THE EXCAVATION OF THE REREDORTER AT CLEEVE ABBEY, SOMERSET

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INTRODUCTION

Cleeve Abbey was Cistercian. It lies in the valley of the Washford River about three miles inland from the north Somerset coast between Watchet and Minehead. The abbey was founded in the late twelfth century. The initial plantation of an abbot and 12 monks came from Revesby, Lincolnshire, itself a daughter house of Rievaulx Abbey in Yorkshire. At the end of the thirteenth century there were 28 monks but after that date the number declined; at the Dissolution in 1536 there were still, however, 17. Cleeve was then valued at £155 9s 5½d. The abbey is now in the guardianship of English Heritage.

The excavation of the reredorter was undertaken before the insertion of a drain round the south end of the Dorter range (Fig. 1). The excavation also meant that the walls in that area could be examined before the construction of a concrete vault within the monks' day room. The position of the reredorter was known from the stubs of walls projecting from the south-east corner of the east range. The walls exposed in the course of the excavation have been consolidated and displayed.

The excavations were carried out over three sessions of a month's duration each in the summers of 1980–82. Further small-scale work was carried out in 1984 and 1985, following the discovery of more masonry during the landscaping of the area to display the remains. The numbers used in the report when referring to contexts are those used on site. The period and phase plans have been compiled from drawings made on site.

Period I (Figure 2)

(a) This phase is comprised of the original construction of the reredorter, which was of one build with the south end of the east range and aligned east-west. The overall dimensions of the building were 19.75m by 7.8m. It had walls of roughly dressed sandstone blocks bonded with mortar with a rubble core. The north wall was 1.05m wide with an offset two courses deep on its north side. In general, only one or two courses survived above the foundations because of robbing but towards the east end, where the robbing was less extensive, three or four courses survived. The east wall was also 1.05m wide and four courses survived above an offset on the east side. The south wall would have been 1m wide but the north face had been totally robbed, exposing the rubble core. There were ashlar blocks at the corners of this wall.

The southern part of the building was occupied by the main drain, which was 1.3m wide

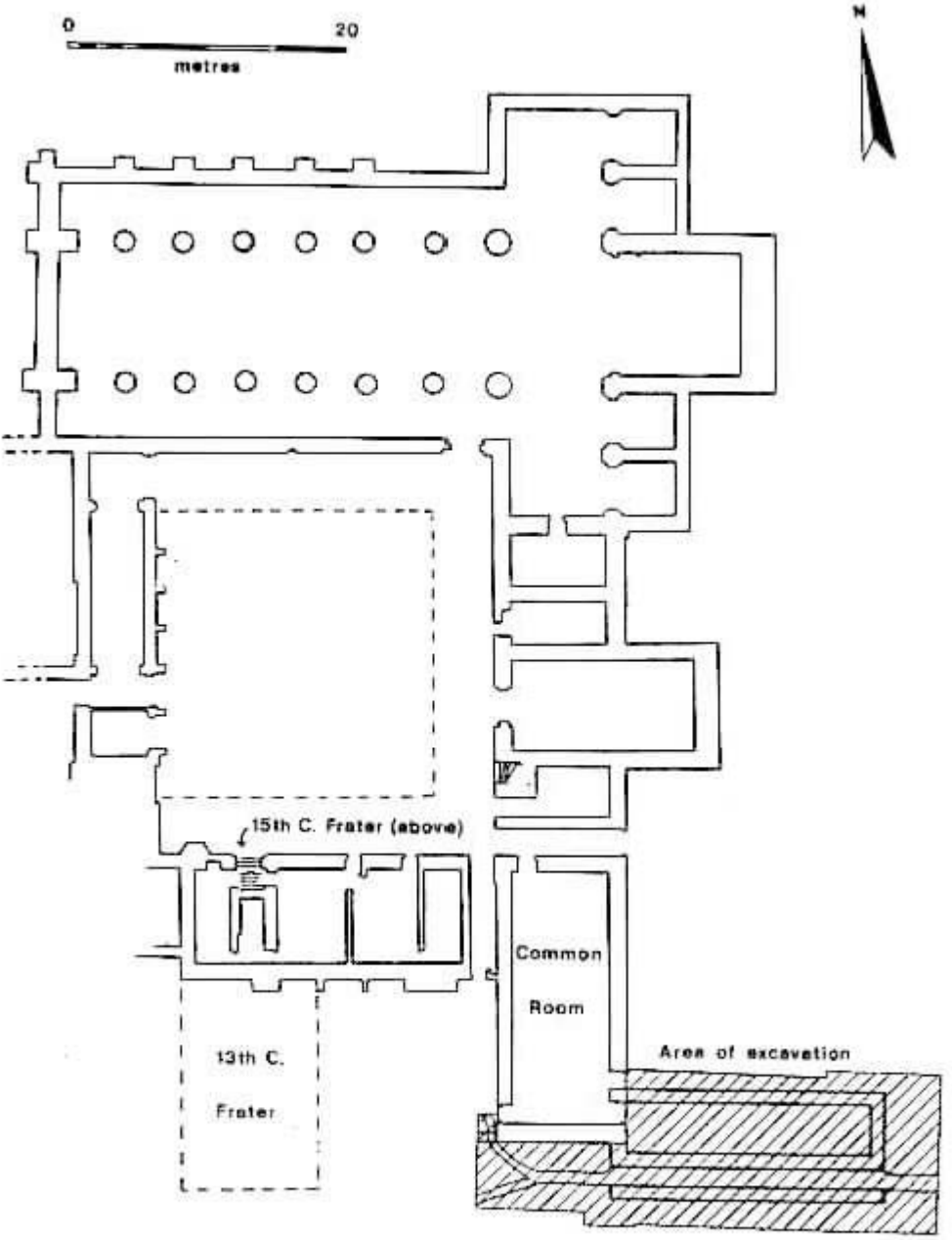

Fig. 1 Site plan

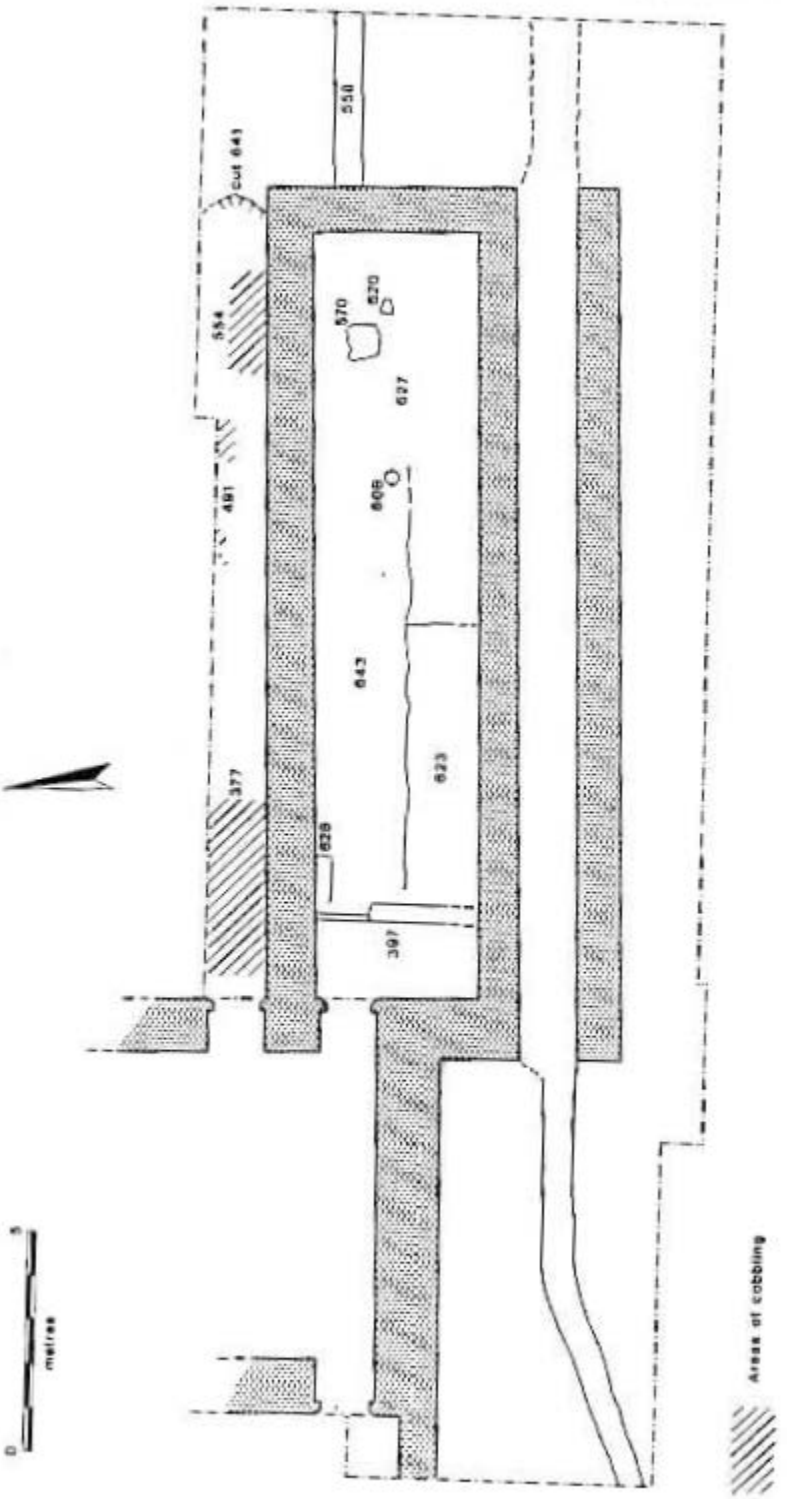

Fig. 2 Period I

Plate 1: The main drains west of the Reredorter

Plate 2: The reredorter, looking west

and had a floor of lias slabs set on sandstone rubble with some slate. The majority of the floor had been robbed out but a small section survived at the west end of the building. Differences in wear on the surface of the slabs showed the width of the drain and of the walls on either side. To the west of the building the drain was capped by slabs of slate and sandstone and passed to the south of the thirteenth-century frater. It is unknown whether or not the drain was capped to the east of the building because of robbing. The wall dividing the drain from a room to the north was similar in construction to the external walls of the building but was only 0.8m wide. It survived to a height of *c.* 1m but the south face was almost entirely missing as a result of the robbing of the drain floor.

At first-floor level the reredorter was probably *c.* 17.5m by 6m internally and was entered through a doorway at the southeast corner of the dorter. The doorway, together with a squint in which hung a lamp providing light to both the dorter and the reredorter, still survives.

On the ground-floor to the north of the main drain there was a room measuring 17.25m by 3.6m, entered from the monks' day room. The primary make-up within this room was clay (627), overlain to the west by gravel (643) and clay/loam (623). The boundary between 623 and 643 was fairly straight and may mark the line of a partition. Two post-holes (608 and 620) may indicate a continuation of the partition, although they could have been roof supports. An area of charred wood (628) towards the west end of the room suggests that there might have been a wooden floor.

North of the reredorter there were the remains and impressions of a cobbled surface (377, 491 and 554) forming the floor of the south alley of the infirmary cloister. There was access to this cloister from the day room and creasing in the wall of the dorter range shows that at least the west alley was roofed. The south alley was probably also roofed but this cannot be proved. There was a cut (641) to the north of the east end of the reredorter which might represent a pre-monastic feature.

To the east of the reredorter, and 5.2m from it, there was the southwest corner of another building, probably the infirmary. The walls were exposed during the laying out of the site for display and apart from planning them no other work was carried out. The west wall was *c.* 0.9m wide with an offset 0.3m wide to its west. The south wall was 0.8m wide. Both walls were faced with roughly dressed stones and had a core of mortared rubble. Only 1.25m in length of the south wall was exposed, while the west wall was at least 2.4m long. Both walls had been extensively robbed.

The construction trench for the south wall of the east range was filled with sandy loam and rubble, probably construction debris (589).

The foundations of a wall running west from the southwest corner of the monks' day room were also found. This wall was 0.8m wide and constructed of sandstone blocks bonded with yellow clay. It was of one build with the east range and had been bonded into the range to first floor level. The function of the wall is uncertain—it may have been a boundary wall. There was a doorway in the west wall of the day room immediately north of this wall which provided access to the area between it and the south range.

(b) In this phase the posts in features 608 and 620 appear to have been removed and the holes backfilled. A stone slab (570) inserted in clay 627 was used as a hearth and may have been the emplacement for a brazier. To the west, layers 623 and 643 were cut by a partition (397) aligned north-south 1.75m from the day room. The southern part of this was formed by a stone and mortar wall 0.4m wide. There was a beam-slot to the north of the wall, indicating a doorway *c.* 1.15m wide. It is possible that the area to the west of the partition was a sort of vestibule. An area of gravel to the west of the wall may be the remains of the floor within this vestibule.

Between the reredorter and the infirmary there was a narrow wall (558) aligned east-west. It was on approximately the line of the south wall of the infirmary and was probably erected merely to fill the gap between the buildings, thus enclosing the infirmary cloister. It was

constructed of roughly coursed limestone blocks bonded with mortar and was set on an offset of rough fragments of limestone. The wall was 0.65m wide above the offset. Only two courses of the wall survived and it was faced with plaster on its north side. The bottom edge of the plaster facing was irregular and it is thus not possible to identify the level of the floor of the infirmary cloister at this time.

Period II

(a) (Figure 3) The partition at the west end of the northern room, dividing the possible vestibule from the remainder of the room, was robbed although a section of the wall remained upstanding. The line of the east-west partition was perpetuated by a layer of hard-packed mortary loam (619) above the west end of layer 623, and of sandy mortar, gravel and loam (615) overlying 643. In the area of the possible vestibule there was a layer of sandy loam (588) in the south and in the north a spread of compact mortary loam (629). All these contexts contained pebbles and pieces of slate, together with some fragments of bone and pottery. These layers probably served as floors, or as the make-up for floors of stone slabs or tiles which were later robbed out.

The eastern end of the northern room was not subdivided but there appeared to be a partition separating it from the areas floored by layers 615 and 619. At the eastern end, above and around 570, there was a spread of ash and charcoal (609) from fires or a brazier set on the hearth slab. The western edge of 609 was overlain by a layer of clayey loam (603), the western limit of which coincided with the eastern limit of 615.

To the east of the reredorter a wall (625) was build above the north side of the drain channel and parallel to wall 558. At its east end wall 625 returned to the north to abut the southwest corner of the infirmary. There was evidence of plaster facing on the south side of 558 but no floor survived within the room, which was 2.6m north-south and *c.* 5.25m east-west. The building may have linked the reredorter with the infirmary. The less substantial nature of the walls suggests that it may have been only one storey high; wall 558 was only 0.65m wide above its offset while wall 625 was 0.8m wide, compared with *c.* 1m for the width of the external walls of the reredorter. There was no indication to show how access was gained to this room. The north, west and east walls all survived to at least two courses above their foundations and no sign of a doorway was observed in them. Access may thus have been from the south, over the drain (which was presumably capped). The south wall was largely rebuilt above its foundations in a later phase so the evidence for a doorway in this phase would have been destroyed.

(b) (Figure 4) The north-south division between the eastern and western sections of the northern room survived into this phase but the partition aligned east-west was removed. A layer of clay (587) partly overlaid both 615 and 619. The eastern limit of this respected the former boundary between 603 and 615 but further south 587 spread east over the edge of 603. A shallow post-hole (598) appears to mark the southern end of a partition between 587 and 603 with a doorway to the south. Slightly to the east of this partition there was a thin spread of clay/ash (601) above floor 603. This would appear to be occupation debris, although it may have served as a floor as it also contained pebbles and flecks of slate. Filling a shallow depression in 603 against the north wall of the room was a layer of loose sandy clay and gravel (580).

Within the eastern section of the room there were two post-holes (579 and 585) but the function of the posts which they held is unknown. They were too close to the north wall to have been ceiling supports but might possibly have supported partitions.

At the west end of the northern room, just west of the northern section of the former partition 397, there was a line of stones (381). The stones were very irregular and do not appear to have formed a step or the base of anything structural. Together with the remaining section of 397 they would appear to have impeded access to the room, although the doorway

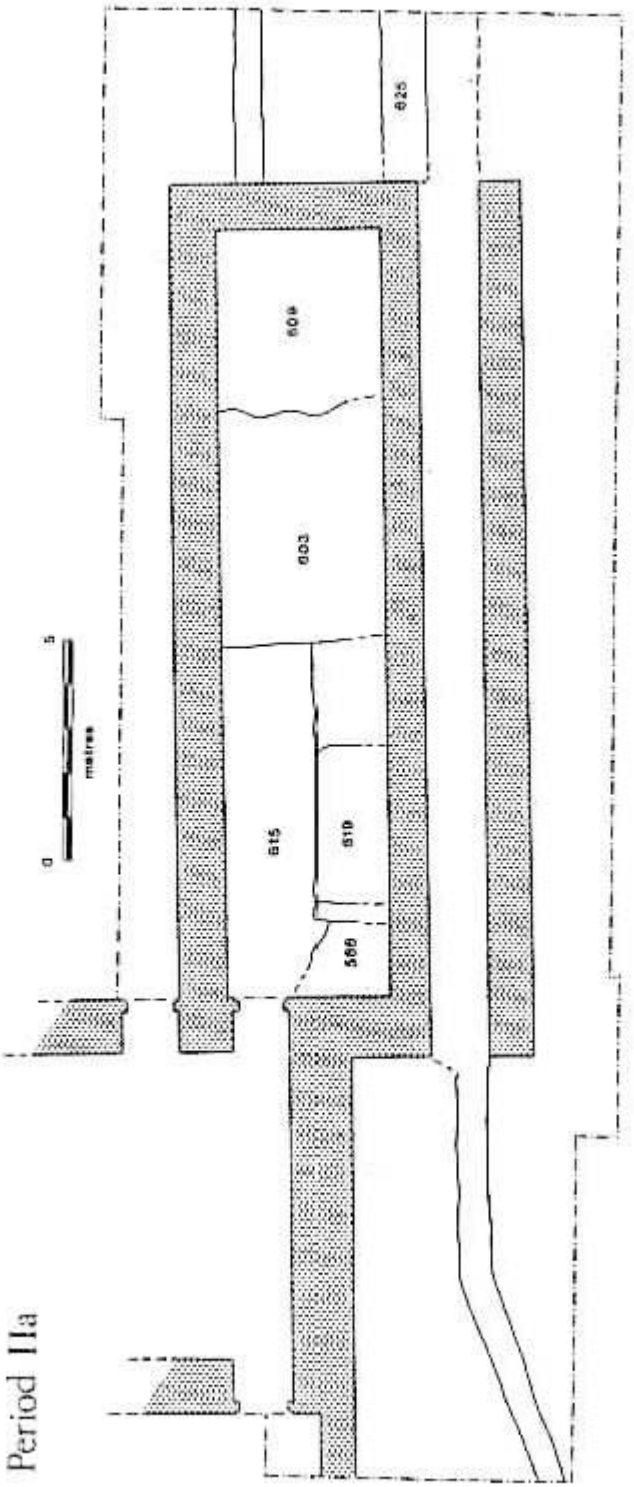

Fig. 3 Period IIa

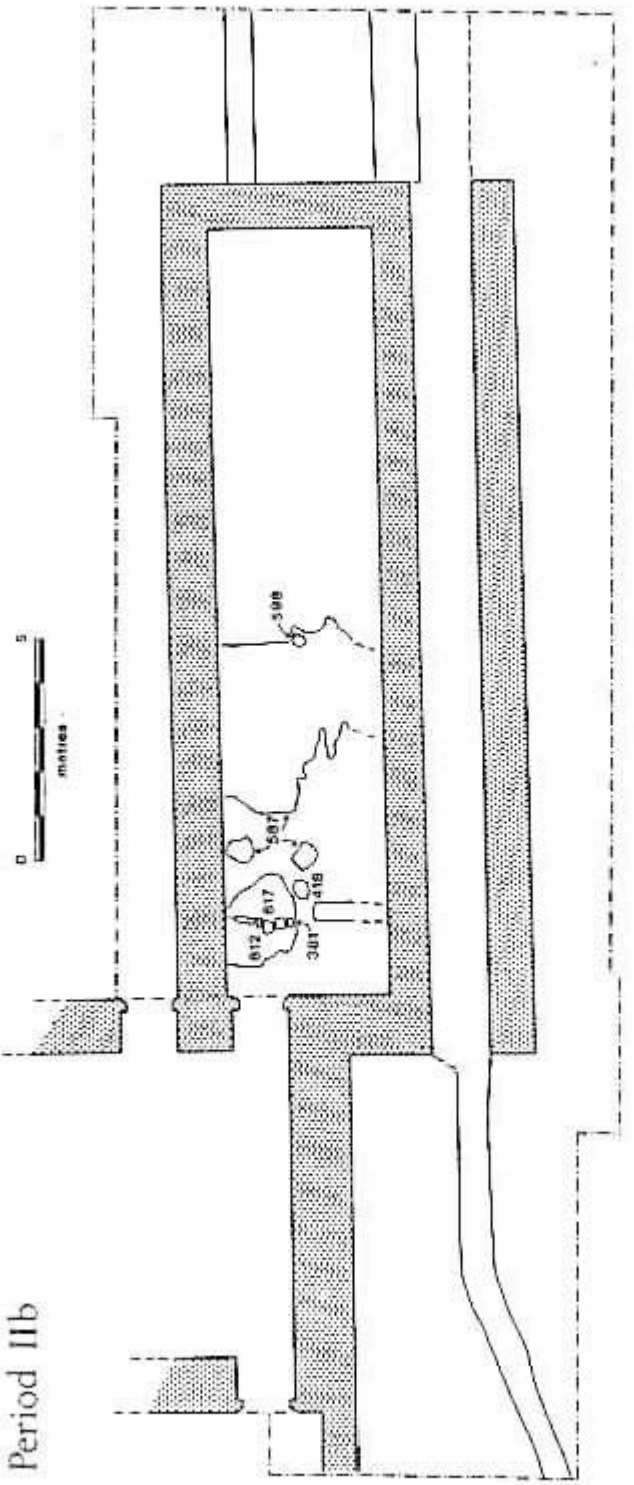

Fig. 4 Period IIb

from the day room continued in use. The stones were abutted on both sides by compact mortary loam (612, 617), perhaps the remains of a surface. Loam 617 sealed a layer of sandy mortary loam with pebbles and slate fragments which also contained a large quantity of fish-bones (618) (see below). This layer was up to 0.1m thick and appears to have formed the make-up for the overlying surface, although it is unclear why a deposit of fish-bones should have been incorporated in the make-up. A post-hole (418) to the east of 397 may have been associated with a partition.

