and skull remains were not so biased. It could be that in the distribution system the right side tended to be allocated elsewhere or perhaps right metapodia were preferred for bone-working. Corroboration for neither idea was available, since none of the few vertebrae were split sagittally and no worked metapodia were found.

The single equid bone was a 3rd phalanx from a small horse.

Discussion

The bone sample found at Tintern is small, but it is the only such collection and is of interest for this reason. The 13th-century bone sample, dating from the height of the Abbey's importance, appears to be refuse from domestic activity. Differences in

the bones found in L136 and L81 (Fig. 7) showed the deposition of relatively more of the larger bones of cattle in the former. Such difference serves as a caution in taking overall percentages as anything other than a very general guide to species importance. But it can be said that most meat eaten was beef or sheepmeat, and most was from sub-adult or adult animals. This age structure is similar to that found at other sites. A bias towards younger animals might be expected in the supply of animals to the Abbey itself, but this seems not to have been the case.

The bone groups from the 15th-/ to early 16th-century layers again show differences, especially between the Drain 1 fill which was dominated by cattle waste bones and the West Range-phase B construction deposit which more nearly calls to mind the medieval banquet with beef, mutton, pork, venison — both red and roe deer — ?rabbit, fowl, cod and conger eel.

Taken as a whole, the 15th-/ early 16th-century bones do not indicate any great change in diet since the earlier bone group, with the exception of a relative increase in pork eaten, the probable presence of rabbit and perhaps a higher frequency of fowl (and hence perhaps eggs also).

Venison appears to have been eaten occasionally. The bones (excluding antlers) of red deer and roe formed just 0.9% of the total identified bone, though the percentage was higher from some individual layers.

Cormorant, present in the 13th-century period, winters but does not breed in the area of Tintern today.⁴⁶ The Wye at Tintern is about 80 m wide and although 15 km upstream from the confluence, it is only 5½ km overland from the Severn estuary. The record could be of a non-breeding bird but it is also possible that colonies used to nest in trees in the area. On the Continent tree-nesting at inland sites is fairly frequent, but this is no longer so in Britain due to persecution by fishermen. Cormorants eat primarily flatfish, shore and estuarine fish but the usual prey on rivers are Brown Trout, Perch, young Salmon and Eels.⁴⁷ The bone could of course be a natural occurrence but perhaps it is a trophy trapped or shot to protect the Abbey fish stocks.

ACKNOWLEDGEMENTS

The finished drawings are the work of H. Mason except for Figs. 6, 8–9, 12, 19, drawn by I. Price, and Fig. 2 drawn by the author. The pottery (Figs. 24–26) was drawn by M. Evans. I wish to thank J. K. Knight of Cadw for his assistance. During the excavation M. Lawler acted as supervisor and the following as site assistants or planners: P. R. and C. Hough, A. E. and A. Johnson, H. O. Thomas, J. Warilow, P. Larkin, D. and R. Brown, S. Andrews, N. and J. Edwards, L. Stacey and R. Magnusson. I am also grateful to Prof. R. F. Tylecote, the late Dr P. Bailes, Dr M. Griffiths, Dr R. Newman, Dr A. M. Pollard, C. Heron, Dr P. Williams, G. G. Jones, Dr G. McDonnell, Dr A. Jones, Dr M. Gray, M. Ponsford, D. Dawson, C. Brown, Dr A. Vince and I. Standing for their help or advice during the post-excavation work. The documentary references from the Badminton Collection appear by kind permission of his grace the Duke of Beaufort. Mrs G. G. Jones wishes to thank G. Cowles and J. Bruckner for their assistance with the bird bones. I would also like to thank R. Jackson for typing the report and the Department of Archaeology, University College, Cardiff for providing me with working space, and the many volunteers who worked on the site with me. The finds and records are deposited in Newport Museum, Gwent. Extended versions of the structural and bone reports are available from the author at 20 Lytton Rd, Leicester, LE2 1WJ.

NOTES

¹ D. M. Robinson, *Tintern Abbey*, Cadw Official guidebook (Cardiff, 1986). Earlier guidebooks include O. E. Craster, *Tintern Abbey* (London, 1956) and H. Brakspear, *Tintern Abbey* (London, 1934). An interim report of the current excavations, since subject to much reinterpretation, is P. Courtney. 'A non-ferrous industrial complex at Tintern Abbey', *J. Hist. Metallurgy*, 161 (1982), 22–23.

² National Library of Wales (N. L. W.) Badminton maps vol. 2, no. 6.

³ D. H. Williams, *White Monks in Gwent and the Borders* (Pontypool, 1976), 96, 134, 136 and plan 8; id., *The Welsh Cistercians*, vol. 2 (Caldey Island, Tenby, 1984), 230–31.

⁴ The cottages are illustrated in a painting of 1901 by William Callow in Newport Museum and Art Gallery, entitled 'Tintern Abbey, West Window'. They are also shown in an undated photograph reproduced in the Tintern Abbey Museum. For the turnpike road, see I. Waters, *Chepstow Parish Records* (Chepstow, 1955), 113.

⁵ Ordnance Survey, 2nd edn. 6 in. to 1 mile, Gloucestershire, sheet 46.

⁶ Williams, op. cit. in note 3, 94–147. A detailed account of the post-Dissolution history by P. Courtney and M. Gray entitled 'Tintern Abbey after the Dissolution' has recently been submitted to the *Bulletin of the Board of Celtic Studies*.

⁷ N.L.W. Badminton Manorial MSS. 1512–1551.

⁸ N.L.W. Badminton Manorial MS. 1524, f. 44.

⁹ N.L.W. Badminton Maps vol. 2, map 6.

¹⁰ S. Wrathmell, *Kirkstall Abbey: The Guesthouse* (Wakefield, 1987).

¹¹ N.L.W. Badminton Manorial MS. 1524, f. 44.

¹² See R. F. Tylecote, 'The Medieval Smith and his methods', 42–50 in D. W. Crossley (ed.), *Medieval Industry* (London, Counc. Brit. Archaeol. Res. Rep. 40, 1981) on the various types of medieval hearth.

¹³ Georgius Agricola, *De Re Metallica*, ed. H. C. and H. L. Hoover (New York, 1950), 227, 453, 455 and 489; Theophilus, *On Divers Arts*, ed. J. G. Hawthorne and C. S. Smith (New York, 1979), 146–47.

¹⁴ I am grateful to Dr P. Williams and C. Heron of the Dept of Chemistry, University College, Cardiff for a discussion of these problems.

¹⁵ R. F. Tylecote, *Metallurgy in Archaeology* (London, 1962), 79–82; id., *The Prehistory of Metallurgy in the British Isles* (London, 1986), 2, 60–61, 69 and 239.

¹⁶ I am grateful to M. Lawler for first identifying the bell mould and for providing information on the Kirkstall excavations. For the Kirkstall bell mould see H. B. Duncan and S. Wrathmell, 'Bell Moulds from Kirkstall Abbey, West Yorkshire', *J. Hist. Metallurgy*, 201 (1986), 33–35 and Wrathmell, op. cit. in note 10, 21. For the Norton Priory bell pit, see L. E. Webster and J. Cherry, 'Medieval Britain in 1976', *Medieval Archaeology*, XXI (1977), 223 and for Ludlow, see P. Klein and A. Roe, *The Carmelite Friary, Corve Street, Ludlow: Its history and excavation* (Birmingham, 1988).

¹⁷ Compare with the medieval saw-pit at Barton Blount: G. Beresford, *The Medieval Clayland Village: Excavations at Goltho and Barton Blount* (London, Soc. Medieval Archaeol. Mono. 6, 1975), 44–45 and M. W. Barley, *Houses and History* (London, 1986), pl. 101.

¹⁸ Wrathmell, op. cit. in note 10.

¹⁹ H. Brakspear, *Waverley Abbey* (Guildford, Surrey Archaeological Society 1905), 81–82.

²⁰ *Ibid.*, 75–77 and 81–82.

²¹ H. E. Butler (ed.), *The Autobiography of Giraldus Cambrensis* (London, 1937), 226 and Williams, op. cit. in note 3, vol. 1, 171–72.

²² Compare I. W. S. Blanchard, 'Lead Mining and Smelting in Medieval England and Wales', 72–84 in Crossley (ed.), op. cit. in note 12.

²³ H. Dewey, *Lead, Silver-Lead and Zinc Ores of Cornwall, Devon and Somerset* (London, Geological Survey 1921); D. G. Tucker, 'The Lead Mines of Glamorgan and Gwent', *Morgannwg*, 20 (1976), 37–52; Blanchard, op. cit. in note 22.

The only currently known reference to actual exploitation of lead in medieval SE. Wales is a £10 rent from Llantrisant (Glamorgan) in an extent of c. 1262: G. T. Clark (ed.), *Cartae et Alia Munimenta quae ad Dominum de Glamorgan antea pertinent*, vol. 1 (Dowlais, 1885), 112. There does not appear to be any evidence at present for silver extraction in medieval Severnside except in Devon. There was, however, a report made to the Crown in 1339 of a potential silver mine near Wells, but there is no evidence that this was successfully followed up: J. W. Gouch, *The Mines of Mendip* (Newton Abbot, 1967), 57.

²⁴ Piercefild: Edward Llwyd, *Parochialia*, ed. R. H. Morris, vol. 3 (London, 1911), 21; Gallery Hill: Gwent County Record Office Evans and Evill MS. 0736.