Period III (Figure 5)

(a) Another change of layout, and probably of function, occurred within the northern room in this phase. A narrow drain (352) was inserted along the south side of the room, connected at either end of the reredorter to the main drain. It was uncapped within the room. Contemporary with the drain were several layers of clay with pebbles and flecks of mortar (376, 387, 416, 479 and 482) which appeared to form the make-up for a floor, of which nothing survived. It is possible that these layers themselves formed the floor. Traces of plaster remained on the internal faces of the north and east walls of the room. It may have been painted as painted plaster was found in the debris from the demolition of the building. In the north-east corner of the room there was an irregular feature filled with soft loam and pebbles (591). The function of the feature is unknown and it may have been merely later animal disturbance. Towards the west end of the room there was a layer of clay abutting the line of stones 381 (380). This had an uneven surface and may have been a make-up layer.

Cut into the make-up layers were several post-holes and a beam-slot. The beam-slot was aligned north-south, dividing the eastern and western ends of the room and 508 may have held a door-post. It is possible that the other posts to the west of the beam-slot held the northern ends of partitions aligned north-south, forming a series of cubicles with access from a corridor along the northern side. There may thus have been a latrine on both floors of the reredorter block. The corridor along the northern side of the western area, as well as providing access to the cubicles, would also have led from the day room to the eastern area. However, it is possible that the western posts merely held the supports for a partition aligned east-west, dividing the corridor from a room to the south. Around 505 there were several stake-holes which may have held wattles from such a partition.

The surface of the make-up to the east of the beam-slot was charred in places but there was no evidence of a hearth. This may indicate renewed use of a brazier, as suggested for Period IIb. The posts in post-holes 579 and 585, erected in Period IIb, may have survived into this phase as they were later replaced by posts in the same positions. They were on the same line as the posts to the west of the beam-slot, supporting the view that they were connected with a partition.

To the north of the reredorter at least some of the cobbled surface appears to have been removed by this period (if not in Period II) as the impressions 554 and the area further east were sealed by a layer of mortary loam (530). It is possible that this was the make-up for a paving of the cloister alley.

To the west of the reredorter there were two intrusions filled with loose loam and some rubble (544, 545). Their function is unknown.

(b) In this phase the area west of the beam-slot was partially resurfaced. A layer of sandy silty loam (478) was deposited which abutted the north wall of the room but which did not extend as far south as drain 352. Although the southern edge of 478 was irregular it may indicate the presence of a structure associated with the drain. Layer 478 surrounded the posts inserted in Period IIIa, suggesting that the partitions may have been replaced at the same time. A later clay spread (480), above 478 in the area of the suggested corridor and immediately west of the beam-slot, may indicate patching of the floor in an area of heavy

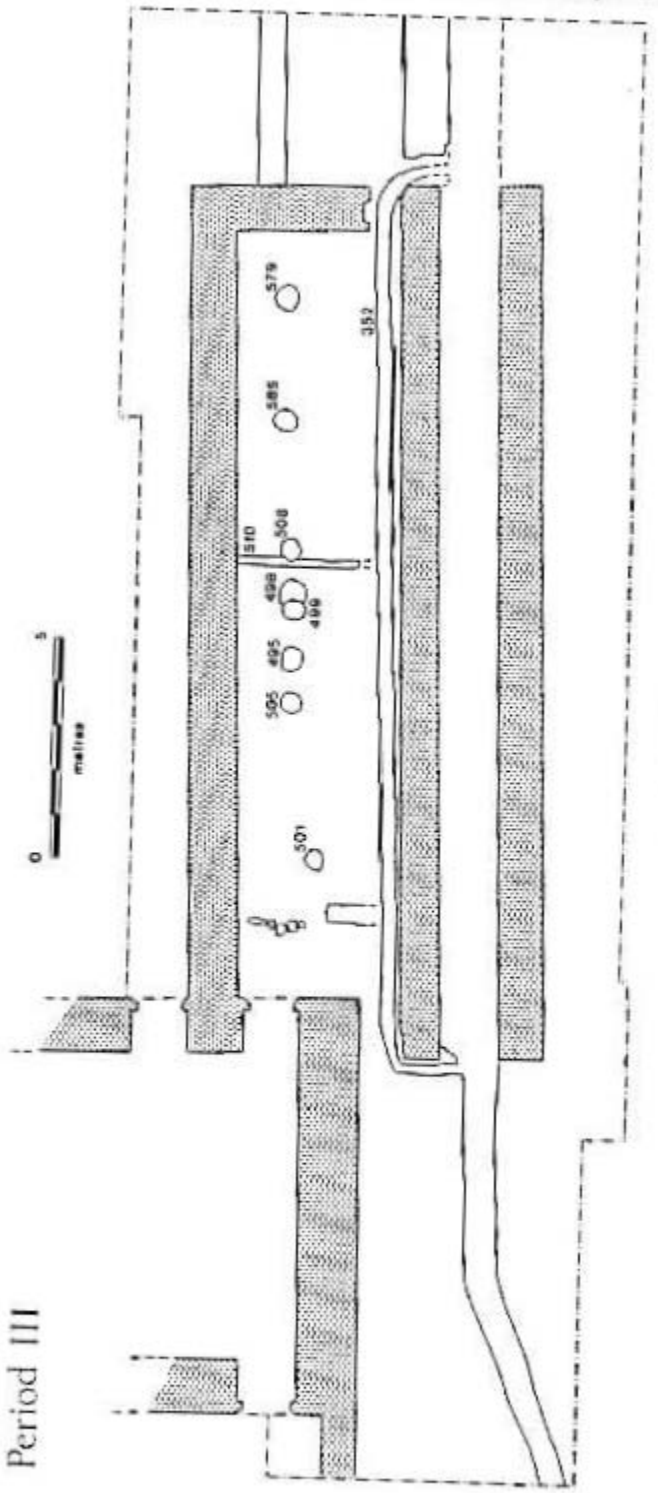

Fig. 5 Period III

wear. There were also thin spreads of hard mortary clay and loam further to the west (323, 326). At the east end of the room, the Period IIIa clay floor or make-up was sealed by a layer of compact sandy loam and gravel (553). It butted the east wall of the room and respected the line of the drain. It would appear to have been a floor or the make-up for a flagstone or tile floor which was later robbed. There was no evidence of burning on the surface of layer 553 to indicate the continued presence of a brazier.

Period IV (Figure 6)

(a) Within the northern room the beam in slot 510 was removed and not replaced, the resultant trench being filled with compact silty loam (481). New posts were inserted on the same alignment as before, in many cases earlier post-holes being re-cut, with additional posts to both east and west. Packing (465) within post-hole 449 contained a nail. Towards the west end the posts were spaced about 1m apart. The whole of the northern room would thus have been divided into cubicles, with access from the corridor along the north side. The cubicles at the east end of the room were wider and may have had a different function, perhaps providing more privacy during washing? A thin compact layer of gritty loam (474, 537) may have formed the floor within this room, or the bedding for a tile/slab floor.

To the east of the building a new wall (521) was built to the north of 558, which was reduced in height until only two courses remained. A mixed layer of rubble, sandy clay and mortary loam (559) was dumped between the walls and partly overlay 558. To the south wall 625 formed the foundation for a new wall (523) which was also built over the capping of drain 352. It is possible that a doorway was forced in the east wall of the reredorter to provide access to the room thus created as post-holes on the same line as those to the west were found within it (540 and 542). The surface of dump 559 was *c.* 0.2m above the contemporary surface within the reredorter. Apart from the alignment of the posts there was no evidence that a doorway had been forced through the east wall of the reredorter, even allowing for later robbing. To the north of wall 523 there were numerous random scoops and hollows (556). Some may have been impressions left by the removal of a cobble floor but some, which had fairly vertical sides, may have been stake-holes, although no pattern could be discerned.

A short stretch of wall (524) was built butting the east end of the reredorter above the south wall of the drain channel. There was a return to the north at its east end. This may possibly have formed a building to house the sluices controlling the flow of water into the drains although no evidence survived of such sluices because of later robbing.

Abutting the outside of the north wall of the reredorter close to its west end was a]-shaped wall (555). It perhaps formed the base for an external stairway to the first floor of the building. This feature sealed clay 530 and may have been constructed in Period IIIb. When it was built the roof of the south alley of the infirmary cloister appears to have been removed. A possible eavesdrip channel (363) was found *c.* 0.5m north of the reredorter wall towards its west end. At the same time the doorway providing access to this alley from the day room was blocked. A layer of shelly loam with slate and charcoal (462) may have been occupation debris which accumulated following the construction of wall 555. Perhaps also from the demolition of the cloister alley was a layer of rubble and slate abutting the north face of the north wall of the reredorter (344).

To the west of the reredorter a new branch of the main drain was built (459). This cut the wall running west from the southwest corner of the east range. The drain flowed along the south side of the new frater range, flushing the garderobes on the ground floor. The main drain was partly rebuilt at this time and there were grooves for sluices at the east end of the old and new channels, although they were not very well opposed. Immediately to the west of this point the old channel was blocked by several large stones (458). Whether this represents deliberate blocking of the channel in this phase or later is uncertain.

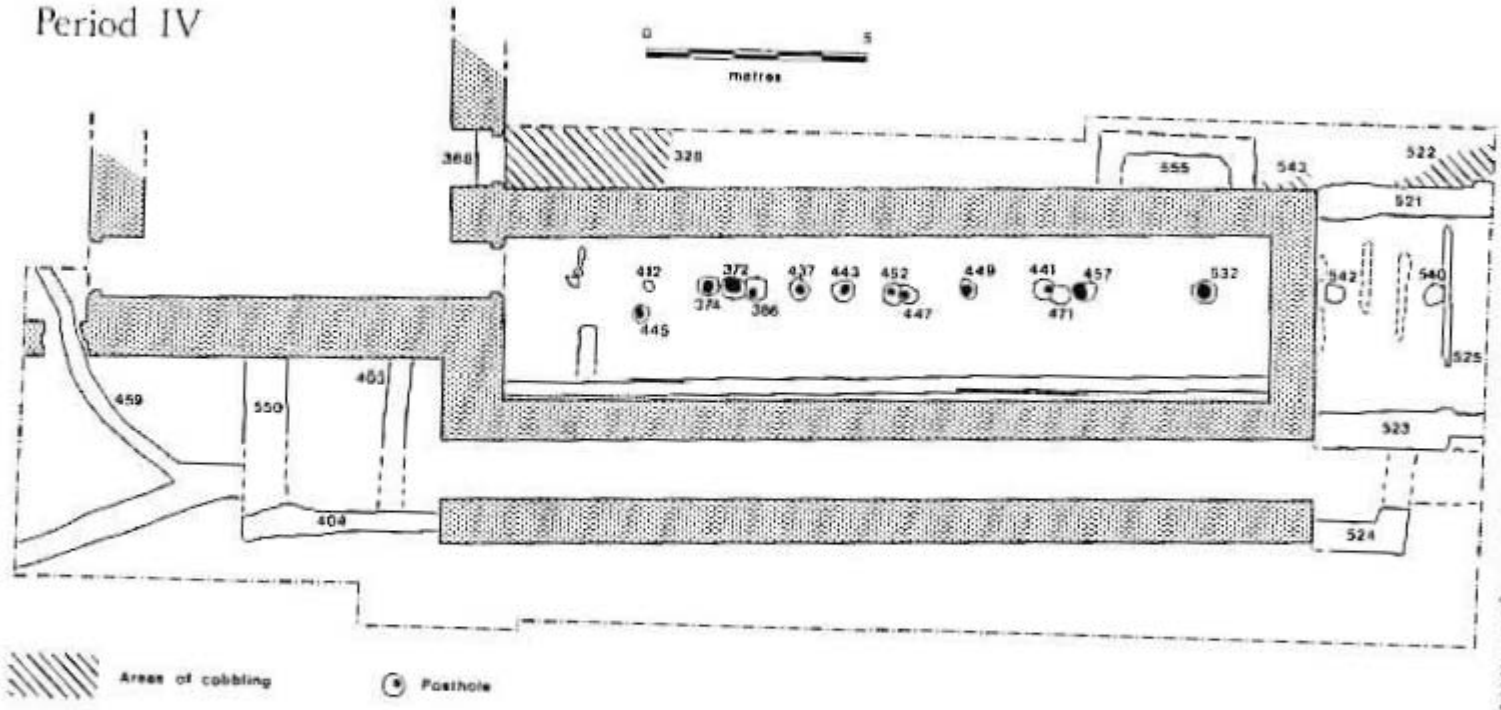

Fig. 6 Period IV

Above the main drain between the reredorter and its division, and abutting the south wall of the day room, there appeared to be an extension to the reredorter. This was formed by walls 404 and 550, which enclosed an area *c.* 3.5m square. Wall 403 may represent an internal partition rather than a structural element. The nature and function of the room are uncertain as it would have blocked the eastern window in the south wall of the day room. A layer of loamy clay (528) appeared to have been dumped between the two branches of the drain.

(b) A cobble floor was inserted on the line of the south alley of the infirmary cloister (328, 522 and 543). The bedding for this was mortary sand (349). The floor abutted the blocked doorway into the day room and also existed to the east of the possible staircase. Several fragments of worked stone were reused as cobbles: these may have come from the demolished arcades of the infirmary cloister.

Within the northern room at least two extra posts were added and one post replaced in the line of supports. Pot came from the packing round one of the posts (464). In the room to the east both posts were removed and not replaced. The north wall of the eastern room showed signs of having been rebuilt, particularly at its western end where it abutted the reredorter, and it is possible that a doorway was constructed at this point. A timber floor appears to have been inserted in the eastern room. One beam-slot (525) aligned north-south was fairly clear and there were faint impressions of three more. There was no evidence to indicate the type of floor within the northern part of the reredorter.

Period V

In this period, following the Dissolution of the abbey in 1536, the reredorter was demolished and the walls were substantially robbed, on the north side right down to the foundations. Within the northern room there was an ashy spread (342), which may have come from a fire at first-floor level or elsewhere as there was no evidence of burning on the underlying or surrounding layers. The lias slab floor of the main drain was robbed, except at the west end of the reredorter, and a rough rubble drain with two or three channels of sandstone and lias fragments and a capping of sandstone was inserted (536, 557). It was sealed by a layer of sandstone rubble (357, 463, 517, 534). A layer of compact mortary loam (582) appears to have been debris resulting from this robbing. The rubble drain was not very effective and quickly silted up (361, 392). Robbing (331) of the south wall of the reredorter continued after this rubble drain was inserted; this robbing cut through demolition debris (319, 336, 425) to the south of the building.

The posts within the northern room were not removed before the building was demolished and the post-pipes were found protruding through the demolition rubble. A nail came from the fill (448) of one of the post-pipes. At least one section of the dividing wall (312) between the main drain and the northern room fell northwards as a single fragment. Traces of painted plaster within the rubble suggest that either the northern room or the first floor room, or both, was of some pretensions. The rubble and other debris in the northern room (310, 314, 347, 423) contained numerous fragments of worked stone as well as occasional fragments of window glass and lead. Drain 352 was filled at its east end with loose gravelly silt (599) similar to the fill of the rubble drain.

The roof of the building appears to have been of slate, certainly in Period IV, as much broken slate was found to the south of the building. However, some roof tile was found, including ceramic ridge tiles. The absence of rubbish deposits below the demolition debris suggests that the reredorter was knocked down and robbed very soon after the Dissolution. Indeed the pottery would indicate that this had occurred by *c.* 1550.

It is possible that the west end of the north wall of the reredorter was left standing for a while, perhaps to form the south end of a lean-to against the day room. The westernmost 3m of the robber trench was not sealed by demolition debris, which here respected the line

of the wall. Two post-pads and a post-hole cut into or sealing cobbles 328 may also be associated with this possible lean-to.

There was a further post-pad or scaffold post hole (439) south-west of the monks' day room. It would appear to have been associated with post-Dissolution activity and may even date from Period VI. To the west of the reredorter, drain channels 458 and 459 were overlaid by a layer of slate and rubble (422).

Period VI

Following the demolition of the reredorter the site appears to have been left undisturbed for two or three hundred years. The doorway from the day room to the northern room was blocked by a low wall and several architectural fragments were found in packing (338) associated with this.

In the late nineteenth century a hedge of earth revetted on both sides by dry-stone walling was constructed running south from close to the southeast corner of the day room. Prior to this the ground level south of the day room and above the southern half of the reredorter had been raised *c.* 0.3m by the dumping of earth (419). A mortared stone wall (307), using stone probably from the abbey buildings and including several fragments of worked stone, was built running east from 2.9m east of the southeast corner of the day room. North of this wall there was a layer of dumped earth up to 0.25m thick. Several post-holes found cut into the layers of demolition debris were filled with the same material as that used to raise the ground surface. They may have predated or been cut through the dumped earth but it was not possible to construct the plan of any building from the features.

Discussion

The reredorter was constructed as part of the original building programme of the abbey and was of one build with the south end of the east range. Although the abbey was founded in the late twelfth century and building work probably started *c.* 1200, it was not until the middle of the thirteenth century that the reredorter was completed. There were probably timber buildings to house the first monks. These timber buildings were then gradually replaced by the stone buildings which have survived. No trace of the postulated timber buildings was found in the excavated area.

The drain was within the southern part of the building, suggesting that at first floor level there was a single row of seats adjacent to the south wall. There were probably timber partitions forming cubicles. The seat supports may have been of stone but no evidence of the arrangements at this level survived. The flow of water through the reredorter was from east to west and to the west of the building the drain passed to the south of the thirteenth century frater. The water was probably supplied by the same leat as that which served the fishponds to the southeast and southwest of the claustral buildings. It was drawn from the river south of the precinct.

It is uncertain whether the drain and the northern room had timber ceilings or stone vaults. The surviving foundations are substantial enough to have supported vaulting but there is no sign of a vaulting scar on the wall of the day room.

The reredorter at Cleeve was built in one of the positions favoured by monastic planners and appears to have formed the south side of a cloister to the east of the monks' day room. The other sides would have been formed by the day room, the eastward continuation of the slype and the infirmary. The line of a pitched roof can be seen in the wall above the east end of the slype and there is also a wall scar to the north of this doorway. A line of creasing and three corbels for the west alley roof can be seen on the day room wall immediately north of the reredorter.

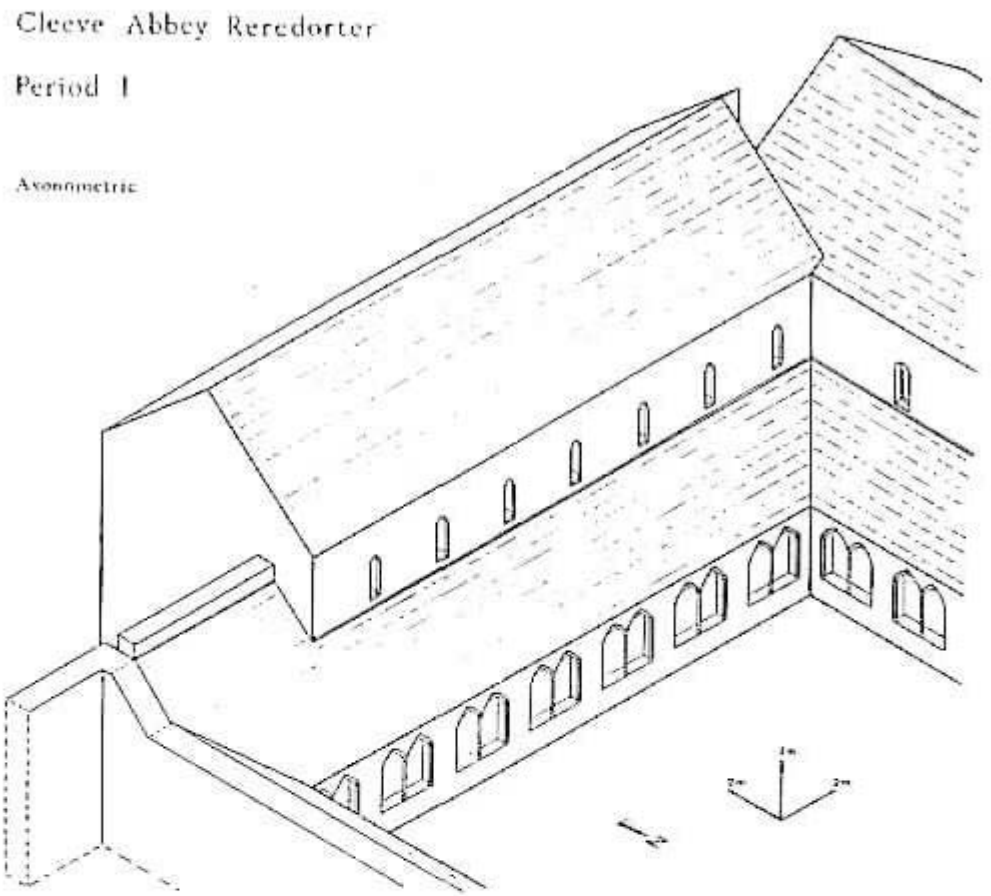

Fig. 7

The site of the reredorter and the area around it appears to have been cleared and de-turfed before building began as no signs of an old ground surface were observed. There was only one possibly pre-monastic feature—a pit close to the northeast corner of the reredorter, which may have resulted from the removal of a tree or shrub.

The use to which the northern ground floor room of the reredorter was put is uncertain. Except in Period IV (late fifteenth/early sixteenth century) the only access to this room appears to have been from the monks' day room. There was no evidence of a doorway in the north wall nor of a fireplace in either the north or east wall. Any evidence in the north wall would have been destroyed by the substantial post-Dissolution robbing. There were no signs in the floors or make-up layers, in the form of renewed surfaces or burning adjacent to the walls, to show where a door or fireplace might have been. The only indications of heating in the room were in Period Ib (late thirteenth century)—when a large flat stone close to the east wall would appear to have been the base for a brazier, as ash was found above and around it—and in Period IIIa (late fourteenth century), when the surface at the eastern end of the room was charred, again suggesting use of a brazier.

The room would have needed lighting as it faced north. There was probably also a covered

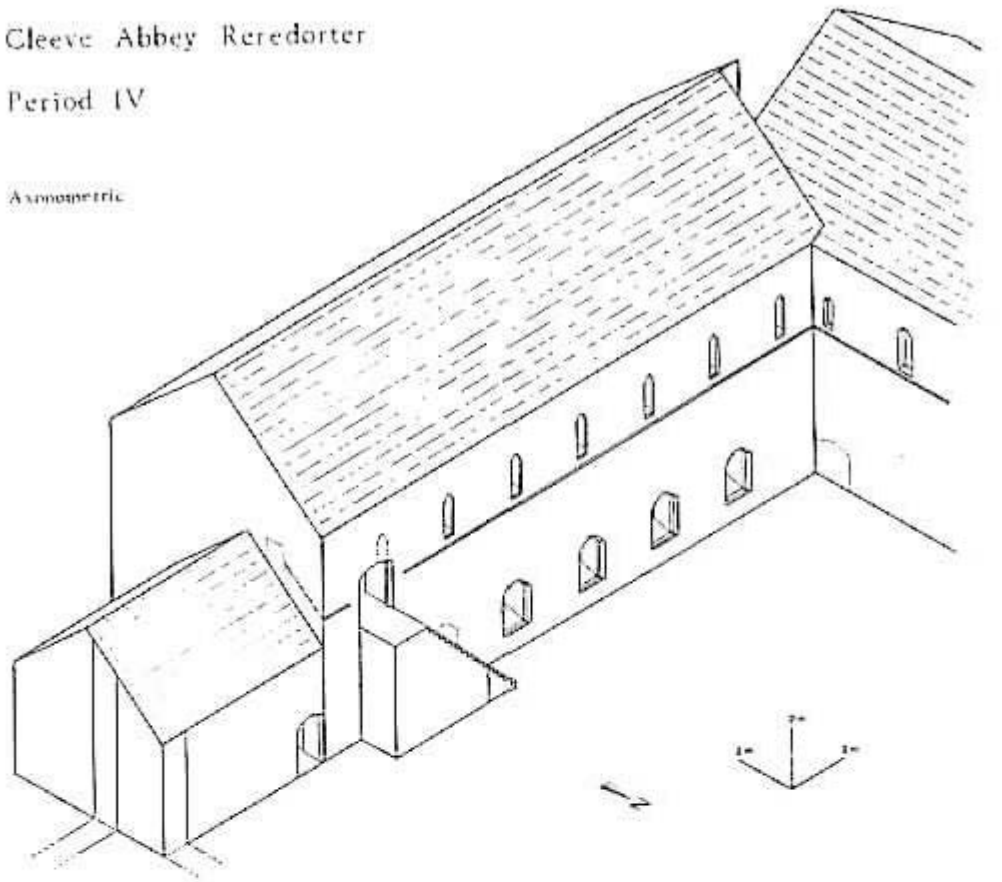

Fig. 8

way to its north, on the south side of the infirmary cloister, further reducing the available light. No light would have come from the south because of the drain. This room was most probably the novices' day room, although the presence of partitions and of a possible vestibule at the west end may be indicative of a different function. The finds from Periods I and II are not suggestive of any particular function which this room might have had.

The insertion in Period IIIa of a narrow drain running the full length of the northern room marks its conversion into a ground floor latrine. The room was divided into two sections by a partition aligned north-south. To the west of this there appear to have been cubicles while to the east there was a relatively open area, perhaps used for washing. The room seems to have continued in use as a latrine right up to the Dissolution as the posts supporting the cubicle partitions were replaced and the line continued further east in Period IV.

The floors in the northern room appear to have been of clay or mortar rather than of timber or stone for much of the time. However, a small area of burnt wood towards the northwest corner of the room in Period Ia (mid-thirteenth century) might have been a remnant of a timber floor. In Period IV it is possible that the floor was paved with flagstones as the pits for the line of posts supporting the partitions were visible immediately upon

removal of the post-Dissolution destruction debris. No flagstones survived to confirm this because of the robbing.

As stated above, the flow of water through the reredorter was from east to west and the drain then passed south of the frater. When the frater range was rebuilt in the second half of the fifteenth century the drain was diverted so that it flushed the garderobes of the corrodians' apartments below the new frater. The original channel was probably blocked at this time, although grooves in the walls of both channels where they diverged suggests that they may have functioned simultaneously for a while. The grooves may have been for sluices which held water back within the reredorter. Signs of a similar arrangement were found at the Dominican Priory, Chelmsford (Drury 1974). There may possibly have been sluices controlling the flow of water into the reredorter and the drain in the northern room as well but no evidence survived because of post-Dissolution robbing. Grooves for sluice gates controlling the flow of water into a reredorter have been found at Chelmsford and at Boxley Abbey, Kent (Tester 1973).

Although the structure above the drain to the east of the reredorter may have been associated with possible sluices, the function of the building to the west is less certain. Both the main and subsidiary drains were capped in this area and there were no signs of sluices operable from inside the building. It would have obscured the eastern window at the south end of the day room and no evidence for an entrance survived.

The function of the building to the east of the reredorter is unclear but the structure underwent several changes during the monastic period. In Period I the northern wall may have served merely to enclose the infirmary cloister, although why it was not built on the same line as the north wall of the reredorter is a mystery. The southern limit of the building is uncertain, if indeed there was a south wall in Period I. In Period IIa (early fourteenth century) a wall was built above the northern side of the main drain but only the lowest course survived. A plaster face on the south face of the north wall may be contemporary with the new wall but no trace of a floor survived. The narrow drain inserted in Period III cut across the southwest corner of the eastern building but was capped, not open. In Period IV the northern wall of the eastern building was demolished and a new wall built which continued the line of the north side of the reredorter. A fragment of window glass (SF 18), recorded as coming from the original northern wall, may have got there when the wall was reduced in height and the new northern wall built. The new wall was of much poorer quality than that which it replaced and appears to have been rebuilt itself. The southern wall was also rebuilt in this period although its position remained unchanged.

Access to the eastern building was probably from the cloister, but this is uncertain. In Period IV, however, a doorway appears to have been forced in the east wall of the reredorter. It is possible that there was also an entrance in the west end of the north wall of the eastern building. At the beginning of Period IV the line of posts in the northern room was continued through into the building but in Period IVb the posts were removed and a timber floor inserted. Faint impressions of the beams supporting the floor were sealed by the post-Dissolution destruction debris.

The infirmary cloister to the north of the reredorter was reached through a doorway in the east wall of the monks' day room. The south alley was cobbled and at least 1.3m wide. The outer wall of the alley, which would have supported the pent-roof, was outside the area of excavation. It is possible that the cloister may have fallen into disrepair with the decline in the fortunes of the abbey as the roof and cobbles seem to have been removed by Period III.

The arcading of the cloister was probably fairly plain and perhaps consisted of trefoil-headed arches supported by blue lias columns, similar to those at the entrance to the chapter house. Fragments of lias columns were found in the make-up associated with the drain in the northern room of the reredorter. More fragments of columns and other architectural

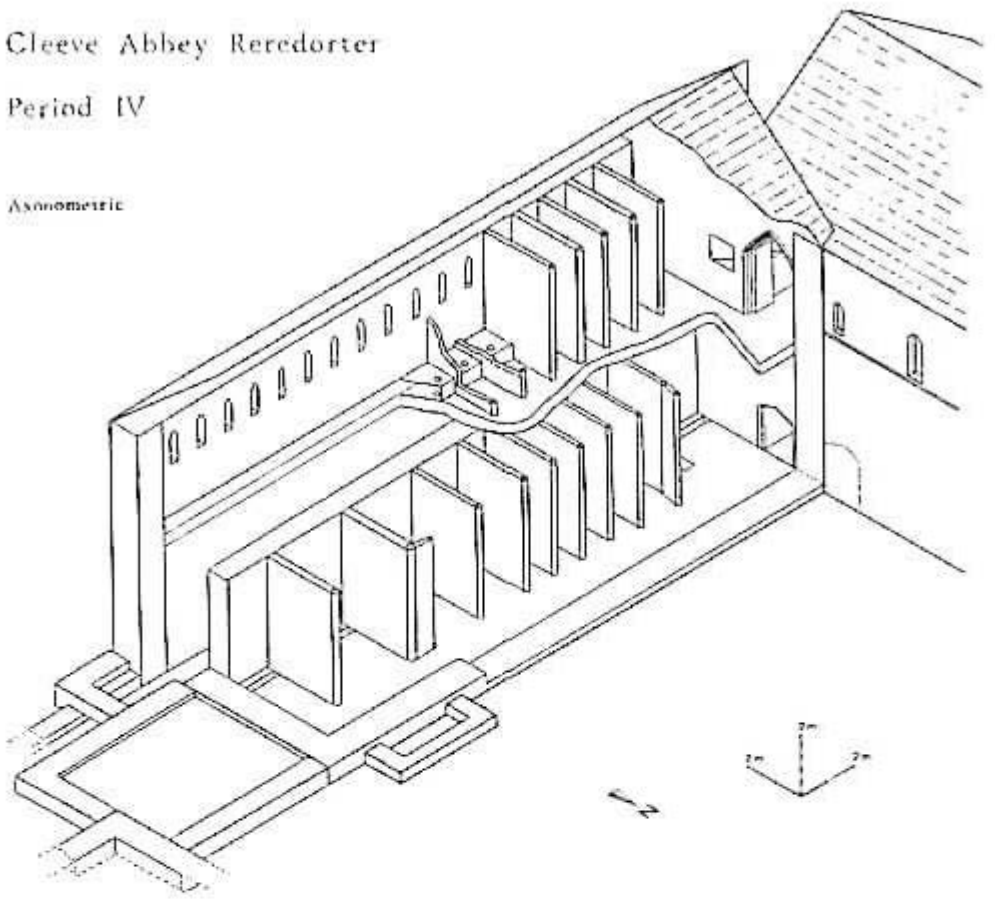

Fig. 9

fragments were incorporated in the cobbles which formed a renewed flooring of the south alley of the infirmary cloister in Period IV.

As part of the remodelling in Period IV some of the windows were replaced. Several fragments of 15th–early 16th century window glass were found, as well as fragments of 13th century glass from the original fenestration. Very little window lead was found and it is possible that it was salvaged for re-use.

It is possible that some of the architectural fragments found came from the great cloister, the south alley of which was remodelled in the fifteenth century when the frater was realigned. The west alley of the great cloister was being rebuilt at the time of the Dissolution. Many more pieces of worked stone were found in the post-Dissolution destruction debris overlying the reredorter, including fragments of tracery probably from the day room windows.

The reredorter was demolished following the Dissolution of the abbey in 1536 and its destruction was complete by c. 1550. The floor of the main drain was robbed within and to the east of the reredorter and replaced by a rough rubble drain which was not very effective. The doorway in the east wall of the day room was blocked and other alterations made for

its use as a farm building. There was no structural activity on the site of the reredorter after the Dissolution until the erection of a wall and hedge in modern times.

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WINDOW GLASS, by Richard Marks

Eleven fragments of medieval window glass were discovered during the excavations, all in advanced stages of de-vitrification through prolonged burial. All appear to be of white glass and all except three retain traces of painted and fired decoration, from which it can be established that they date variously from the 13th and the 15th–early 16th centuries. The earlier fragments comprise stylised leaves and stems in *grisaille* (white glass) of similar type to those found at Hailes Abbey in Gloucestershire;[1] one of the fragments has these motifs on a cross-hatched ground which indicates a date in the first half of the 13th century. Both the Cleeve and Hailes designs are not peculiar to the Cistercians but belong to the general repertoire of *grisaille* window decoration in England during the period, as evidenced by Lincoln and Salisbury Cathedrals.[2]

The 15th and early 16th-century fragments are also in white glass, although the two with border *motifs* employ yellow-stain. Both border designs are common in English late medieval glazing. No definite traces were found of figural or historiated glazing, although the fragment with the 'black-letter' inscription perhaps was originally associated with a figure or scene. This should cause no surprise, for the English Cistercians, like their Continental counterparts, had long since introduced figures in coloured glass into their windows.[3]

NOTES

1. R Marks, 'Cistercian window glass in England and Wales' in C Norton and D Park (eds.), *Cistercian Art and Architecture in the British Isles*, Cambridge 1986, Fig. 25, p 216.
2. Ibid., pp 215–217.
3. Ibid., pp 217–219.

The Fragments

823150; Context 425; SF 7; from Period V demolition debris.
No traces of paint.

823151; Context 474; SF 11; from floor within north room, Period IVa.
Unidentifiable painted decoration on one surface.

823152; Context 425; SF 16; from Period V demolition debris.
No traces of paint.

823153; Context 5582; SF 18; probably from robbing of Period I wall to east of reredorter.
Almost complete fragment of a formal design from a border of a window light. The design comprises two leaves springing from a bud within a diamond-shaped framing; the spandrels are filled by foliate designs. Three of the edges bear the marks of the

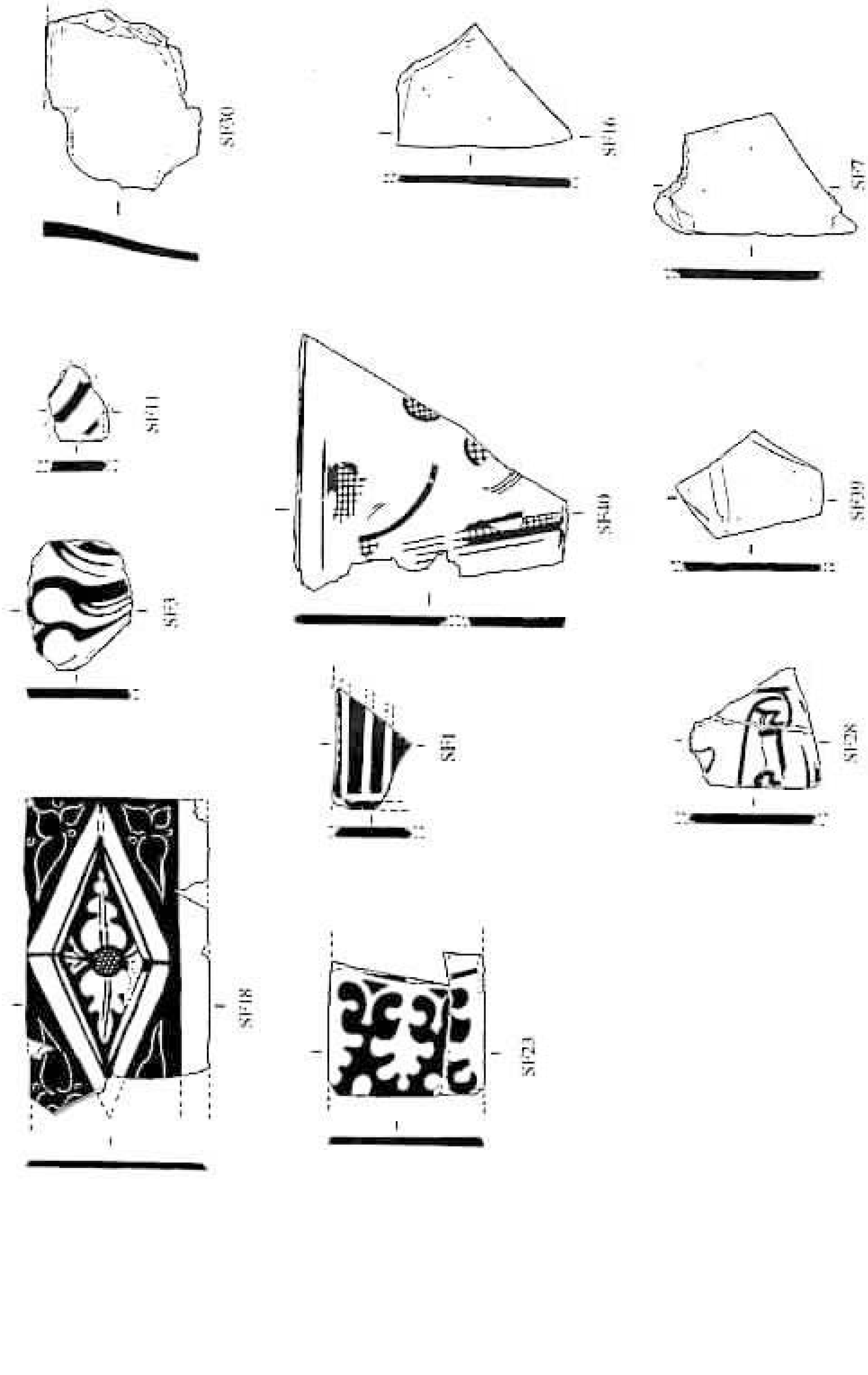

Fig. 10

glazier's grozing-iron. The glass was originally white with yellow-stain decoration. 15th–early 16th century.

823154; Context 525; SF 23; from beam-slot to east of rerederter, Period IVb.
A different border design of a yellow-stain crown picked out on a painted matt ground. Three of the edges are grozed. Crowns are a common medieval border design from the 14th century onwards; this particular piece is of 15th century date.

823155; Context 556; SF 28; from ?stake-hole to east of rerederter, Period IV.
Unidentifiable painted decoration on one surface. One edge is grozed.

823156; Context 462; SF 30; from surface to north of rerederter, period IV.
In a very advanced state of chemical decomposition. Unidentifiable painted decoration on one surface.

823157; Context 582; SF 39; from silting of monastic drain, Period V.
No traces of paint.

823158; Context 580; SF 40; from shallow depression within north room, Period IIb.
Traces of stems and leaves on a cross-hatched ground. Three of the edges are grozed. Extensive pitting through weathering on external surface of glass. First half of 13th century.

823827; Context 314; SF 1; from Period V demolition debris.
Beginning or end of a 'black-letter' inscription or label. Two edges are grozed. 15th–early 16th centuries.

823828; Context 347; SF 3; from Period V demolition debris.
Fragment with stylised leaves and stems. 13th century.

WINDOW LEAD, by Barry Knight

Six fragments were received in the Ancient Monuments Laboratory and are briefly described as follows:

823131; Context 423; SF 21; from Period V demolition debris.
Two decayed fragments, type C, one with soldered joint, partly split in the web. Lengths 50mm and 85mm, joined to another piece 35mm long 30mm from one end. Width of flange 4.7mm, depth 5mm, width of groove 2.8mm (hard to measure due to distortion).

823132; Context 525; SF 25; from beam-slot to E of rerederter, Period IVb.
One fragment, type C, length 40mm.
Width of flange 4.2mm, depth 5.7mm, width of groove 3.3mm (hard to measure due to distortion).

823133; Context 536; SF 29; from channel created above monastic drain in Period V.
One piece, type A, unused, cut both ends. Heavy with prominent flash. Length 155mm.
Width of flange 5mm, depth 9mm, width of groove 3.5mm.

823823; Context 314; from Period V demolition debris.
Tracery fragment, type C, with length of type A soldered to one face as a tie. The tie appears to come from the bottom (hinge) end of the lead mould as the flanges taper to almost nothing. Max length 80mm, max width 35mm, total length of tie 210mm.
Type C: width of flange 3.6mm, depth 6.0mm, width of groove 2.8mm.
Type A: width of flange 4.6mm, depth 7.5mm, width of groove 2.8mm.

823824; Context 342; from Period V demolition debris.
Two very decayed fragments, one probably not came, the other possibly came split in the web. Length 50mm.

823825; Context 462; from Period IVa surface to N of rerederter.

Three fragments, type C, partly split in web, two with remains of solder. Lengths 50mm, 90mm and 110mm.
Width of flange 4.5mm, depth 5.0mm, width of groove 2.3mm.
Unfortunately these small fragments of came tell us very little about the glazing history of Cleeve Abbey. The small quantity recovered indicates the thoroughness of the post-Dissolution robbing. The pieces examined are all typically "medieval" cast cames rather than post-medieval turned lead, and all the pieces that appear to have been used for glazing are pared cames, type C. The two exceptions which are type A, as cast, are 823133 and the piece used as a tie on 823823. The first is unused as it has clearly been cut at both ends and has no soldered joints. Such pieces are likely to have been discarded by glaziers when fixing the glass panels in position. The piece used as a tie appears to come from the bottom (hinged) end of the mould and would have been unsuitable for glazing as the flanges taper away to nothing. It would have been perfectly suitable as a tie, and there would have been no need to pare off the casting flash for this application.

The Small Finds, by Quita Mould

Acknowledgements:
I am most grateful to Miss Sarnia Butcher for providing the dating and comparanda for the Roman bow brooch which is given in the catalogue.

INTRODUCTION:
107 objects were examined from the excavations at the Cistercian Monastery of Cleeve Abbey, Somerset (6 lead items in Avebury Museum were, unfortunately, unavailable for study). The report consists of a brief discussion of the objects recovered, a summary of the objects found within each phase and a catalogue of the finds in AML number order. A list of the types of object found and the quantity recovered is given in table 1.

Objects mentioned in the text are followed by their small find number, where applicable, and their unique AML number. Those object numbers preceded by an asterisk * have been illustrated.

DISCUSSION:
The finds come from the 1980–1982 excavations of the ground floor of the monks' reredorter. 36% (43) of the finds occurred in floor make-up and are likely to be redeposited, including a Roman bow brooch (* SF5 830090) of copper alloy dating to the mid first century which occurred residually within a floor make-up deposit of late 14th century date. A further 16% (19) came from post-Dissolution demolition debris, the largest single group.

The finds comprised a limited range of personal, domestic and structural items. No object can be regarded as specifically reflecting the ecclesiastical nature of the site with the possible exception of the head from a bone parchment pricker (* SF9 869005) from a late 15th century floor deposit (474); see Geddes in Hare 1985, 149ff for a selection of complete parchment prickers from a Dissolution rubbish deposit outside the reredorter at Battle Abbey, East Sussex. In the absence of a better interpretation it is tempting to suggest that the group of 27 small copper alloy rings (* SF38 823141) found together within a late 14th century floor or make-up deposit (387) are spacer beads, possibly from a rosary, the larger organic beads between having perished. The size of their central perforation suggests that, if beads, they were originally strung on a cord rather than a thread.

Part of a decorated copper alloy buckle frame (* SF36 869008) with traces of vernis brun within the decorative grooves occurred in post-Dissolution demolition debris (557). Vernis

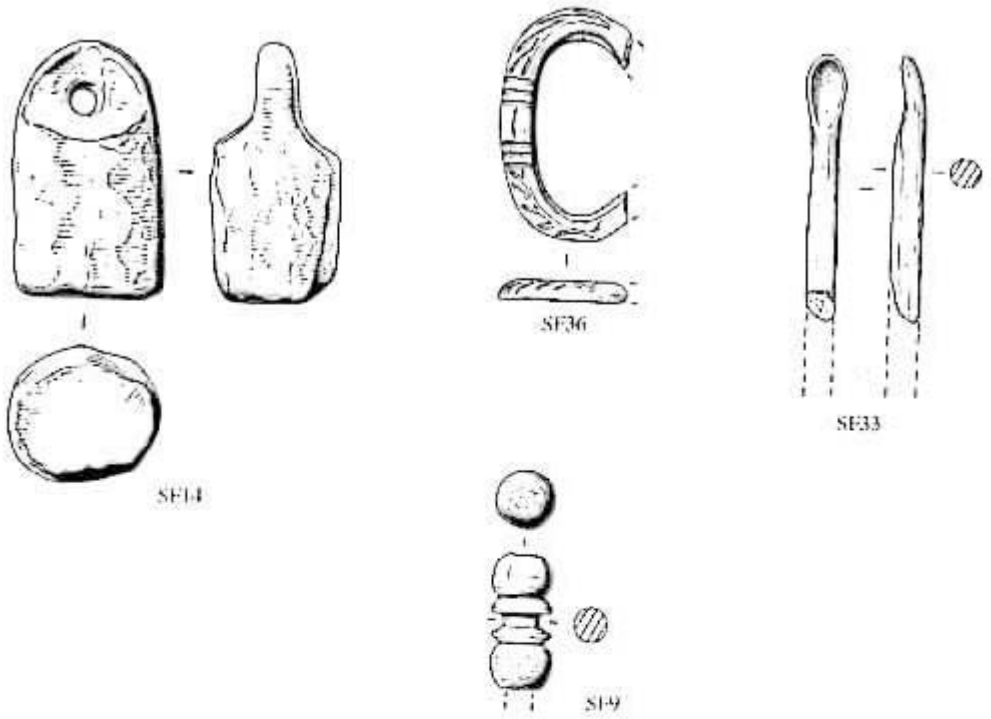

Fig. 11

brun, a decorative surface technique described by Theophilus (chapter 71, Hawthorne and Stanley Smith 1979), is found on highly decorative items, including reliquaries and caskets, and indicates that the buckle was an expensive item of high quality.