²⁵ See A. G. Vince, 'The Medieval and Post-Medieval Ceramic Industry of the Malvern Region: the Study of a Ware and its Distribution', 257–306 in D. P. S. Peacock (ed.), *Pottery and Early Commerce* (London, 1977), at 286–87.

²⁶ Ancient Monuments Laboratory, pers. comm., 1980.

²⁷ G. Lambrick and H. Woods, 'Excavations on the Second Site of the Dominican Priory, Oxford', *Oxonienisia*, XI (1976), fig. 12, no. 29; R. Poulton and H. Woods, *Excavations on the Site of the Dominican Friary at Guildford in 1974 and 1978* (Guildford, 1984), fig. 46, no. 44.

²⁸ C. Caple, 'Pins and Wire', in P. Mayes and L. A. S. Butler (eds), *Sandal Castle Excavations 1964–1973* (Wakefield, 1983), 273.

²⁹ D. H. Evans, 'Some Current Problems in Defining Late Medieval pottery in Wales', *Medieval and Later Pottery in Wales*, 6 (1983), 1–22.

³⁰ E. M. Carus-Wilson, *Medieval Merchant Venturers* (London, 1965), 7; Williams, op. cit. in note 3, 140.

- ³¹ S. Moorhouse and A. M. Slowikowski, 'The Pottery' in S. Moorhouse and S. Wrathmell, *Kirkstall Abbey, vol. 1, The 1950-64 excavations: a reassessment* (Wakefield, 1987), 107-09.
- ³² S. Wrathmell, 'A Medieval Pottery Kiln and Wasters at Penhow, Gwent', *Medieval and Later Pottery in Wales*, 4 (1981), 1-7. The Weobley material is in Hereford Museum.
- ³³ K. J. Barton, 'A Medieval Pottery Kiln at Ham Green, Bristol', *Trans. Bristol Gloucestershire Archaeol. Soc.*, LXXXII (1963), 95-126; M. Ponsford (Bristol Museum), pers. comm.; A. G. Vince, *The Medieval Ceramics Industry of the Severn Valley* (Unpublished Ph.D. thesis, University of Southampton, 1983), 49-53.
- ³⁴ Vince, op. cit. in note 33, 56-63; M. W. Ponsford, pers. comm.
- ³⁵ D. P. Dawson, R. G. Jackson and M. W. Ponsford, 'Medieval Kiln Wasters from St Peter's Church, Bristol', *Trans. Bristol Gloucestershire Archaeol. Soc.*, xci (1972), 159-67.
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- ³⁷ A. G. Vince, 'Late Saxon and Medieval Pottery in Gloucestershire', in A. Saville (ed.), *Archaeology in Gloucestershire* (Cheltenham, 1984), 263-66; J. Musty, 'A Preliminary Account of a Medieval Pottery Industry at Minety, North Wiltshire', *Wiltshire Archaeol. Mag.*, LXVIII (1973), 79-88; M. Ponsford, pers. comm.
- ³⁸ M. W. Ponsford, pers. comm.
- ³⁹ A. G. Vince, pers. comm.
- ⁴⁰ J. M. Lewis, *Medieval Pottery and Metal-ware in Wales* (Cardiff, 1978), 18 and 21; J. M. Lewis and D. H. Evans 'Southern European Imported Pottery in Wales', *Medieval and Later Pottery in Wales*, 5 (1982), 85 (no. 18).
- ⁴¹ J. K. Knight, 'The Pottery', in F. Radcliffe and J. K. Knight, 'Excavations at Abergavenny 1962-1969: Medieval and Later', *Monmouthshire Antiq.*, 3ii (1972-73), 92.
- ⁴² Lewis and Evans, op. cit. in note 40, 84 (no. 9e).
- ⁴³ Evans, op. cit. in note 29, 9-12; Vince, op. cit. in note 25.
- ⁴⁴ P. Courtney, 'Two Early Modern Pit Groups from Tintern Abbey', *Medieval and Later Pottery in Wales*, 8 (1985), 70-78.
- ⁴⁵ J. K. Knight (pers. comm.) recovered a group of Romano-British coarse wares, and a colour-coated Gaulish beaker of 2nd-/ early 3rd-century date, from a pit on a building site. It was located west of the Laytons (ST 5306 0008). I am grateful to P. V. Webster for the pottery identifications.
- ⁴⁶ P. Lack, *Atlas of Wintering Birds in Britain and Ireland* (Staffordshire, 1986); J. T. R. Sharrock (ed.), *Atlas of Breeding Birds in Britain and Ireland* (Aylesbury, 1976), 50.
- ⁴⁷ S. Cramp, *Handbook of the Birds of Europe, The Middle East and North Africa I* (Oxford, 1980), 200-07 and Lack, op. cit. in note 46.

This report is published with the aid of a grant from Cadw/Welsh Historic Monuments