The small number of personal items found can be paralleled by finds from sites of similar date. The small bone scoop (* SF33 869007) from an early 14th century floor (601) may have been used for mixing and dispensing medicaments. The bowl is of similar shape to a copper alloy example from St. Augustine's Abbey, Canterbury (Sherlock and Woods 1988 fig 68 no 57) thought to have been used in manicure, and a gilded pewter example of mid 14th century date from Cuckoo Lane, Southampton (Platt and Coleman-Smith 1975 fig 246 no 1901). The small toilet implement of copper alloy (* SF24 823138) recovered from the fill of an early 16th century beam-slot (525) can be paralleled by an example from Battle Abbey, East Sussex (ibid. fig 52 no 76).

Similarly, the decorative trefoil mount of copper alloy (* SF22 823137) found in post-Dissolution destruction debris (423) is comparable with a gilded five petalled boss from a Dissolution layer at Maison Dieu, Ospringe (Goodall in Smith 1979 fig 25 no 132). The single copper alloy dressmaking pin (* SF26 823139) found can be paralleled by finds from numerous later Medieval/Post Medieval excavations, as can the annular copper alloy ring (* SF17 823136) recovered.

Domestic ironwork comprised a fragment of knife blade (* 823847) from the fill of an intrusive feature within Period III (late 14th–mid 15th century, 545) and a key. The key (* 823843), from late 15th/early 16th century make-up (528), operated a simple, single ward lock with a central projecting pin. The shape of the bow suggests a 13th–14th century date

(LMMC type III Ward Perkins 1940, 136–7) so that it may be residual within the deposit.

A cylindrical 2.5 ounce lead weight (* SF14 869006) was found in post-Dissolution demolition debris.

Structural fittings included 2 iron split-pins or possibly unused ring-headed staples (* 823848, * 891510) and iron nails. The relatively small quantity of timber nails and their broken shanks recovered occurred in all periods, with the exception of Periods Ia and IVb. All were of Goodall's Type 1 with square sectioned shanks and flat heads (Goodall in Huggins 1973, 175).

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Table 1

Bone	Parchment Pricker	1
	Scoop	1
Copper Alloy	Brooch, bow	1
	Buckle	1
	Ear scoop	1
	Mount, trefoil	1
	Pin, dressmaking	1
	Ring	1
	Ring/head	27
	Waste	1
Iron	Blade	1
	Blade/strap	1
	Brooch pin	1
	Collar ferrule/offcut	1
	Key	1
	Nail, horseshoe	1
	Nail, timber	33
	Nail, timber, shanks	19
	Nail/punch	1
	Ring/staple	1
	Sheet	2
	Slag	1
	Split pin/ring-headed staple	2
	Waste	1

Table 1 *continued*

Lead	Offcut	2
	Sheet offcut	1
	Stem	1
	Weight	1
Leather	Lace toggle	1
	Fragment	1
	Total	107

SUMMARY OF THE FINDS BY PERIOD

PERIOD Ia (mid 13th century)
A single fragment of iron sheet (SF44 823146) occurred within a floor deposit (643).

PERIOD IIa (early 14th century)
A fragment of iron strap, possibly a knife blade (* 891511), and a fragment of iron waste (823845C) occurred in floor make-up (615).

2 type 1 nails were also found in Period IIa deposits.

PERIOD IIb (mid 14th century)
A small bone scoop (* SF33 869007) was found in a floor deposite (601). 1 type 1 nail was also found in Period IIb deposits.

PERIOD IIIa (late 14th century)
A make-up/floor deposit (387) contained 27 small copper alloy rings (* SF38 823141), an iron brooch pin (* SF48 823142), disintegrated leather fragments (SF46 823143, SF47 823144) and a residual Roman brooch of copper alloy (* SF5 830090). A fragment of copper alloy waste (SF34 823140) also occurred in make-up (479).

An iron split pin or ring-headed staple (* 891510) was found within an intrusive feature (591). A second example (* 823848) occurred in an early 15th century deposit (553), see below.

A fragment of narrow knife blade (* 823847) along with 2 Type 1 nails and a shank occurred in the fill of an intrusive feature (545).

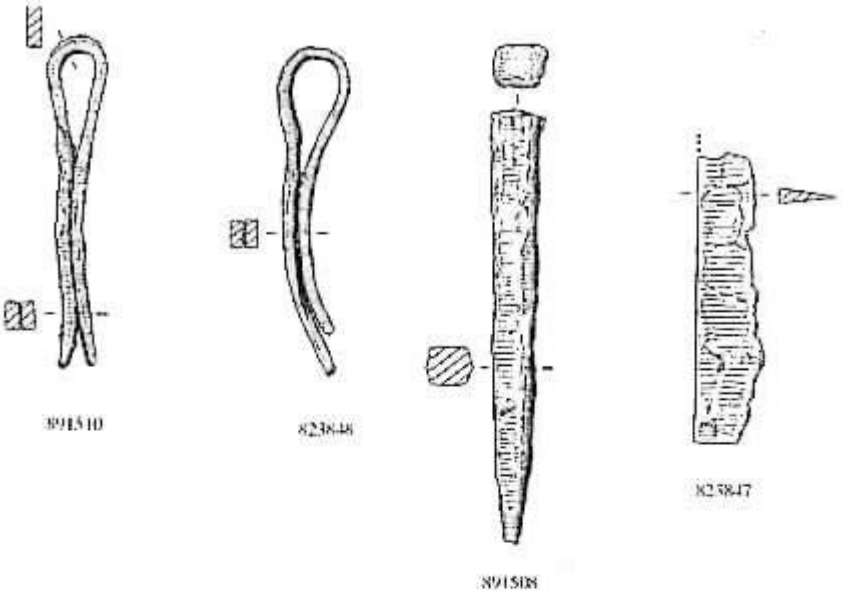
2 Type 1 nails and a broken shank were also found in Period IIIa deposits.

PERIOD IIIb (early-mid 15th century)
An iron split pin (* 823848) and a fragment of offcut lead sheet (* SF31 823134) were found in make-up (553). 2 Type 1 nails were also found in Period IIIb deposits.

PERIOD IVa (mid-late 15th century)
The head of a bone parchment pricker (* SF9 869005) occurred in a floor deposit (474). A small copper alloy pin with a wire wound head (* SF26 823139) and an iron horseshoe nail (* 823849) were found in make-up (559).

8 Type 1 nails, 1 shank and a fragment of iron slag also occurred in Period IVa deposits.

PERIOD IVb (early 16th century)
A copper alloy ear scoop (* SF24 823138) occurred within the fill of beamslot (525). A fragment of lead stem (SF 823135) was found in cobbled surface (522) north of the rere-dorter, whilst a large iron rotary key (* 823843) was found within a make-up deposit (528).



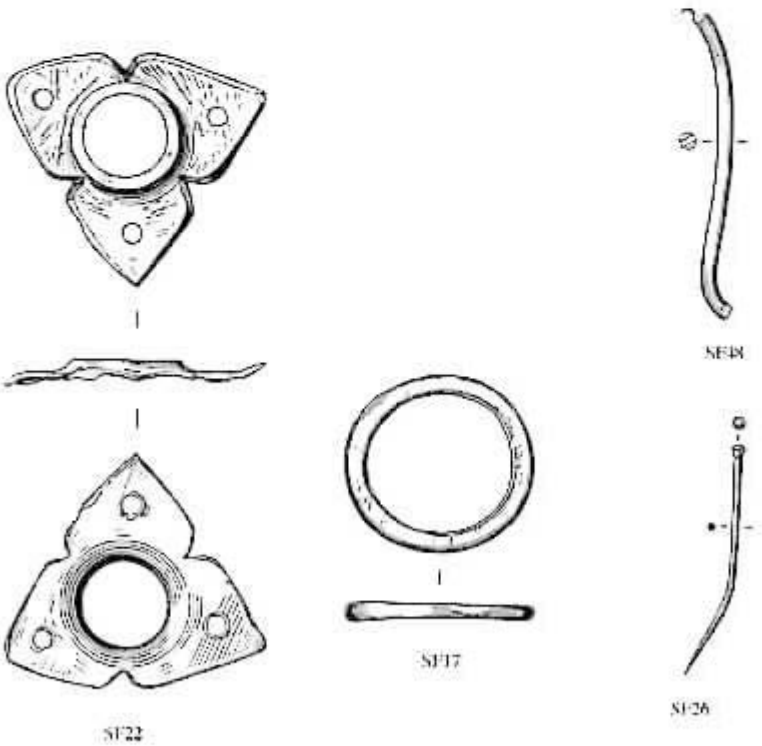


Fig. 12

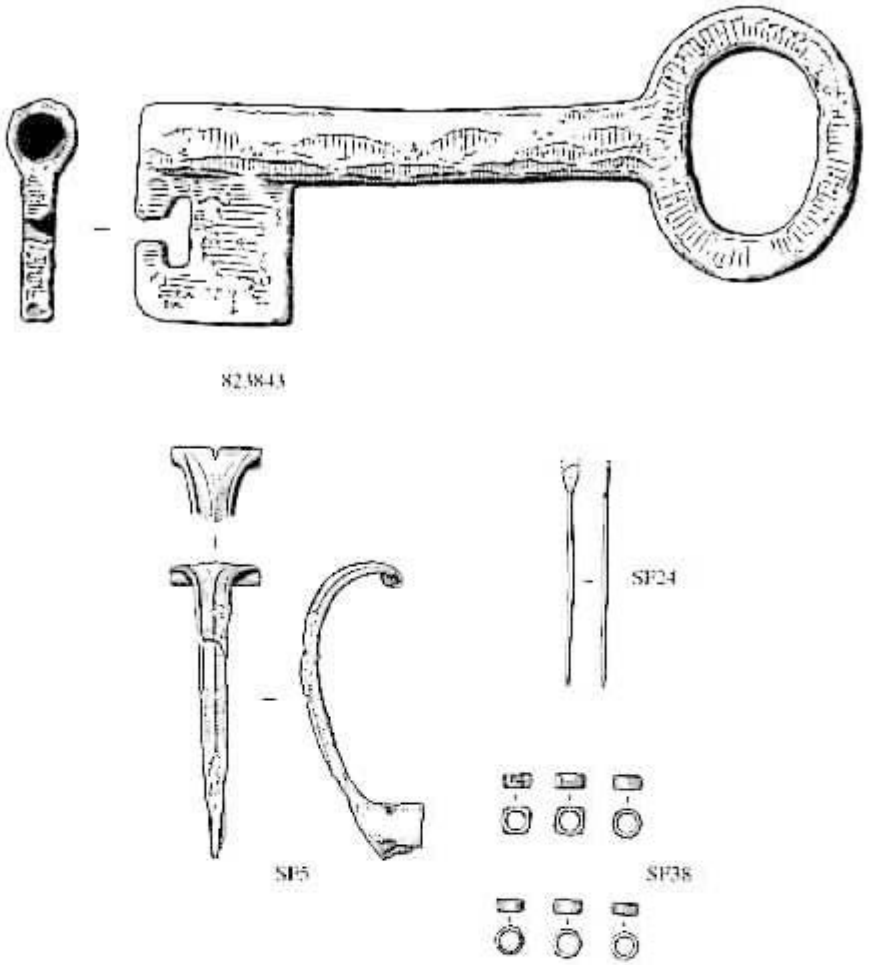


Fig. 13

An iron penannular ring, possibly a U-shaped staple (823833), along with 3 Type 1 nails and 4 shanks, was found in the fill (458) of the main drain west of the refectory; the line of the drain was altered in the 15th century but the finds from the fill might belong to Period V.

PERIOD V (1536–c1550)

Part of a decorated copper alloy buckle frame (* SF36 869008) was found in a soakaway (557).

General demolition debris (423, 425, 517) contained a trefoil-shaped mount (* SF22 823137) and a ring (* SF17 823136) of copper alloy, a cylindrical 2.5 ounce lead weight (* SF14 869006), a heavy iron shank, possibly a small punch (* 891508), a possible collar ferrule (* SF15 823145) and a fragment of iron sheet (823831).

7 Type 1 nails and 8 shank fragments also occurred in Period V deposits.

SMALL FINDS CATALOGUE IN AML NO. ORDER

Abbreviations used:

AT	= After Treatment
diam	= diameter
enc	= encrusted
flk	= flaking
ht	= height
l	= length
max	= maximum
min	= minimum
mm	= millimetres
th	= thickness
w	= width
XA	= X-ray No. After treatment

823134 Context 553 Period IIIb SF31
Lead Sheet
Length of rolled flat-sectioned sheet with a nail-hole at one edge. 2 edges are cut, others are torn. Offcut. Treated, unrolled. l 68mm; w 45mm

823135 Context 522 Period IVb SF35
Lead Stem
Length of round-sectioned stem, broken at each end. l 35mm; diam 4mm

823136 Context 517 Period V SF17
Copper Alloy Ring
Annular ring with flattened upper and lower faces, varying in arm width and thickness. File marks visible on both faces. Treated. Complete.
Outer diam 22mm; inner diam 17mm; max th 2.5mm; max w 3mm
Photo A870935 (AT)

823137 Context 423 Period V SF22
Copper Alloy Mount
Trefoil-shaped fitting with large central hole surrounded by 3 leaf-shaped flanges each perforated by a round rivet hole. File marks present on the upper surface. Treated. Complete.
Max l 30mm; central hole diam 10mm
Photo A870935 (AT)

823138 Context 525 Period IVb SF24
Copper Alloy Toilet Implement
Ear scoop with slender twisted stem with a pointed tip, flattening at the other end into a shallow scoop, broken. Almost complete. Treated.
l 42mm; stem diam 1mm; scoop l 5mm; scoop w 3.5mm
Photo A870935 (AT)

823139 Context 559 Period IVa SF26
Copper Alloy Pin
Dressmaking pin with slender round-sectioned stem with pointed tip and wire wound head of a single coil around a flat stem end. Bent. Complete. Treated.
l 28mm; stem diam 1mm; head diam 1.5mm
Photo A870935 (AT)

823140 Context 479 Period IIIa SF34
Copper Alloy Waste
Fragment with no distinguishing features

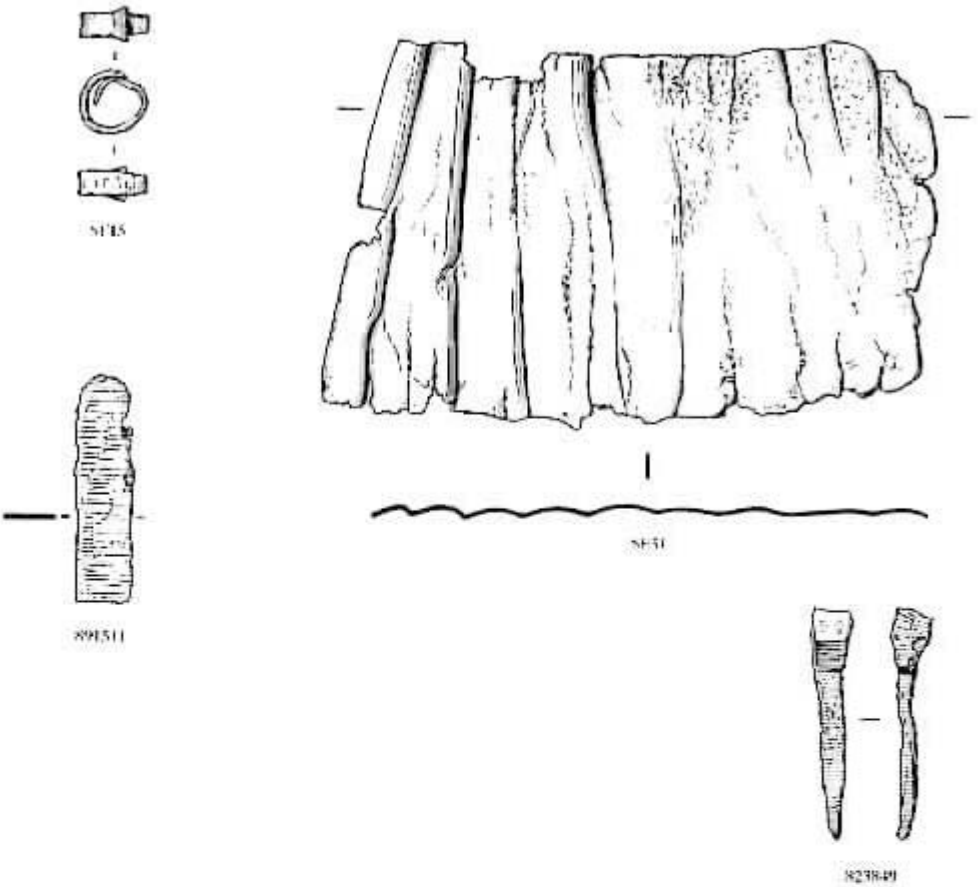


Fig. 14

823141 Context 387 Period IIIa SF38
Copper Alloy Small Rings
27 small annular rings of rectangular section. 25 of circular profile diam 5mm; w 2.5mm and 2 with an angular outer profile diam 5.5mm; w 3mm. Some found encrusted together when excavated. Complete. Treated.
Photo A870931 (AT)
823142 Context 387 Period IIIa SF48
Iron Stem
Length of fine round-sectioned stem/wire, sinuous in profile and with chisel-cut ends; possibly a brooch pin. Incomplete. Treated XA 4683; 4971.
137mm; diam 1.5mm
Photo A870935 (AT)
823143 Context 387 Period IIIa SF46
Leather
Disintegrated; conservation list description suggests it to have been the rolled toggle termination of a lace.

823144 Context 387 Period IIIa SF47
Soil possibly containing small fragments of leather no longer identifiable.
823145 Context 425 Period V SF15
Iron Collar Ferrule
Rectangular-sectioned strip tapering to a pointed tip and spirally curled into a ring. Possibly a collar ferrule or simply a rolled offcut. Complete. Cleaned. XA 4683 diam 16mm; max w 9mm
Photo A870935 (AT)
823146 Context 643 Period Ia SF44
Iron Sheet
Rectangular fragment of flat-sectioned sheet. One edge straight, possibly original, others are broken. Incomplete. Partially cleaned. XA 4683 l 48mm; w 29mm
Photo A870935 (AT)
823830 Context 423 Period V SF-
Iron Nails
2 type 1 nails and a shank enc, flk XA 4683
823831 Context 425 Period V SF-
Iron Sheet
Heavily encrusted fragment of flat-sectioned sheet, all edges broken. Incomplete. XA 4683. l 60mm; w 43mm
823832 Context 448 Period V SF-
Iron Nails
3 type 1 nails and 2 shank fragments enc, flk XA 4683
823833A Context 458 Period IV SF-
Iron Ring/Staple
Small penannular ring tapering to 2 gently pointed arms. Very little metal visible in x-ray; possibly a U-shaped staple. ?Complete. XA 4684 diam 27mm
823833B Context 458 Period IV SF-
Iron Nails
3 type 1 nails and 4 shanks, enc XA 4684
823834 Context 461 Period V? SF-
Iron Nails
Type 1 nail with large flat head, enc, flk XA 4683 and 3 shanks
823835 Context 465 Period IVa SF-
Iron Nail
Type 1, enc, flk XA 4684
823836 Context 474 Period IVa SF-
Iron Nails
7 type 1 nails with relatively large heads and 2 shanks enc, flk XA 4684
823837 Context 478 Period IIIb SF-
Iron Nail
Type 1, enc, flk XA 4684
823838 Context 479 Period IIIa SF-
Iron Nail
Shank, cleaned, XA 4684
823839 Context 480 Period IIIb SF-
Iron Nail
Type 1, enc flk XA 4684
823840 Context 481 Period IVa SF-
Iron Nail
Type 1, enc heavily, stone adhering, XA 4684

823841 Context 482 Period IIIa SF-
Iron Nail
Type 1, enc heavily, XA 4684
823842 Context 517 Period V SF-
Iron Nail
Shank, enc, flk XA 4684
823843 Context 528 Period IV SF-
Iron Key
Large rotary key with thick round-sectioned hollow stem, rectangular bit with a single T-shaped tooth cut out and a large oval bow of round section. Complete. Cleaned. XA 4685; 4693; 4958 l 132mm; stem diam 13mm; bow diam 50 × 40mm; bit l 26 × 29mm
Photo A870430 (AT)
823844 Context 534 Period V SF-
Iron Nail
Type 1 nail and shank fragment, enc XA 4685
823845 Context 537 Period IVa SF-
Iron Nail
2 type 1 nails, clenched, enc, flk XA 4685
823846 Context 544 Period IIIa SF-
Iron Nail
Type 1 nail and shank, enc, flk XA 4685
823847A Context 545 Period IIIa SF-
Iron Blade
Length of narrow blade with straight back and broken edge, broken at each end. Incomplete. Treated. XA 4685; l 70mm; max w 16mm; back th 4mm
823847B Context 545 Period IIIa SF-
Iron Nail
Type 1 nail, enc, XA 4685
823848 Context 553 Period IIIb SF-
Iron Staple
Clip comprising a rectangular-sectioned strip folded to produce an eye at one end and tapering to a pair of straight arms with pointed terminals. Slightly curved in profile. Split pin or ring-headed staple. Complete. Cleaned. XA 4685. Similar to 891510. l 80mm; head diam 16mm; max w 8mm
Photo A870931 (AT)
823849 Context 559 Period IVa SF-
Iron Nail
Shank, enc and fragment of slag. XA 4686
823850 Context 580 Period IIb SF-
Iron Nail
2 type 1 nails, 2 shank fragments and a fragment of non-ferrous slag. XA 4686
823851 Context 591 Period IIIa SF-
Iron Nail
Type 1 nail, enc, XA 4686
823852 Context 599 Period V SF-
Iron Nail
Type 1 nail, enc, XA 4686
823853 Context 601 Period IIb SF-
Iron Nail
Type 1 nail, enc, XA 4686

823854B Context 615 Period IIa SF-
Iron Nail
2 type I nails. Complete. one heavily. XA 4686
823854C Context 615 Period IIa SF-
Iron Waste
Fragment with no distinguishing features. one. l 75mm; w 56mm
830090 Context 387 Period IIIa SF5
Copper Alloy Bow Brooch
Simple cast bow brooch with rolled-under head forming a tube to hold the axis bar for the hinged pin. A central slot is present to take the tension lug of the hinged pin. The gently humped bow has a triangular section tapering to a plain pointed foot with a solid catchplate, now broken. The bow is decorated by an incised line along each edge, produced in the casting.
Almost complete. Treated. XRF analysis found copper and tin.
l 56mm; head w 18mm; max bow w 12mm
Photo A870931 (AT)

No exact parallel is known at present to Sarnia Butcher but the brooch is clearly related to the first century strip bow brooches of "Maiden Castle type" as recognised by Hull although the Cleeve Abbey example is cast not flat-sectioned as the others. In shape and head construction, but not decoration, it is quite close to the following examples:

Hod Hill, Brailsford 1962, C35, C36
Maiden Castle, Wheeler 1943, fig 84 no 18 p 261
Dorchester, Wollaston House (CEU Batchelor forthcoming) 7816710, 7816092
Charterhouse-on-Mendip, unpublished, in Bristol Museum, several examples.

The brooch seems to be a local product. No continental examples are known and the British examples are concentrated in the south-west. The head construction is typical of the examples listed above and therefore the Cleeve Abbey brooch is likely to date around the same time i.e. mid first century or slightly earlier.
869005 Context 474 Period IVa SF9
Bone Parchment Pricker
Head with paired bead-and-reel decorative mouldings. One end is smoothed with linear file marks visible, the other end has been snapped off before the stem. l 18mm; max diam 7mm
869006 Context 425 Period V SF14
Lead Weight
Small cylindrical weight with a flat, oval base. Flattened centrally-pierced suspension loop created by pinching the top of the cylinder. Complete. Treated. Ht 33mm; diam 19mm; weight 63.2g (*c.* 2.5oz)
869007 Context 601 Period IIb SF33
Bone Scoop
Small scoop terminal with a broken round-sectioned stem handle. Incomplete. l 34mm; stem diam 3.5mm; scoop l 10mm; scoop w 5mm
Photo A870935 (AT)
869008 Context 557 Period V SF36
Copper Alloy Buckle
Small D-shaped buckle frame of plano-convex section, pin bar missing. Frame is decorated with linear cast ornament including 3 horizontal lines to either side of the pin rest with a feathered line to either side of the curved frame. Cast. Possibly broken from a small double "figure-of-eight" frame originally. Black material present in the grooves found during cleaning is likely to be Vernis Brun. Incomplete. Treated.
Ht (l) 31mm; w 16mm; arm w 4mm
Photo A870935 (AT)

891508 Context 423 Period V SF-
Iron Punch
Rectangular-sectioned shank tapering from a flattened head to a pointed tip. Possibly a small punch. Complete. fik, XA 4683
l 103mm; max w 13mm; th 10mm
Photo A870931 (AT)
891509 Context 559 Period IVa SF-
Iron Horseshoe Nail
Later Medieval horseshoe nail with rectangular-sectioned shank tapering to a pointed tip, expanding at the other end into a cuboid head from a slight shoulder. Head appears unbroken. Unused. Almost complete. Cleaned. XA 4686
l 56mm; head l 8mm; head w 9mm
Photo A870935 (AT)
891510 Context 591 Period IIIa SF-
Iron Staple
Clip comprising rectangular-sectioned strip folded double to produce an eye with a pair of arms tapering slightly to the blunt straight terminals. Split pin or ring-headed staple. Complete. Treated. Similar to 823848.
l 80mm; max w 10mm; min w 5mm; eye w 14mm
Photo A870931 (AT)
891511 Context 615 Period IIa SF-
Iron Strap/Blade
Fragment of narrow blade/strap with straight back and edge meeting at a gently rounded tip. No distinct edge visible in x-ray or on object. Incomplete. XA 4686. l 56mm; w 13mm; max th 2mm
Photo A870935 (AT)

The Fishbones From A 13th/14th Century Deposit at Cleeve Abbey, Somerset, by Alison Locker

Summary:
A sample sealed by the make-up of a floor in the reredorter in Cleeve Abbey was sieved and found to contain a variety of marine fish; all of these would have been eaten. The abbey being only five miles from the coast, transportation of fresh fish would not have been a problem. As well as the fish bones rib fragments of ox, sheep, bones of domestic fowl, blackbird and shell fragments of oyster, whelk and limpet were also identified.

Report:
A 4kg sample of a deposit (context 618) of late 13th to early 14th century date (Period IIb) from beneath the floor (context 617) of a room in the ground floor of the reredorter was wet sieved. Fragments of bone and shell were extracted.

A number of fish bones were identifiable to species or group level: Eel (*Anquilla anquilla*), herring (*Culpea harengus*), haddock (*Melanogrammus aeglefinus*), whiting (*Merlangius merlangus*), Gadoid indet., hake (*Merlucecius merluccius*), gurnard (*Triglidae*), mackerel (*Scomber scombrus*) and plaice/flounder (*Pleuronectes platessa*/*Platichthys flesus*).

The number of bones is summarised below:

Species	Skull	Vert.	Other	Total
Eel	2	—	—	2
Herring	—	3	—	3
Haddock	3	4	—	7
Whiting	—	7	1 otolith	8
Gadoid (cf imm cod)	—	6	—	6
Hake	—	3	—	3
Gurnard	1	—	3 fin ray	4
Mackerel	—	1	—	1
Plaice/Flounder	1	6	—	7
Total	7	30	4	41

A number of indeterminate fragments, such as fin rays, were also found which have not been included in the table.

All the fish are marine, except for eel which although part of its life cycle is spent in the open ocean is usually caught in estuaries and rivers. Since the abbey is only 5 miles from the coast transportation of fresh fish would have presented no difficulties. Information on the biology of these species can be found in Wheeler 1978.

Despite the presence of fish ponds at Cleeve where water was drawn off the river to drive two mills outside the precinct, then feeding two fish ponds before draining into the abbey moat (Bond 1988, 98), there is no evidence from this sample of the consumption of fish from the ponds. Eels, although they were kept in ponds could just as easily have been caught in the river.

Although there are much data, both documentary and topographical, relating to the use and management of fish ponds during the medieval period the evidence from fish remains usually emphasises the importance of marine fish rather than freshwater. The relatively high prices recorded for freshwater fish during this period ensured that they remained a high status food, and Bond (*ibid*, 74) has shown that sea fish generally appeared to have preferred on monastic sites. The small sample from Cleeve also supports this view, although as a single context it cannot be regarded as representative of the site.

As well as fish remains a few fragments of ox and sheep ribs were identified (the former showed evidence of chop and knife marks), a fragment of domestic fowl coracoid, a blackbird carpometacarpus and some fragments of bird long bones. Fragments of oyster, limpet and whelk were also present. The entire sample is composed of domestic food refuse.

References

Bond, C. J., 1988, "Monastic Fisheries". In *Medieval Fish, Fisheries and Fishponds in England*, pt 1. Ed. M. Aston, BAR British Series 182(i), 69–112.

Wheeler, A., 1978, *Key to the Fishes of Northern Europe*, Warne.

Cleeve Abbey Architectural Fragments, by Stuart Harrison

Thirteenth-Century Cloister Arcading

The excavation produced a number of thirteenth-century fragments from a twin shaft cloister arcade. No complete components were recovered but it is possible to reconstruct their full form with some certainty.

Base A; Context 328; from Period IVb cobble surface to north of reredorter.

Part of a twin shaft base with triple roll profile, rebated on top to hold the shafts securely in position and designed to support 10cm diameter shafts. The lower section of the base profile is lost.

Bases B; Context 338; from packing east of doorway at west end of northern room. Period VI.

Two examples of part of a twin shaft base similar to A with a triple roll profile. They have lost most of the upper roll and shaft seating but retain more of the lower sub base.

Base C; Context 314; Period V demolition debris.

Part of a triple or quadruple base which has lost both the upper and lower sections of its profile. What remains shows close similarities to Bases A and B. The slots in the bed of the stone are natural fossil inclusions.

These form the most complete base sections recovered but in addition there were also several smaller fragmentary pieces which showed similar profiles.

Capital D; Context 319; Period V demolition debris.

Evidence for the capitals was far less substantial than that for the base forms but sufficient fragmentary pieces were recovered to establish their form with some certainty. The best surviving rim fragment shows a chalice form with fillets. The upper impost which probably featured an undercut roll moulding is unfortunately lost.

Capital E; Context 331; from fill of Period V robber trench of south wall of reredorter.

This fragment from a capital shows the neck rim and start of the chalice. The underside has a hollowed base seating to securely hold the supporting shaft in place. Combined with capital fragment D it serves to illustrate the most likely complete chalice or bell form of the cloister capitals.

Shaft Fragments F; illustrated fragment from Context 376; Period IIIa make-up within northern room.

By far the largest quantity of material recovered were many pieces of broken shaftings. Circular in section and mainly 10cm in diameter with some pieces 11cm diameter, the finished ends invariably show a small chamfer which serves to locate the shaft in position within the seating worked upon the respective base or capital. One shaft had a 6cm flat worked upon its length, possibly indicating that it had served as a respond. The un-illustrated fragments came from several different pre- and post-Dissolution contexts.

All the base, capital and shaft fragments are cut from lias and were highly polished to a smooth finish in imitation of marble.

Spandrel Filler G; context 338; from packing east of doorway at west end of northern room. Period VI.

Small sandstone spandrel stone which has a roll moulding worked on the angle to form a hoodmould over an arcade. It has slight traces of white paint.

These various fragments can be tentatively combined to give an indication of what a typical bay of the arcade must have looked like. Presumably the lias bases, capitals and shafts were darkly polished and the arches and hoodmould painted white to give the usual black and white contrasting appearance. The base profiles and general details suggest a date between 1220 and 1250 for the construction of the cloister.

Foil H; Context 463; Period V demolition debris.

Part of what may have been a sandstone trefoiled opening, presumably a window. The exterior featured a plain chamfer on the angle whilst the interior (illustrated) has a small rebate and chamfer, possibly for glazing or wooden shutters. At the base springing is a slot worked along the bed of the stone; 5cm long × 2cm wide × 1cm deep it most likely held an iron reinforcing bar or possibly part of a grille across the opening. The upper edge of the block is worked with the curve of a comprising arch. The stone

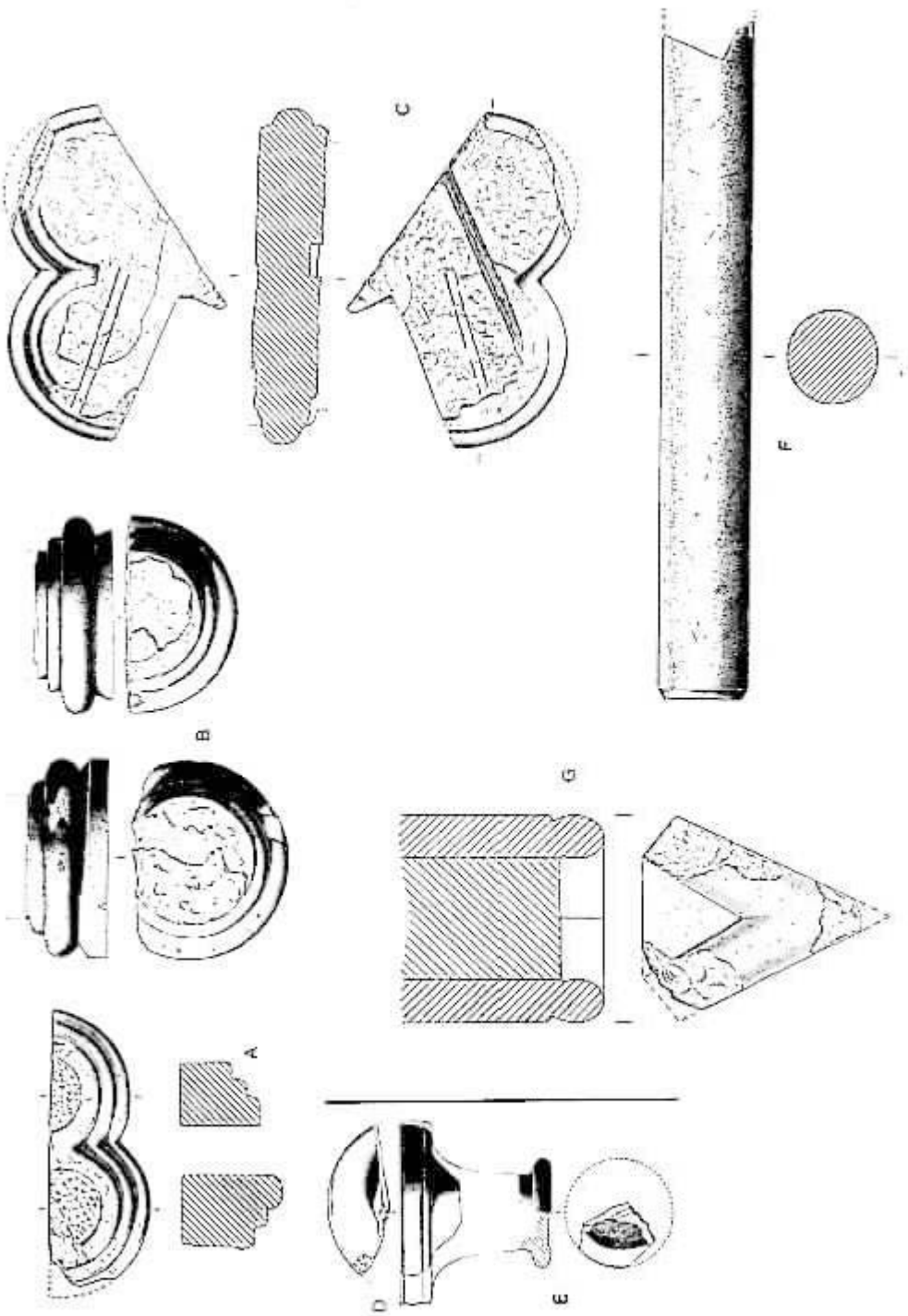


Fig. 15

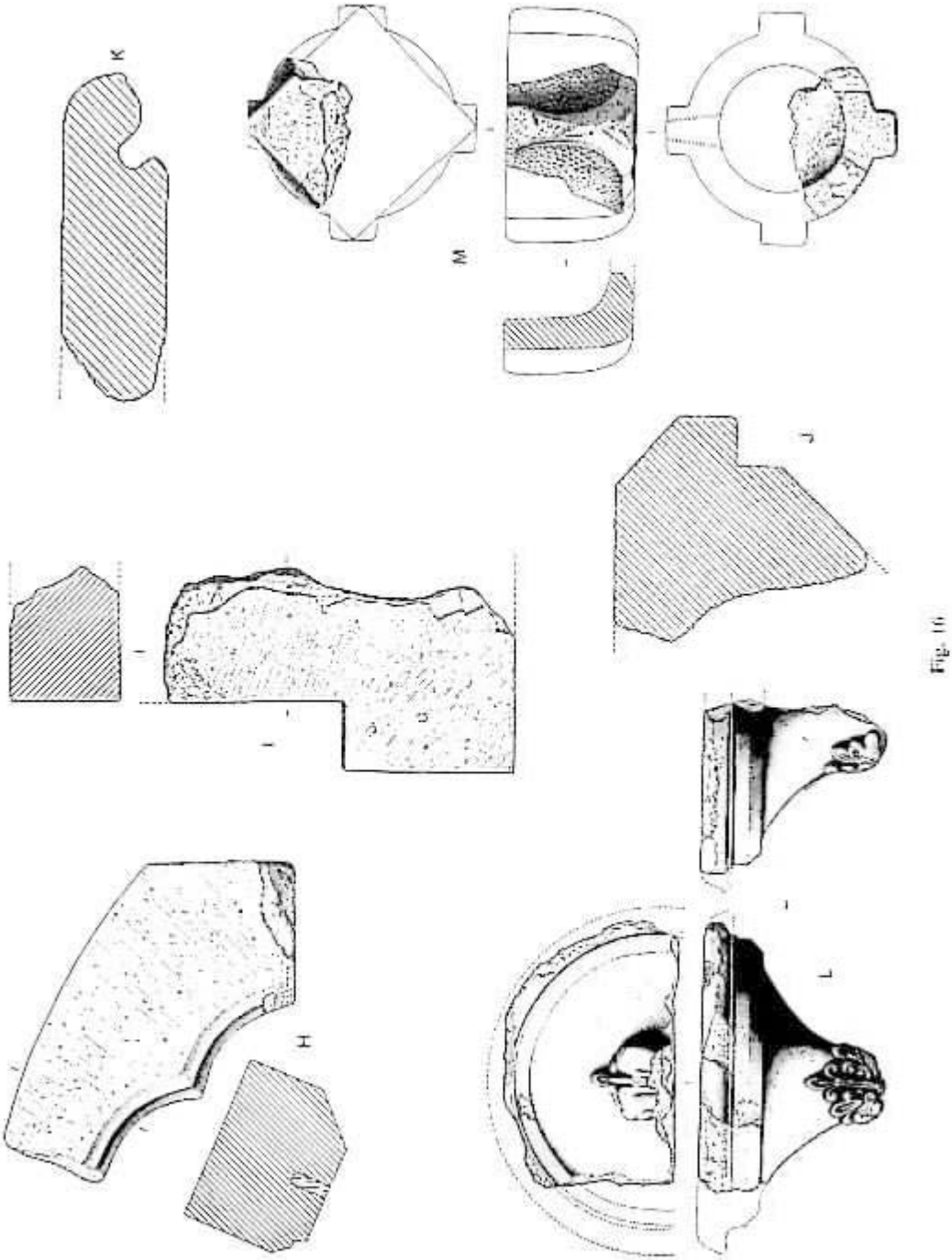


Fig. 16

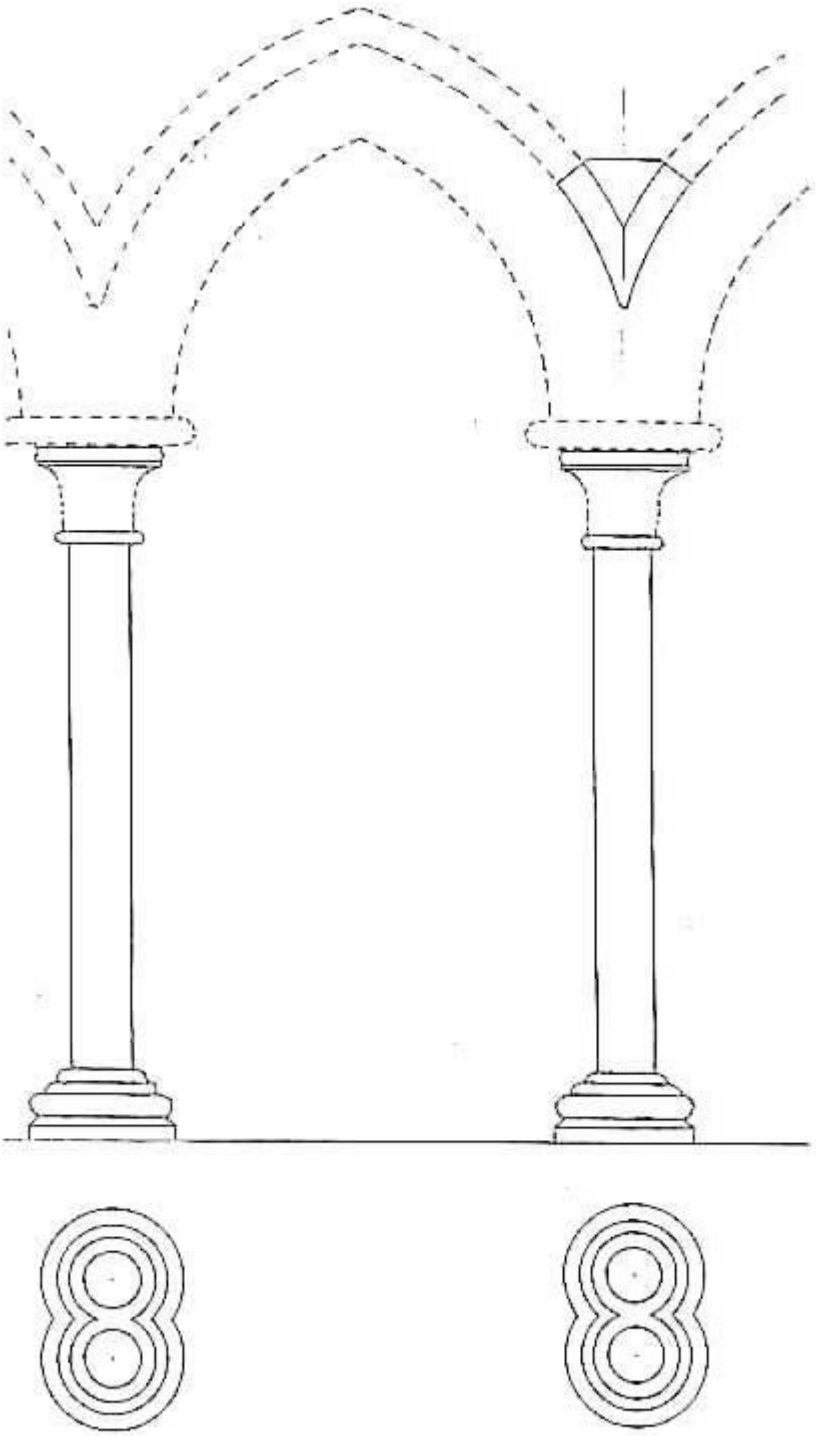


Fig. 17

shows similarities to the bar tracery which screens the interior of the windows in the south wall of the dorter undercroft and may possibly have formed part of a similar composition.

Jamb I; Context 463; Period V demolition debris.

Stepped sandstone block, probably the jamb from a doorway.

Jamb J; Context 439; from ?post-pad south-west of monks' day room, Period V or VI.

Sandstone jamb with plain external chamfer and internal rebate, incomplete but probably part of a window, cut with a bolster and retaining traces of white limewash.

Moulding K; Context 314; Period V demolition debris.

Small section of sandstone moulding with an undercut filleted roll, possibly a stringcourse or hoodmould but too fragmentary for exact identification. Traces of mortar remaining on upper bed face.

Corbel L; Context 307; Period VI boundary wall.

Semicircular sandstone thirteenth-century corbel which has unfortunately lost its rear tail block. Plain chalice form with a moulded rim with fillet and a small decorative foliate boss at the base springing. It retains traces of white limewash and red highlighting.

Mortar M; Context 419; Period VI dump.

Fragmentary rim of a lias mortar of conventional form, showing the usual projecting reinforcing rib.

CLEEVE ABBEY: THE POTTERY

BY JOHN ALLAN

with contributions from Richard Coleman-Smith, Michael Hughes, Roger T. Taylor and David F. Williams

INTRODUCTION

Whilst the last 30 years have seen extensive progress in our understanding of the ceramics of many parts of South-West England, the study of the medieval pottery of western Somerset is a neglected topic. Jean Le Patourel's publication of the documentary evidence for potters in medieval Somerset indicates that they lived and presumably operated at Milverton, Nether Stowey and Bridgwater, and at ten places in the county more distant from Cleeve (Le Patourel 1968, 125). Her work emphasises the potential range of sources of the Cleeve finds, most of which are unknown from archaeological evidence. The nearest finds of medieval kiln waste are the recently-discovered debris of 15th- or early 16th-century date from Crowcombe and the probable kiln waste from Nether Stowey, discussed below. Since the abbey lies close to the Bristol Channel, it would also have been readily accessible to coastal trade, so finds of the products of the kilns of the Bristol area, and of north Devon, are unsurprising. The closest published sequences of medieval ceramics from the county are those from Taunton, among which the finds published by Pearson (1984) are the most useful. Oliver Kent's publication of the Glastonbury Abbey pottery (Kent 1996) now allows some comparisons to be made with the largest (albeit unstratified) assemblage of monastic ceramics from the county. Dating, however, continues to rely in large part on the two best-dated sequences of medieval pottery in the region—those at Bristol (Ponsford 1991; 1998; Good and Russett 1987) and Exeter (Allan 1984).

The sherds from the reredorter offer the first stratified medieval pottery sequence from west Somerset. The quantity of pottery deposited during the monastic use of the building is, as might be expected in a reredorter, quite modest—just 157 sherds (some tiny) from 29 or more vessels from the first three periods, rising to 131 sherds in Period IV. It should be emphasised that this series will not of course be a representative sample of the late medieval pottery of the abbey; a sample from the kitchens would no doubt be very different. The much more plentiful early 16th-century finds from Period V, the demolition layers over the building, may be more representative, including more material used outside the reredorter.

APPROACH

Sherds from each context and period were examined visually, then recorded by sherd count and minimum vessel count. The Iberian vessels were studied in thin-section by David Will-

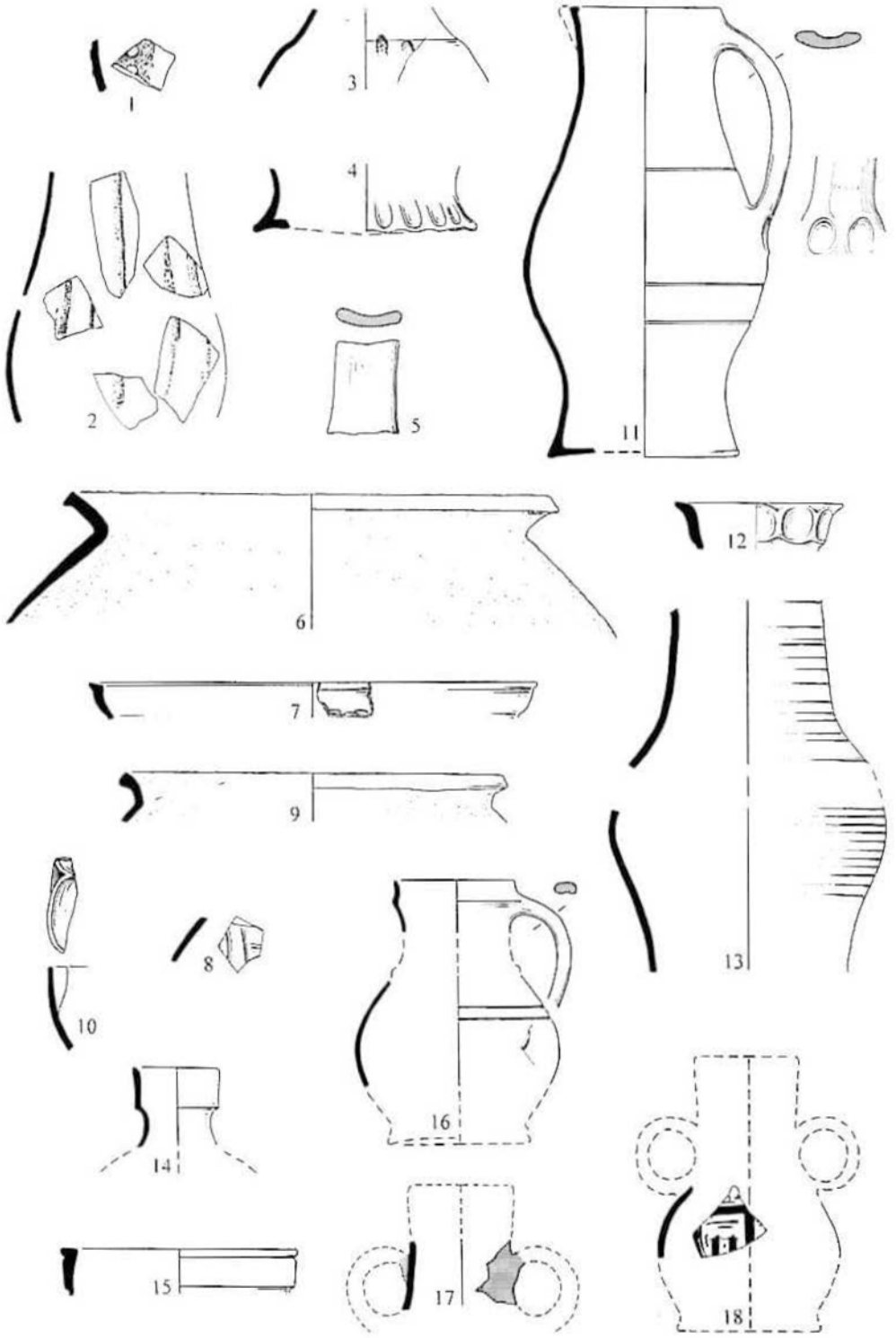


Fig. 1 Cleeve Abbey reredorter: medieval wares (1–13) and post-medieval imported pottery (14–18). Scale 1 : 4.

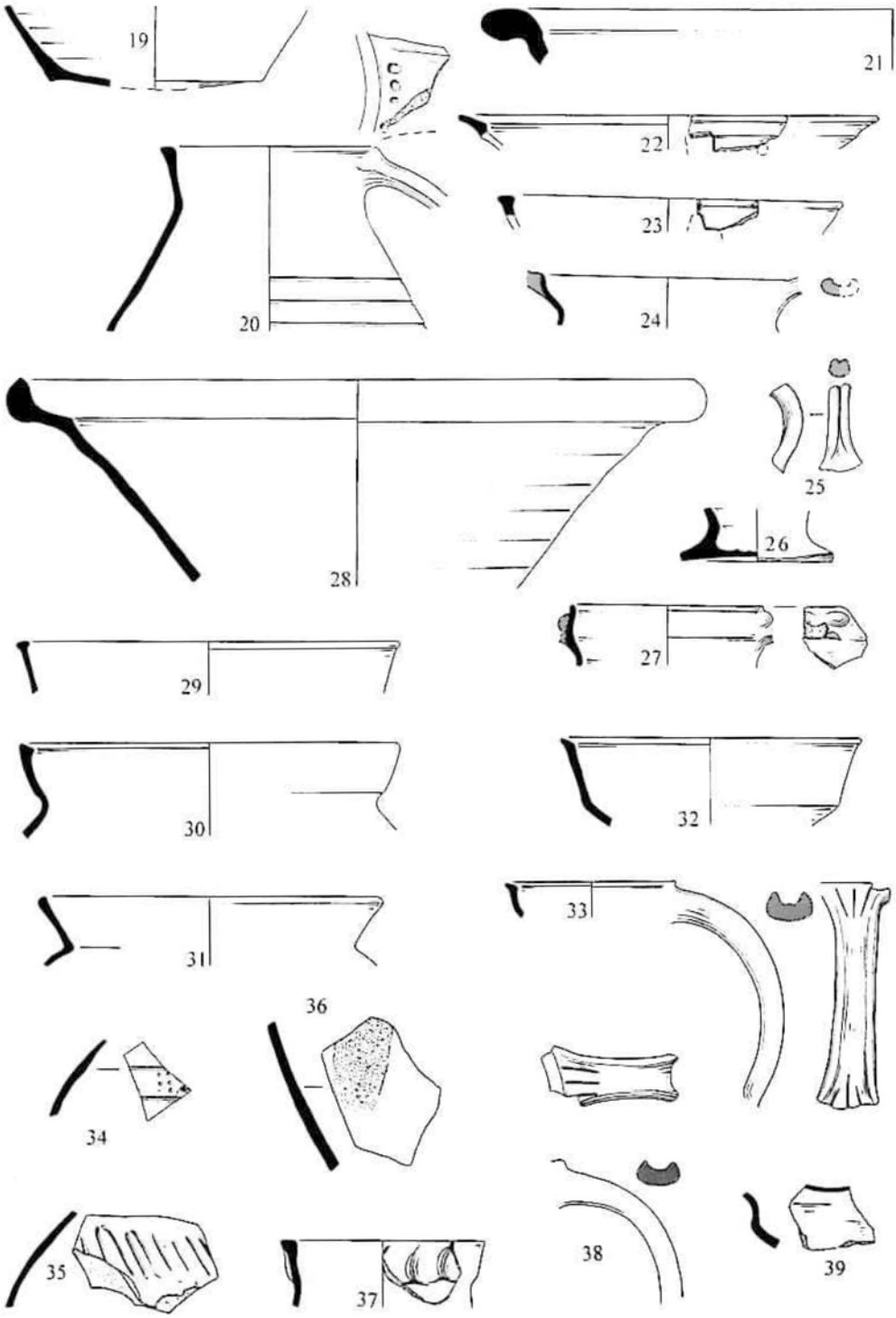


Fig. 2 Cleeve Abbey refectorter: South-West English pottery from Dissolution deposits. Scale 1 : 4.

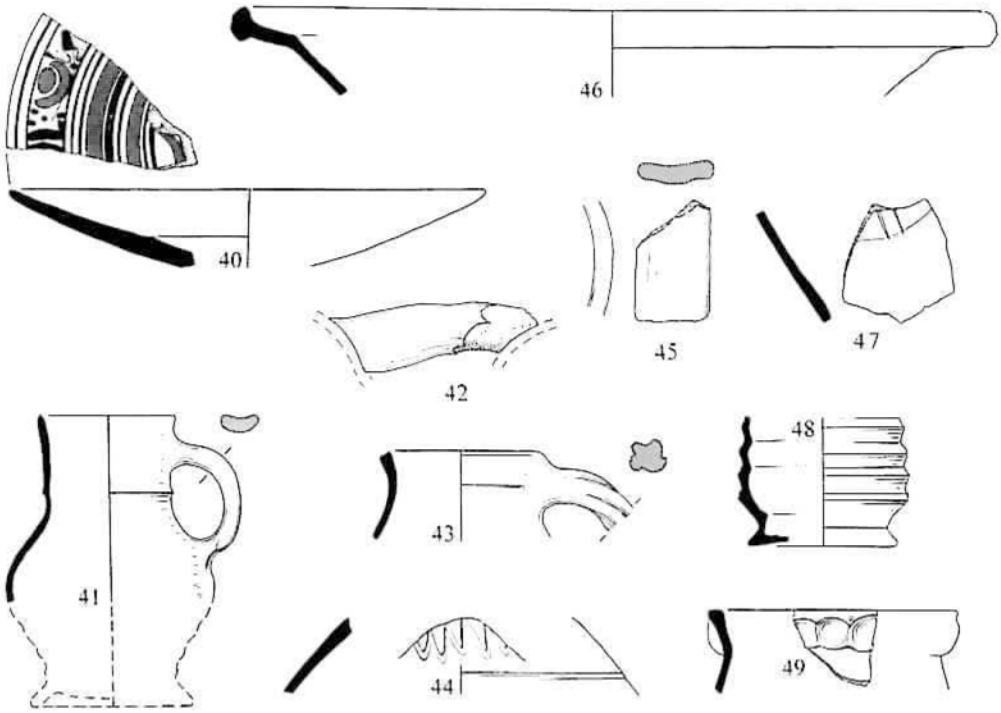


Fig. 3 Cleeve Abbey reredorter: residual medieval and 16th-century sherds in modern contexts. Scale 1 : 4.

iams. Since it seems likely that much South Somerset pottery will be unresponsive to thin-sectioning, the local wares were studied by a combination of ICP-AES analysis (described in Appendix 3) of South Somerset ('Donyatt-type') pottery with Dr Taylor's examination of the local wares under binocular microscope without the use of thin-sectioning. Had funding been unlimited these two approaches would have been combined with thin-sectioning, and ICP-AES analysis would have been extended both to further Cleeve sherds and to further comparative material from other sites. Finally, Richard Coleman-Smith collaborated with the writer in presenting a reconstruction of the important group from Dissolution deposits (Fig. 4).

FABRICS

The following fabrics, widely distributed on sites in Somerset, Devon, Dorset and Cornwall, can be distinguished in the assemblage:

Redcliffe ware from Bristol
Introduced *c.* 1250, this fabric (Bristol Pottery Type 118) comes to dominate the Bristol market in the late 13th century; it circulated as late as *c.* 1500. The pale buff/yellow to white fabric typical of this ware makes it readily distinctive in South-West England, where most clays fire to darker reds and greys. It must have been quite widely distributed, at least on high-status sites, in southern Somerset: it is for example a major fabric in Taunton by

Fig. 4 Cleeve Abbey reredorter: reconstruction drawing of the ceramic assemblage at the time of the Dissolution in 1536 (drawn by Richard Coleman-Smith).

the 14th century (Pearson 1984, 143–4) and is 'relatively common' at Glastonbury Abbey (Kent 1996, 97).

At least four vessels are represented at Cleeve, one of them (No. 42) from an elaborate vessel, perhaps an aquamanile. There are no Ham Green wares in the collection, no doubt because most of the material dates after 1300.

Donyatt-type ware

The long-running research project studying the Donyatt potteries (Coleman-Smith and Pearson 1988) has demonstrated that this group of kilns already formed a major industry in the later Middle Ages, and apparently rose to dominate the pottery market of South Somerset by the early 16th century (for example fully 90 per cent of Taunton's 16th-century pottery has been attributed to Donyatt: Pearson 1984, 142–4). At Cleeve, Donyatt-type wares first appear in Period IIb; they rapidly become the most common ware in the early 16th century. The question of whether these vessels do actually come from the Donyatt potteries, or from other local kilns working in the same tradition, is a considerable problem which visual examination and thin-sectioning are unlikely to resolve. In an attempt to make progress with this problem a programme of ICP-AES analysis has been carried out upon the Cleeve sherds—see Hughes, Appendix 3. This draws the important conclusion that, although the medieval examples of this type at Cleeve are indeed Donyatt products, the majority of the apparently typical early 16th-century Donyatt products at Cleeve (identified as such both by the writer and Richard Coleman-Smith) come instead from west Somerset kilns. This is a problem which has long been suspected (Allan 1984, 98–100) and must cast doubt on attributions to Donyatt made elsewhere (e.g. Taunton, Bristol) solely on visual examination.

Exeter fabric 40

Amongst the finest medieval pottery made in South-West England, these vessels were first distinguished in the Exeter finds volume (Allan 1984, 5–6 and *passim*), where a petrological description was also published (Brown and Vince 1984, 33). They have a fabric with much fine sand temper, occasional fine white mica inclusions and a few ferruginous particles. Dr Taylor has now re-examined many specimens of this fabric and shown that the initial conclusions regarding their source were wrong; rather than deriving from the Greensand, the inclusions indicate a probable source in the Exe Valley (Appendix 2). Production consists principally of jugs; many are handsomely decorated with iron stripes or applied plastic ornament. Vessels of this fabric are widely distributed in south and east Devon, but are also known in smaller numbers in Somerset, along the south Devon coast and into Cornwall. The writer has published a map of the distribution known *c.* 1982 (Allan 1984, 6, Fig. 5): since that time there have been several new finds, extending the distribution westward as far as the Isles of Scilly and northward to Taunton.

Somerset/East Devon redwares

Beside the distinctive Exeter fabric 40 sherds are fragments of several redware jugs with fine sand temper, essentially very similar in fabric but lacking the typical features of colour, technique and glaze of that ware. Such wares have previously been distinguished in Taunton ('Taunton redware': Taunton Pottery Type 132; Pearson 1984, 143–4 and MF 1 and 2) and Glastonbury (Kent 1996, 98) and probably derive from various Somerset or east Devon kilns. It is quite possible there are a few Exeter 40 sherds or even Donyatt ones in the grouping.

Poole-type white ware

A highly distinctive component of the medieval assemblages of Poole, Dorset, is a series of jugs with a sandy white fabric, usually glazed yellow, decorated with black iron-rich pellets

(Jarvis 1992, 63, fabric 5). These are quite different from French white wares, and are presumably local wares of the Poole area. They were distributed westward in small quantities along the south coast, being present at Plymouth and Launceston Castle. The presence of one such vessel at Cleeve is a surprise but a second Somerset example has recently been found at 50–54 Eastover, Bridgwater (I am grateful to Alejandra Gutiérrez for showing me this sherd).

North Devon medieval coarseware
The medieval ceramics of north Devon consist principally of unglazed hand-made wares, largely fawn-brown in colour, liberally tempered with coarse sub-angular quartz sand; the fabric often includes fragments of water-worn brown or grey sandstone, shale or slate. Such wares were certainly made in Barnstaple, probably also in Bideford, and perhaps in other unidentified kilns in the area. The dating and distribution of the type is discussed by Allan (1994, 141–6), where reference to published descriptions will also be found. The Cleeve sherds are the first examples identified in Somerset. The fabric first appears in Period IIb.

North Devon calcareous ware
Alongside the mass-produced hand-made coarsewares, the north Devon potteries adopted the production of wheel-thrown glazed jugs in the late Middle Ages. A distinctive fabric with fine calcareous temper (almost certainly crushed shell), nowadays giving a strong effervescent response when sherds are tested with dilute acid, was employed for these jugs; subsequently it was widely used in the post-medieval north Devon industry. Such wares were certainly made in Barnstaple (Markuson 1980, 83–5) and presumably in Bideford and other north Devon production centres.

Other Fabrics

Once these familiar fabrics have been separated, a body of less familiar material remains. The obvious sources for these are local. Cleeve lies on the edge of the Mercia Mudstones (formerly the Keuper Marls), which extend westward to Porlock Bay and east and south in a wide band around Bridgwater, Taunton and Wellington, providing an extensive area of serviceable potting clays which must have provided raw material for the documented potteries at Bridgwater, Milverton and Nether Stowey, and no doubt for others.

Two groups of supposed kiln wasters were compared with these fabrics:

(1) *Quantocks Cottage Farm, Crowcombe.* Definite wasters and associated presumed waste were recovered by D. Dawson *et al.* for Somerset County Museums in 1992; no kiln was found. (SCM 52/1992). (The sherds described here are definite kiln waste with glaze extending over broken edges, or edges burnt after breakage). The wares have a hard-fired brick red to pink-buff or light grey fabric with sparse rounded white quartz sand grains and a few iron ore inclusions. Internal surfaces are pimply; glaze is thick dark olive green or orange-brown.

(2) *Nether Stowey*: Large quantities of unglazed coarsewares, believed to be wasters, were excavated at The Castle, Nether Stowey, in 1970. Their fabrics are distinctive in having a filler of plentiful rounded fragments of slate, sandstone and shale, obvious upon visual examination (see Appendix 2). This ware has also been noted by the writer among the finds from Lundy (where it forms less than five per cent of the large sample recovered by S. Blaylock in 2000 from Pigs Paradise) and among the sherds from the deserted settlement at Leyhill, Luccombe, on Exmoor (excavation by I. Richardson and N. Grace, 1999–2000).

Among the Cleeve sherds, a few offered a good visual match to the Nether Stowey material; Dr Taylor found that they also matched petrologically (Appendix 2), so these are listed as 'Nether Stowey type'. No convincing matches were made to the Crowcombe finds.

The remaining material varies considerably in the quantity of sand temper, and some vessels contain crushed shell inclusions. Dr Taylor's inspection of a range of samples showed that they repeatedly contained weathered fragments of shale, sandstone or slate which must ultimately have been washed downstream from Exmoor or the Quantocks. These vessels are here described as 'Exmoor/Quantocks-derived'. Whilst a shale-tempered fabric was produced as far west as Barnstaple, the glazed jugs at Cleeve appear different from those of north Devon, where glazed jugs are in fact rare; likewise the cooking pot forms are quite different from those of North Devon. These presumably come from local West Somerset kilns.

Vessel Forms

Excavations on the sites of reredorters elsewhere in England have sometimes recovered rich and highly distinctive assemblages of glass and pottery, including distilling apparatus (Moorhouse 1972; *idem* 1993, 128–30). No comparable assemblage is present at Cleeve. The vessel types represented in successive periods may be summarized as follows:

Table 1: Vessel types at Cleeve Abbey (minimum number of vessels)

Period/date	Cooking pots	Jugs	Lobed cup	Pancheons	Cups & drinking jugs	Costrels	Chafing dishes
I L13/E14C		4					
II 14C	2	10					
III ?L14/E15C	4	9					
IV L15/E16C	5	27	1		3		
V (Dissolution)	3	12+		4	5	1	3

Elsewhere in the South West the cooking pot remains the most common vessel form into the late 13th and early 14th centuries. In some towns consumption of ceramics had shifted almost entirely to jugs by the early 15th century, although cooking pots remained much the most common vessel type in the countryside, even on high status sites. The strong predominance of jugs in phases I–IV at Cleeve may therefore show a distinct bias of vessel use in this area of the monastery towards jugs, separate from the ceramics used in cooking and food storage in the kitchen area. We may speculate upon the specific reasons for this. Earthenware jugs may perhaps have been used in the reredorter for handwashing or have contained water used to flush garderobe shafts, or have held drinking water consumed in the adjacent dorter. An alternative interpretation might be that jugs served for collecting urine, which had various purposes in the medieval world (cf Moorhouse 1993, 129, where these are briefly discussed and where it is suggested that monks' urine may have been regarded as especially efficacious for these purposes). Again, the excavator's interpretation of the ground floor as a possible bathing area in period IV could explain the increase in the volume of finds from this phase and the dominance of jugs here—although the lobed cup and bowls may have had different origins.

The vessel forms in the Dissolution deposit are also distinctive. In most urban groups of this date examined by the writer the most common vessel form by far, often making up more than half the entire group, is the large bowl or pancheon. These bowls are normally heavily sooted externally and were more probably used in cooking than in dairying. In this

Table 2: The incidence of the medieval and 16th-century SW English pottery (sherds: min. numbers of vessels)

	Ia	Ib	IIa	IIb	IIIa	IIIb	IVa	IVb	V	VI	TOTAL
Bristol Redcliffe			17:1				1:1			4:2	22:4
Poole-type			16:1							1:R?	17:1
Exeter 40			45:2			2:2					47:4
Redwares	1:1	8:2		1:1	3:3	3:2	2:1			9:4	27:14
North Devon coarse			2:1		6:3			1:1	1:1		10:6
North Devon calcareous jugs							2:1		4:2	3:2	9:5
Donyatt 14-15C				16:1			2:1				18:2
Exmoor-Quantocks jugs	1:1				1:R?		85:11	18:6	30:10+	66:30	201:58
Exmoor-Quantocks cooking pots			1:1	16:1	1:1		5:2	3:2		1:R	27:7
Nether Stowey									1:1	2:2	3:3
South Somerset L15/16C							1:1		191:24	53:10	245:35
Unclassified jug			4:3			2:2	7:3		19:8	23:10	55:26
Post-med contamination					2:2			4:4			6:6
TOTAL	2:2	8:2	85:9	33:3	13:9	7:6	105:21	26:13	246:46	159:59	687:171

NB Sherds from a single vessel scattered through successive phases have been grouped together in the earliest phase in which the vessel was found. R = repeat, ?R = probable repeat of a vessel listed in an earlier phase.

group jugs are far more common, even when one excludes medieval types which may still have circulated in the early 16th century (Tables 2 and 4). The numerous drinking jugs and the prominence of specialist tableware in the form of three chafing dishes (which kept food warm at table) and a plate may show that the group reflects the vessels used nearby in the monastic refectory, or perhaps in the corrodians' accommodation in the south range.

THE MEDIEVAL SOUTH-WEST ENGLISH WARES

The occurrence of these wares is summarized in Table 2. It shows that there is a high proportion of regional imports brought from up to 100km away, especially in Periods Ib–II (late 13th and 14th century). In the absence of other west Somerset collections one cannot say whether these attractive products were commonly marketed in the area or reflect the specific links of the abbey. A feature of the later medieval pottery market was the steady growth of the Donyatt industry: ICP-AES analysis confirms that the Donyatt potteries were supplying Cleeve by Period IIb, i.e. probably by the early or mid 14th century.

THE IMPORTED POTTERY

There are no sherds of medieval Saintonge pottery at Cleeve and the imported wares reflect the surge of new types of mass-produced ceramics which accompanied the changes in domestic eating and drinking habits at the end of the 15th century. These form 6.3 per cent of all sherds in the large Dissolution group, 7.8 per cent if all the medieval wares there are

Table 3: Summary of distribution of imports by phase (sherds: minimum numbers of vessels)

	Phase IVa	Phase IVb	V, Dissolution	VI, modern	TOTAL
Tuscan maiolica			1:1		1:1
Isabela Polychrome			2:1		2:1
Merida-type			4:2	7:2	11:4
Beauvais yellow-glazed	2:1		6:2		8:3
Beauvais green-glazed				1:1	1:1
S. Neths maiolica			1:1		1:1
Raeren stoneware		2:2	4:4	5:3	11:9
Cologne plain stoneware				1:1	1:1
Tudor Green wares			4:1	1:1	5:2

regarded as residual. The exact date at which these imports began arriving in Britain is not firmly known. Conventionally they are dated to the early 16th century but the customs account evidence from Exeter, for example, suggests large-scale importation began a little earlier—at least by *c.* 1480. At Cleeve they are all datable to *c.* 1470/80–1536. Their frequency is shown in Table 3 below.

The predominance of Raeren stoneware drinking mugs is normal in groups of this date. The attractive Beauvais earthenware drinking jugs are more common along the south coast of South-West England than elsewhere in Britain: more than 60 examples of this sort have been found in Devon alone, reflecting its trade with the Normandy ports. These jugs are however decidedly less common around the Bristol Channel; sherds of either one or two were present at Glastonbury Abbey (Kent 1996, 101–2) but there were for example only two others among the large groups containing over 900 early 16th-century imported sherds from Acton Court, Avon (Vince and Bell 1992, 104–7). They were probably brought to Cleeve from a south coast port such as Exeter. The single find of Isabela Polychrome and the strong showing of Merida-type pottery reflect the scatter of Sevillan finds and the surprisingly numerous finds of Merida-type wares in South Wales and the Bristol area (Gerrard *et al.* 1992, 292–4). More unexpected is the maiolica vessel from Tuscany, although chemical analysis may show that such finds are more common than is apparent at present.

The Dissolution deposit

The contents of this deposit are summarized in Table 4.

The two Roman sherds should be noted. A few more were present among the finds from

Table 4. Summary of Period V (Dissolution) pottery

	Sherds	Min. No. Vessels	Forms
Roman black-burnished	2	1	
Medieval wares	55	22+	details in Table 2
Imports	2	15	details in Table 3
North Devon calcareous	8	6	2 jugs
North Devon gravel-tempered	2	1	pancheon
South Somerset	191	24+	10 jugs, 3 chafing dishes, 5 cups, 3 cooking pots, 3 bowls
unclass post-med. coarse	4	2	
	284	71	

Table 5. Summary of Period VI pottery

	Sherds	Min. No. Vessels	Forms
Medieval all wares	104	*c.* 48	see Table 2
Imports, L15/E16C	16	8	details in Table 3
Westerwald, E18C	4	2	1 tankard, *c.* 1700
Delftware, E18C	1	1	dish
Bristol-Staffordshire wares, L17/18C	66	19+	12+ closed forms, 7 press-moulded dishes
Yellow slipware			
Treacle brown-glazed earthenware	3	2	tankards
Agate ware	3	1	large cup
Grey/white stonewares	7	4	tankard; cup
Staffordshire-type 19/20C transfer print, mocha, pearlwares, stonewares, misc	316	?100++	details in archive
SW England, post-medieval	8	3	3 jugs
N. Devon calcareous, probably 16C			
N. Devon sgraffito, L17C	7	4	3 dishes, 1 porringer
N. Devon coarsewares	27	8+	Allan 1984 types 3B, 3D (bowls), 7 (chamber pot), 11 (× 2: large crocks); 16
S. Somerset 16C wares	53	*c.* 10+	4 pancheans, 2 cups, 3 jugs
S. Somerset 17C slipwares, sgraffito	5	5	2 dishes, 1 cup, 1 bowl
S. Somerset 18C sgraffito	37	8	types 1A (×2); 3D; 3D; 5; 6
S. Somerset 16/17C coarsewares	101	*c.* 40	Forms not studied
S. Somerset 17–19C coarsewares	267	*c.* 100?	Forms not studied
TOTAL	1025	*c.* 363	

the excavations by Exeter Archaeology of 1999–2000 in the abbey cloister. Some form of Roman occupation must lie on, or close to, the abbey site.

Among the 16th-century finds the central feature is the rise of pottery production in the South Somerset tradition. ICP-AES analysis has demonstrated that, although nearly all the sherds look like Donyatt products, only four of the thirteen vessels analysed were in fact made there, the remainder being south-western Somerset products (see Appendix 3).

The post-Dissolution sherds (Period VI)

As is often the case, the modern contexts contain by far the largest groups of sherds. They are worthy of study, not only because they contain much residual material which extends the volume and range of medieval and 16th-century types recorded from the site, but because the series also gives some impression of the local pottery market in the 18th and 19th centuries. This material shows that, although the North Devon potteries were relatively accessible, their products were far outnumbered by South Somerset (Donyatt *et al.*) products, even at this late date. There is very little pottery belonging to the years 1550–1700, as is evident from the absence of, for example, Frechen stoneware and 17th-century delftwares, and the presence of only seven North Devon sgraffito sherds and five South Somerset slipwares of the 17th century. These are summarized in Table 5.

A note on cross-fits between contexts

The recognition of individual vessels scattered in various contexts of the same or successive phases can prove a significant aid to the understanding of the processes of site formation. The vessels at Cleeve which have been recognised in this manner are each listed in the Catalogue. It should be noted that much of the pottery in periods IIb and IIIb derives from vessels in Period IIa, showing either that they are close in date or that contexts in periods IIa and IIb were soon distributed and redeposited.

CATALOGUE

An asterisk beside a vessel's number indicates that it has been inspected and described by Dr Taylor. Vessels whose sherds are scattered in contexts of successive phases are listed in their earliest contexts. Numbers in brackets following descriptions are those of contexts.

Period Ia

1.* Fine sandy redware, possibly Exeter fabric 40, oxidised, with vertical iron stripe and red clay pellet over, the body and pellet with rich orange glaze, black over the iron. The succession of red body, black vertical iron stripe and red clay pellet is seen on 'Rouen-copy' jugs but this is merely one of a wide variety of combinations of applied decoration known in local redwares and may be unrelated to 'Rouen copies' (589). There is good evidence from Exeter that this fabric comes into use *c.* 1250, alongside the earliest Saintonge imports (Allan 1984, 6).

1a* (Not drawn). Green-glazed jug sherd with applied strip of iron-rich clay, Exmoor/Quantocks-derived fabric group (589).

Period IIa

2.* Bodysherds of a tall jug of Poole-type white ware fabric 5, discussed above. Granular white fabric; applied white clay strips, rich in iron; speckled rich yellow glaze, metallic black over strips (615 and residual in 587, period IIb). Whilst the Poole report (Jarvis 1992) offers no dating evidence, the fabric is known both in Plymouth and at Southampton in contexts also containing Saintonge green-glazed and polychrome wares datable to the end of the 13th and early 14th century or generally to the 14th century (Allan 1986, 17–18).

3.* Shoulder of a globular jug of Exeter fabric 40, discussed above. Green-brown glaze, black metallic iron-rich applied clay pellets (615 and residual in 587, period IIb). The type has a long use from the mid 13th to the early 15th century but is especially common in the late 13th/early 14th centuries (Allan 1984, *passim*).

4.* Jug base in Exeter fabric 40, the temper differing slightly from vessel 3 (615).

5.* Jug handle and plain bodysherds in Bristol Redcliffe ware. Pale buff fabric, speckled light green glaze (603, 609 and residual in 482, period IIIa).

Period IIb

6.* Hand-made unglazed cooking pot in sand-tempered Exmoor/Quantocks-derived fabric, described by Taylor (below); fired fawn externally and black internally (580).

6a. (Not drawn). Scraps of a typical 'Donyatt-type' jug with slip and mottled copper-green glaze. The type is characteristic of the late 14th/15th centuries, but examples are known as early as the early 14th century. The vessel offers a *terminus post quem* of *c.* 1300 for the Period (617, with residual sherds in period IIIa, 380 and period IIIb, 323, 326).

Period IIIa

7.* Rim of an unglazed cooking pot of North Devon medieval coarseware with row of impressed stab-marks. The type has a long life (Allan 1994, 142–4) although this particular form of decoration is uncommon (482).

Phase IIIb

8. Shoulder of a Donyatt-type sgraffito-decorated jug, similar to that in period IIb (478). Attribution to Donyatt confirmed by ICP-AES.

Period IVa

9.* Hand-made unglazed cooking pot in the sand-tempered Exmoor/Quantocks-derived fabric group, fired reddish-buff, sooted externally by use, probably West Somerset (344 and residual in 301, modern).

10.* Rim of a lobed cup. Sand-tempered fabric as 9 above, internal black-spotted reduced green glaze extending over rim, probably West Somerset or North Devon. Although lobed cups were in circulation, for example in London, by the mid 14th century (e.g. Pearce and Vince 1988, 87 cf. McCarthy and Brooks 1988, 114 and *passim*), such vessels are first recorded in the South West in the 15th century (possible example in early 15th-century context: Allan 1984, no. 1502), becoming fairly common only in the late 15th/early 16th century (e.g. at Donyatt: Coleman-Smith and Pearson 1988, 162–3) (344). Analysis by ICP-AES indicates a North Devon origin.

11.* Jug in sand-tempered Exmoor/Quantocks-derived fabric with crushed shell inclusions, thick mid to dark green glaze with heavy iron spotting. Probably West Somerset (559).

12. Rim of a typical Donyatt-type jug with applied thumbed strip, traces of slip and mid green glaze (416). Attribution to Donyatt confirmed by ICP-AES (footnote). Further stratigraphic analysis has shown that this context should be in Period IIIa.

13.* Bodysherds of a tall-necked jug. Pronounced surface rilling in Exmoor/Quantocks-derived fabric group, the precise angle of the sherds uncertain. Thick mid green glaze with heavy black spotting (559).

13a. Not drawn—sherds from a similar jug with a thumbed base (559).

Period V: Dissolution deposits of 1536 or shortly after

This important group is datable by context after 1536. It contains a variety of typical early 16th-century wares: the Beauvais drinking jugs, South Netherlands Maiolica, Raeren stonewares, Tudor Green wares and South Somerset vessels which correspond closely in style to the products of Donyatt site 3, period 4 (Coleman-Smith and Pearson 1988) also datable to the early 16th century. The stonewares include no Frechen sherds, which arrived in bulk on the English market after *c.* 1550. The group is thus datable to 1536–*c.* 1550; like many groups in contexts of this sort it probably consists entirely of ceramics discarded at the Dissolution.

14. Rim of coarse unburnished unglazed Merida-type ware, with light red surfaces, described in thin-section (Appendix 1). The vessel form is either a standing or a barrel costrel (cf. e.g. Hurst 1977, 97, Nos 42–3, 50–1) (423).

15. Rim of Merida-type ware, described in thin-section (Appendix 1). Areas of black internal and external sooting, as often seen on vessels of this fabric. Perhaps from a globular jug; Fig. 4 shows a reconstruction based on a complete Merida-type jug from Kingman Cove, Newfoundland (unpublished, Museum of Newfoundland) (336).

16. Sherds from the rim and handle, with overlapping bodysherds, of a Beauvais yellow-glazed white ware drinking jug with the edge of circular applied medallion (Hurst 1971; Hurst *et al.* 1986, 106–8) (336, 361; sherds in 474 (Period IVa) may be the same vessel).

16a (Not drawn). Sherds of at least one other similar yellow-glazed Beauvais drinking jug (319, 422, 459).

17. Neck of an Italian maiolica flower vase with handle stub (probably a ring handle but this is not certain), fine cream fabric and bright all-over-blue painting. *Published*: Allan 1999, 165, Fig. 12.2, No. 49. Submitted for ICP-AES analysis—see Hughes below; shown to be of Tuscan origin (439).

18. Bodysherd of a South Netherlands Maiolica flower vase with part of a typical dull blue-painted trigram 'YHS' within a circular frame. Presumably from a ring-handled vase as shown in the reconstruction of the body form. *Published*: Allan 1999, 165, Fig. 12.2, No. 48, where the other south-western finds of this type are also discussed. They form a higher proportion of the imports on monastic sites than on secular ones in the South West (*ibid.*, 158) and this may reflect their religious associations (Blake 1999, 28–30, where it is argued that they may have been used in private devotion and linked specifically in Britain to the cult of the Holy Name of Jesus.) (534).

Flower vases such as this, with the characteristic YHS trigram, have until recently been accepted as being of South Netherlands (i.e. Antwerp) manufacture. Recent Neutron Activation Analysis by the British Museum has, however, revealed a more complex picture, showing that some examples were in fact made in Italy (Hughes and Gaimster 1999; see Appendix 3 below). ICP-AES analysis confirms an Antwerp source (*ibid.*).

19. Base of an unglazed North Devon calcareous ware jug.

20.* Rim, body and handle in Quantocks/Exmoor-derived fabric, with rounded chert, grey sandstone, fine white mica and shell fragments mixed in the angular to round sand filler. Hand-made; incised lines, reduced grey core, oxidised surfaces, patchy dark green glaze with much black iron speckling. Medieval form, ?residual (422).

21.* Typical North Devon gravel-tempered bowl, sooted externally, with usual internal glaze (423).

South Somerset wares:

The following have the sandy, predominantly oxidised, fabric of South Somerset wares and all except No. 28 match closely the Donyatt kiln waste. However, whilst ICP-AES analysis confirms that Nos 30, 35, 37 and 38 are indeed Donyatt products, Nos 22–3, 25–7, 29, and 31–3 are in fact from kilns in south-west Somerset. The other sherds were not analysed.

22–3 Rims of chafing dishes with rectangular or cruciform cut-outs below the rim, 22 also with circular piercing (319 and 336).

24–27 Sherds from two-handled cups (336, 310, 336, 458).

28. Bowl, hard red fabric with white inclusions—not typical Donyatt ware. (R. C-S suggests possibly Wellington/Bridgwater). Hard reduced green internal glaze, the unglazed exterior heavily sooted (319, 357, 392).

29–31 Three cooking pots/jars with internal glaze (534, 336 and 422).

32. Small bowl form with internal glaze—perhaps from a pedestalled vase (see Fig. 4) (459).

33–38 Sherds from six jugs, 33 with strap handle slashed top and bottom (319); 34 a shoulder sherd with impressed combing through thin slip, perhaps from one of the other drawn vessels (310); 35 with incised wavy lines through slip and copper-green mottled glaze (582); 36 with vertical iron stripe; 37 with applied thumbed strip; 38 with slashing at junction of handle and rim and with patches of pale green glaze (347). R.C-S comments that, in addition to the published examples from Donyatt site 3, which match all these fragments, the recently-excavated Site 13 also produced many sherds of these types.

39. Sherd from the bowl of a chafing dish with traces of patchy internal slip and iron-speckled orange-brown glaze (342). For a reconstruction of the form see Fig. 4.

Sherds from 19th/20th-century deposits

40. Two joining sherds of an Isabela Polychrome (*azul y morada*) dish from the Seville area (Hurst 1995, 50; Gerrard *et al.* 1995, 284). Cream-buff fabric, described in thin-section (Appendix 1); plain tin-glazed back, upper surface painted with usual broad purple bands alternating with narrow blue ones; purple arc at centre; alternating blue and purple motifs on rim. Such vessels are typical of the early 16th century (Hurst 1995, 49) (419).
41. Typical Raeren drinking mug (Hurst *et al.* 1986, 196–7) (507).
41a. (Not drawn). Further sherds from standard Raeren mugs (303, 419, 507).
42. Handle of a jug or perhaps an aquamanile of Bristol Redcliffe ware. Pale-firing fabric with typical mid grey core, buff surfaces, copper-mottled mid green glaze. There is also a fragment of curving applied plastic ornament (303, 507).
43. Jug rim and twisted handle in unglazed North Devon calcareous ware of 16th-century type with edge of slip from glaze mix (308).
44. Jug body, wheel-thrown, in unglazed North Devon gravel-tempered fabric, late 15th- or 16th-century type (308).
45.* Jug handle, in unglazed Nether Stowey-type ware, described by Taylor (303).
46. South Somerset large bowl/pancheon with reduced internal green glaze and probable external sooting. The fabric is finer and harder than is typical of Donyatt. R.C-S suggests Wellington/Bridgwater as source (307). ICP-AES confirms a west Somerset source.
47.* Jug bodysherd of Exmoor/Quantocks-derived ware, oxidised internally, with incised lines surrounding an area of pale slip. Glaze is thick and green-brown over body. Probably West Somerset (422).
48. Body of a tall cup with corrugated sides. South Somerset fabric with pale grey core and black-spotted mid green internal and external glaze (458).
49. Jug rim with applied strip. South Somerset fabric with oxidised interior, thick external light to dark green glaze with iron bleeding (419).
50. (Not drawn). Bodysherd of a plain Cologne stoneware drinking jug with pale grey fabric and surfaces (309).
51. (Not drawn). Flat base of a large Merida-type vessel such as a standing costrel, *thin-sectioned*. Unstratified.

SUMMARY OF DATING EVIDENCE

Period Ia:	Sherd 1, after *c.* 1250.
Period IIa:	Sherds 2-5 collectively late 13th/early 14th century or a little later.
Period IIb:	Cross-fits with period IIa (see vessels 2 and 4); 'Donyatt-type' sgraffito in 617, 618; after 1300, probably 14C (? early or mid).
Period IIIa:	Donyatt-type slipware jug, 14–15C in 323, 326, 478; Donyatt-type late 15C/16C jug sherd in 416, but with 18C contamination.
Period IVa:	Drawn sherds, showing a mix of jugs in high medieval tradition (11, 13) with the new Donyatt-type wares. The latter are known to come into use by *c.* 1450 and are the sole jug type by *c.* 1500. Probably early to mid 15th century. There is a pronounced change in the ceramics above this horizon.

Period IVb: Raeren stoneware in 349, after *c.* 1470; South Somerset bowl in 464, after *c.* 1500. Early 16th century: South Somerset jug sherds, late 15C/early16C, in 522.

Period V: Published sherds, for which a date shortly after 1536 is acceptable.

Period VI: Staffordshire-type transfer-printed wares, white earthenwares, all post *c.* 1780 and misc. 19C stonewares, modern bricks, in 300, 301, 302, 303, 304, 307, 308, 309, 325, 410, 419, 421, 428, 450 (much post-1850).
Staffordshire grey and white stonewares, post *c.* 1720, in 334.
Bristol-Staffordshire feathered yellow slipwares and brown-glazed tankards, 18C, in 329, 420, 507; South Somerset 18C slipwares and sgraffito wares in 305, 313, 329, 420, 519.

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APPENDIX 1: A NOTE ON THE PETROLOGY OF THE SIXTEENTH-CENTURY IBERIAN POTTERY FROM CLEEVE ABBEY

By David F. Williams
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Each of the five Iberian vessels from Cleeve Abbey was thin-sectioned.

Unglazed Merida-Type Ware (sherds 14–15, 51 with further sherd in context 458)
All four sherds are in a hard, fairly smooth, light red micaceous clay (Munsell 10R 6/6 to 6/8). An examination in thin section suggests that these sherds can be divided into two distinct fabric groups. Sherds 15 and 51 contain frequent well-sorted grains of quartz, average size 0.05–0.25mm, and flecks of mica, mostly muscovite but with some biotite. Also present are a few small discrete grains of plagioclase felspar and some opaque iron oxide. This fabric is similar to a number of Merida-type sherds from Exeter previously analysed by the writer (Williams 1984, Fabric 1).

In contrast, the sherds 14 and 458 contain a much larger, ill-sorted, size-range of quartz grains, average size 0.20–0.70mm, discrete grains of potash and plagioclase felspar, strands of muscovite and biotite mica, a few grains of tourmaline and sparse fragments of a tourmaline-granite. Tourmaline has previously been noted by the writer in Merida-type ware from Spanish Armada wrecks (Williams 1979).

It is now realized that the so-called 'Merida Ware' term for Iberian red micaceous pottery is, strictly speaking, somewhat misleading (Hurst *et al.* 1986, 69). Instead, the sources for this distinctive pottery were almost certainly centred in the wider region of Alentejo/Merida. This region contains a wide geological range, including granites, sandstones, slates and other crystalline rocks from which the inclusions in the pottery derive, particularly the micas, felspars and rock fragments. It is, however, difficult to equate the above petrological results,

and those from the Armada wrecks quoted above, with Vince's statement that much of this type of pottery shares 'an identical fabric' (Gerrard *et al.* 1995, 288). Unfortunately, it is not clear from the latter work whether this 'standard' fabric is restricted to 'costrels', which may possibly have a limited area of production or includes other red micaceous forms as well. The writer would prefer to see 'Merida-Type' ware as the common red micaceous ware made at a number of places in this part of Portugal and Spain, with some variations occurring in the clays used and by implication the inclusions present.

Isabela Polychrome dish (No. 40)

Thin-sectioning shows that the principal non-plastic inclusions consist of frequent silt-sized grains of quartz and flecks of mica, together with some small pieces of cryptocrystalline limestone. A similar range and texture of inclusions has previously been noted in a petrological examination of two sherds of Isabela Polychrome from Exeter (Allan 1995, 309, Nos 40 and 45).

Seville is thought to be a source for this pottery (Hurst *et al.* 1986, 54–7). With this in mind, a fabric comparison was made between the Cleeve Abbey sherd and a sample of local clay from Seville. The later was fired, thin sectioned and studied under the petrological microscope. The range and texture of the non-plastic inclusions found in the clay compare well with the Isabela Polychrome dish. This is another useful piece of corroborative evidence for a Seville origin, but as quartz, mica and limestone are not uncommonly found in many classes of pottery it cannot be said to be at all conclusive.

APPENDIX 2: PETROLOGICAL STUDY OF THE TEMPER OF THE SOUTH-WEST ENGLISH POTTERY FROM CLEEVE ABBEY

By Roger T. Taylor

Some 25 medieval vessels from Cleeve Abbey were examined by the writer under a binocular microscope at 20× magnification without the use of thin-sectioning. Vessels were inspected along their broken edges and across their exposed surfaces. This kind of examination allows observations to be made about the surface appearance of common minerals which can aid recognition of their sources, and entails study of a much wider surface area than the conventional thin-section of ceramic studies. Ideally inspection would have been combined with thin-sectioning. The purpose of the exercise was first to check the validity of the identifications made solely on a visual inspection by John Allan, and second to make progress in identifying the sources of these wares. Comparative material from the kiln sites at Donyatt, Barnstaple, Nether Stowey and Crowcombe was also examined, as were selected samples from consumption sites in Poole, Bristol and Exeter.

Exeter fabric 40

Two jugs identified by visual examination (Nos 3 and 4) and one possible example (No. 1) were studied, alongside a dozen vessels from excavations in Exeter which are published as examples of this fabric. The results of this exercise deserve fuller presentation than would be appropriate here, so will be published elsewhere and summarized only briefly here. Exeter fabric 40 has a fine clay matrix tempered with abundant fine, distinctly angular, quartz sand with a little very fine white mica. Among the fine sand are larger quartz sand grains (up to 0.5 mm), seen repeatedly on Exeter specimens, which have a polished surface, indicating an origin in a modern marine or beach sand such as one would expect on a coastal or estuarine site. Conditions of this sort exist in the Exe and Teign estuaries. Given the concentration of finds around Exeter and the fact that finds are less common in Newton Abbot, with the documentary evidence for medieval potteries near the city, the vicinity of Exeter

seems the most likely production area. This suggestion may be supported by the presence of very sparse and small dark crystalline grains which appear to be basic igneous rock fragments, such as would be derived from the Permian rocks which outcrop on the flanks of the Exe estuary and in its hinterland.

The Cleeve sherds Nos 3 and 4 contain less fine sand filler than is typical of Exeter fabric 40 but No. 3 does contain the distinctive rare rounded and polished grains and is therefore in the Exeter group. No polished grains were seen in No. 4 but it contains one large fragment of white vein quartz, a mineral typical of the area west of the Triassic. Given that the fine red fabric is typical of the area of Exeter eastward, the Exeter area is the most likely source for this too.

Sherd No. 1, the possible example of fabric 40, contains the usual fine-grained angular quartz sand (both clear grains and others stained pinkish-brown) with a little fine white mica and some soft white platey grains of shell. All these indicate a general similarity to Exeter fabric 40 but no distinctive grains which would provide a more conclusive identification were found.

Poole-type white ware

The one vessel from Cleeve (No. 2) was examined with two sherds from excavations in Poole, Dorset. They are virtually identical to one another in temper, as well as in glaze and decoration, and surely come from the same source. The body is a smooth white clay with some very fine white mica inclusions of 0.05 mm or less. The temper consists of angular to sub-angular clear quartz sand with some sub-rounded grains, generally less than 0.3 mm across. There are some reddish and brown ferruginous patches and grains. The body is identifiable as Dorset pipe clay and the temper could be obtained from fluvial sands associated with these deposits in the Reading Beds. A source very close to Poole is likely.

North Devon medieval coarsewares

Three examples of the fabric (No. 7 and bodysherds in period IIIb contexts) were examined and compared to kiln waste from Green Lane, Barnstaple. The three Cleeve samples are very similar to one another, containing much coarse and poorly sorted temper, comprising plentiful angular white and clear colourless quartz grains with a mix of fine-grained micaceous sandstone (some rather silvery from the mica within), siltstone and slate up to 2mm. These do match some Barnstaple samples. It should be emphasised, however, that the range of inclusions present in these samples is really no different from those in the Exmoor/Quantocks-derived group described below and the petrology of the temper would fit as well with a source in Somerset as with a North Devon source. Identification specifically as North Devon pottery, rather than North Devon/West Somerset, thus depends entirely on visual matching of hand specimens.

North Devon gravel-tempered ware

The bowl fragment No. 21 was examined. Its temper is predominantly clear angular quartz, but some of the grains are sub-rounded. There are also sparse brown sandstone fragments, a few grains of clear felspar and rare rounded black tourmaline, with a little white mica. The fabric was compared to three typical late 17th-century sherds of North Devon gravel-tempered ware. These contained much angular clear and white quartz but not the rounded quartz or rock fragments of the early 16th-century sherd. If these are typical, this suggests that the North Devon potters became more rigorous in their selection of temper during the 16th and early 17th centuries, abandoning sources with mixed temper in favour of those which consisted almost entirely of clean angular quartz.

Exmoor/Quantocks-derived wares

The largest single group of sherds examined has essentially the same components, although the proportion of temper differs from sherd to sherd. These wares are predominantly sand-tempered, the sand being mainly angular but with some well-rounded quartz grains (occasionally a few polished), 0.2 to 0.8 mm in size, mainly clear and colourless. Mixed with these are sparse grains of fine-grained sandstone (some recognisably quartzose/quartzitic) up to 0.5 mm, sparse rounded medium-grey slate up to 0.5 mm, a few possible platey shell fragments, and ubiquitous fine white mica.

The temper shows the kind of mix which could be expected in fluvial deposits derived from the slates, sandstones and shales of Exmoor or the Quantocks. The Nether Stowey 'kiln waste' is merely one extremely coarse version of this material and sites in that area could be one source of much of this material. Potential production centres could however extend as far west as Barnstaple and the Taw in North Devon and as far east as Taunton and Bridgwater.

Nether Stowey-types wares

Three Cleeve sherds—the flat handle No. 45, a rod handle fragment and a basal angle sherd—were examined alongside a group of Nether Stowey sherds. Each shows complex temper; in each Cleeve sherd and in most instances in the kiln waste this is coarse, abundant and distinctive, as follows:

(i) Red mudstone: soft, well rounded to sub-rounded terracotta-coloured grains; no grains apart from very fine white mica and possible occasional fine quartz sand. These are weathered Mercia Mudstone fragments.

(ii) Quartz—rounded grains 0.3 to 0.7 mm, often clear; clear white angular grains up to 1.5 mm.

(iii) Micaceous slate—white very soft with rounded to sub-rounded outlines up to 3 mm, composed of finely divided white micaceous slate, sometimes with discrete mica flakes. (The pale colour of the slate may result from firing in the kiln).

(iv) Micaceous silty slate or fine-sandy slate, whitish and similar to the micaceous slate but with some quartz silt or fine sand. Some are pink-spotted by iron.

There are also sparse grains of the following: sandstone (fine grained quartz sandstone, sparse grains up to 0.5 mm); tourmaline (sparse black rounded grains *c.* 0.3 mm); felspar (a single cleaved white grain was seen) and white mica (mainly fine flakes *c.* 0.1 mm or less with occasional larger flakes up to 0.25 mm).

Both the Quantocks and Exmoor would provide mineral suites of this sort, which would then be transported downstream by river action. The Cleeve specimens are remarkably close to the Nether Stowey sherds and it seems very probable that they come from there.

APPENDIX 3: ICP-AES ANALYSIS OF SOUTH SOMERSET POTTERY AND SOUTH NETHERLANDS TIN-GLAZED MAIOLICA FROM CLEEVE ABBEY

By Michael J. Hughes

INTRODUCTION

This investigation was undertaken to establish the place of manufacture of two classes of pottery found at Cleeve. First, sherds of South Somerset type which matched visually the Donyatt kiln finds were analysed to examine whether they actually came from Donyatt or

from other kilns working in the same tradition spread across the southern part of the county. Two possible geological zones are involved (whose clays should be readily distinguishable chemically): the Mercia Mudstones on which Cleeve stands and which extend westwards, and the Jurassic Lias clays which lie to the east, including Donyatt and other potteries. Second, tin-glazed pottery of South Netherlands type has been thought straightforward to recognise, but recent chemical analyses have shown the presence of some north Italian pieces of very similar forms and decoration.

ANALYSIS AND STATISTICAL METHODS

Chemical analyses of pottery from consumer sites can be compared with the analyses of pottery from potential kiln sources to look for close similarities. Such investigations are known as provenance studies and are well established.[1] The method used here was that of Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES), a technique for chemical analysis for major and trace elements in the body fabric of the pottery, which is being increasingly used in such work. A significant feature of ICP-AES is that it is a widely-available analytical technique, much used in geological laboratories,[2] and it rapidly gives reliable results for a large number of chemical elements. An earlier unpublished comparison between Neutron Activation Analysis (widely used for provenance studies up to the present) and ICP-AES on the same samples of pottery was very satisfactory. It showed practically identical statistical results for Principal Components Analysis, leading to the same interpretation and groupings of samples from different sites.[3] There has apparently been only one previous very small analytical provenance investigation of this type on medieval and later pottery of this area of England.[4]

A powdered sample of the body fabric of each ceramic was obtained by drilling the sherds with a solid 2 mm dia. tungsten carbide drill, and sent for analysis for 29 elements by ICP-AES in the Department of Geology at Royal Holloway, University of London.[5] The results of the analyses are given in Tables 7 (South Somerset) and 10 (South Netherlands) and a summary showing the average composition of the sherds from the Somerset and Devon kiln sites is listed in Table 8.

Because the analyses include a large number of elements, interpretation has to be made through multivariate statistical methods which examine all the elemental results simultaneously. Successful methods of examining the data, widely used in archaeological science, are the techniques of Principal Components, Discriminant and Cluster Analysis, and descriptions of their application to archaeology are given elsewhere.[6] For this set of samples, Principal Components and Discriminant Analysis proved very suitable for interpretation. As is customary, the analyses were first transformed to logarithms to eliminate problems with different magnitudes of element concentrations; the statistical tests were carried out with the SPSS computer package.[7]

INTERPRETATION OF THE ANALYSES

South Somerset Wares

The accurate identification of the place of production of South Somerset wares presents problems. To settle the question of whether all those identified as such among the pottery finds from Cleeve Abbey were correctly recognised as Donyatt products, samples submitted for analysis by ICP-AES were taken of a selection of representative sherds of this ware from Cleeve Abbey and from kilns at Donyatt (sites 3, 4 and 13), Nether Stowey, Crowcombe and

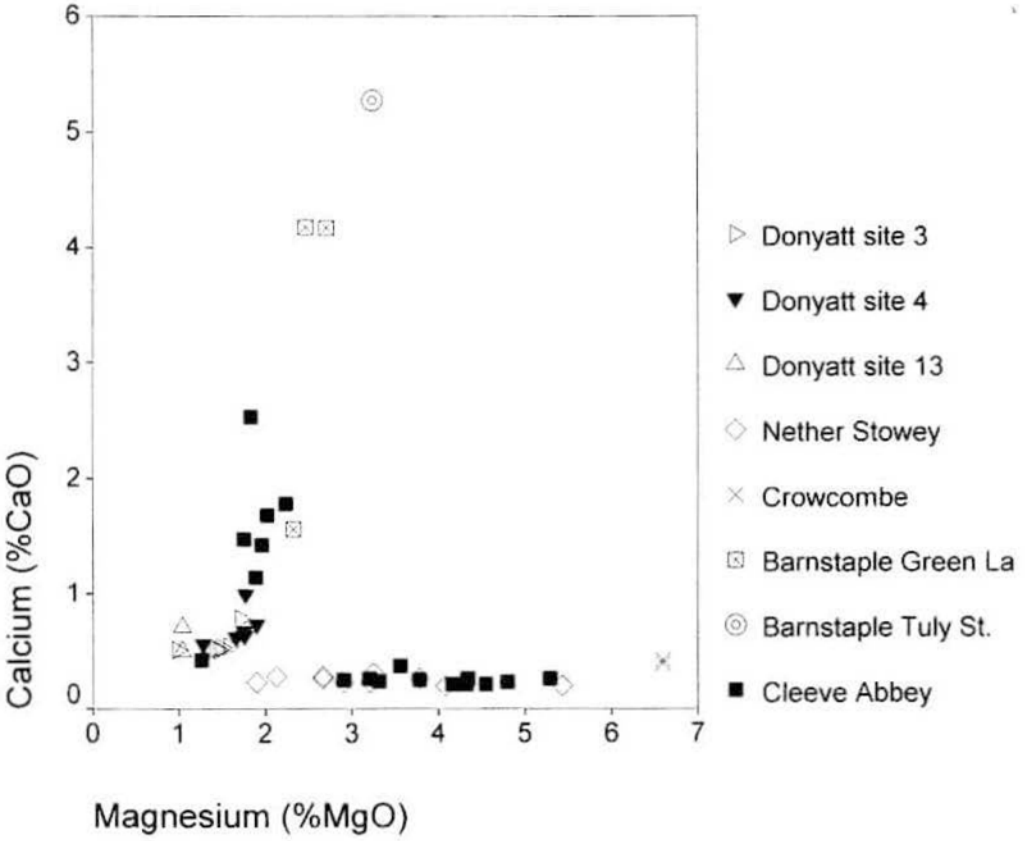

Fig. 5 Plot of the elements calcium and magnesium in South Somerset pottery from Cleeve Abbey and kilns in Somerset and Devon.

Barnstaple (Green Lane and Tuly Street kilns). The full list of these and the Cleeve Abbey sherds tested is given in Table 6, and the analyses in Table 7. In Table 8, which summarises the results on the kilns, there are obvious differences in their average compositions, including the major elements calcium, magnesium and potassium. Figure 5 shows a plot of the first two elements for all the kiln and Cleeve Abbey sherds. The Nether Stowey and Crowcombe kilns are characterised by low calcium but relatively high magnesium (*c.* 2–6.5%). All the Donyatt kilns have lower magnesium (less than 2%) but rather higher calcium, whereas the Barnstaple kilns have higher concentrations of both. The Cleeve Abbey pottery falls into three distinct groups which correspond to these divisions, implying that three different origins are represented.

Principal Components Analysis (PCA) is a good first stage for obtaining an overall view of a set of analysis results. It was first tried with eighteen of the elements[8] in Table 7 including calcium and magnesium, but calcium was found to influence the statistics unduly, which is undesirable.[9] Removing it and re-running the PCA led to a more even spread of elements contributing to the components. Figure 6 shows a plot of these first two principal components arising from the ICP-AES data. This is a kind of map of the overall chemistry of

Table 6: List of pottery analysed, from Cleeve Abbey and kilns in north Somerset and Devon

(ICP No.)	*Kilns:*
1–6	Donyatt site 3 kiln (Don 3/3)
7–12	Donyatt site 4 kiln (S4 F7)
53–4	Donyatt site 13 kiln
21–6, 37–40	Nether Stowey kiln 1970
41–2	Crowcombe kiln
45–7	Barnstaple Green Lane kiln 1979
55	Barnstaple, Tuly Street kiln
	Pottery from Cleeve Abbey: (Numbers in brackets are published drawing numbers)
Medieval	
13	1981: 416 (12)
14	1980: 344 (10)
15	1981:478 III 6 (8)
Post-Medieval	
16	1980–2 336:V (30)
17	1982: 582 (35)
18	1980–2 459: V (32)
19	1980:307 (19C) (46)
20	337 (28)
27	1980–82 336:V (26)
28	1980 347 (38)
29	1980–82 336:V (37)
30	1980–82 319:V (22)
31	1980–82 310: V (25)
32	1980–82 319: V (33)
33	1980–82 458:V (27)
34	1980–82 422:V (31)
35	1980–82 336:V (23)
36	1980–82 534:V (29)

the fabric of each sherd, based on many elements. Sherds which have very similar overall analyses will plot close to each other, indicating a common clay source. This will suggest they were made at the same kiln site.

From the Principal Components Analysis there is an overall composition difference between the products of all the kilns analysed, of which the differences in calcium and magnesium (Figure 5) are an indication. This is an important conclusion since such differences allow the assignment of 'unknowns' to their place of production. The main differences in composition between the Donyatt and the Nether Stowey and Crowcombe material lay in the elements potassium, vanadium, chromium, and titanium. What is particularly noticeable is that the pottery from Cleeve Abbey falls into distinct composition groups, rather than being scattered all over the Figure, implying a consistency in composition and therefore origin, although at least three different groups of pottery are present.

The three *medieval* sherds from Cleeve Abbey (samples 13–15) all have different compositions. Sherds 13 and 15 do have similarities to each other and to the Donyatt kiln material, with 13 closest to site 4 and 15 to site 13. In contrast, the lobed cup (sample 14) fell among the Barnstaple Green Lane kiln sherds and is the only item among the Cleeve pottery of any period tested here which is clearly from its chemistry a Barnstaple product.

Table 7: Analyses of pottery from Cleeve Abbey and kiln sites by ICP-AES

ICP	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Ba	Co	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb
Kiln sites:																													
Donyatt site 3																													
1	18.82	7.23	1.49	0.53	0.63	2.62	0.88	0.12	0.03	464	33	130	29	122	60	18	118	143	20	107	62	39	67	35	4.8	1.3	3.3	1.9	137
2	14.61	5.94	1.46	0.51	0.19	2.15	0.60	0.09	0.03	337	19	109	108	103	78	15	69	125	25	135	54	37	57	34	6.9	1.3	3.9	2.0	3657
3	19.41	7.74	1.71	0.78	0.25	2.67	0.79	0.19	0.10	399	79	141	61	117	133	22	79	174	43	192	69	52	98	58	9.5	2.2	7.4	3.8	889
4	16.56	6.46	1.42	0.52	0.19	2.59	0.82	0.12	0.06	327	24	124	32	95	76	16	65	155	23	116	55	38	66	38	6.1	1.3	3.9	2.0	553
5	18.20	6.84	1.58	0.54	0.66	2.60	0.91	0.15	0.04	440	24	124	25	108	65	18	141	150	16	126	71	40	67	30	6.2	1.2	2.9	1.8	522
6	15.32	5.57	0.98	0.51	0.06	1.63	0.68	0.72	0.02	316	51	108	32	67	42	15	62	130	17	86	64	26	55	24	0.9	1.2	2.6	1.8	72
Donyatt site 4																													
7	19.18	8.37	1.75	0.67	0.17	2.66	0.82	0.08	0.13	362	58	134	46	119	147	22	75	164	36	167	93	46	140	54	9.2	2.1	6.7	3.8	664
8	14.82	6.19	1.28	0.56	0.08	1.92	0.63	0.13	0.01	357	15	109	27	82	42	14	67	118	16	71	59	31	56	25	5.6	0.9	2.8	1.7	2444
9	18.24	7.67	1.77	0.99	0.14	2.59	0.81	0.12	0.04	337	41	128	33	123	86	18	85	160	30	116	76	45	76	41	5.3	1.6	4.8	2.8	1095
10	18.63	8.59	1.76	0.63	0.16	2.65	0.77	0.09	0.07	316	58	131	51	120	121	21	67	161	34	155	89	42	86	43	5.6	1.8	5.7	3.3	1666
11	17.75	13.57	1.66	0.62	0.16	2.51	0.73	0.09	0.08	338	70	143	45	116	159	20	70	157	39	165	61	46	63	46	6.2	2.3	6.6	3.7	714
12	21.42	7.69	1.90	0.73	0.34	2.83	0.93	0.13	0.11	406	34	154	42	123	230	22	91	178	39	191	89	54	105	49	10.1	1.9	6.2	3.3	965
Donyatt site 13																													
53	20.7	5.15	1.04	0.5	0.35	2.5	1.04	0.09	0.01	351	10	128	23	59	38	17	67	122	13	73	70	31	69	31	4.4	0.7	1.3	1.0	
54	19.08	6.13	1.04	0.71	0.44	2.52	0.93	0.13	0.02	346	10	126	28	59	34	16	81	145	11	70	64	34	61	32	5.0	0.8	1.4	1.0	
Nether Stowey																													
21	15.26	6.85	3.21	0.23	0.12	3.98	0.70	0.31	0.07	905	50	97	17	111	49	15	44	96	22	183	54	40	65	38	2.8	1.2	4.1	2.1	43
22	16.28	6.20	5.43	0.20	0.17	3.73	0.81	0.11	0.06	548	21	104	35	152	53	16	40	95	30	179	62	45	71	41	8.3	1.9	4.9	2.4	12
23	16.39	5.88	2.13	0.28	0.14	3.39	0.75	0.97	0.06	1388	16	101	26	92	65	15	49	88	26	179	72	43	67	40	9.6	1.6	4.8	2.6	11
24	16.55	6.61	2.67	0.28	0.15	3.67	0.74	0.27	0.06	1120	18	108	31	84	59	15	54	94	24	160	55	46	69	41	8.7	1.3	4.3	2.2	20
25	16.18	6.73	1.90	0.23	0.10	3.26	0.71	0.31	0.06	1207	17	99	45	67	55	15	38	91	22	158	57	40	62	34	7.7	1.5	4.1	2.1	14
26	15.55	6.08	4.08	0.20	0.18	3.77	0.71	0.12	0.06	1067	17	94	43	107	44	14	52	86	17	172	50	37	65	28	6.2	1.3	3.3	1.8	21
37	17.01	6.99	2.91	0.23	0.15	3.88	0.75	0.32	0.10	857	21	104	33	94	57	15	51	96	21	172	44	44	77	38	8.0	1.1	3.8	1.9	27
38	17.67	7.71	2.67	0.26	0.22	4.18	0.76	0.29	0.07	851	24	104	39	99	59	17	53	107	26	233	52	48	84	43	9.2	1.8	4.8	2.5	21
39	15.28	7.69	3.78	0.26	0.16	3.68	0.65	0.13	0.11	2049	30	89	50	106	120	14	66	84	16	213	38	40	88	28	7.2	1.2	3.3	1.7	20
40	16.20	5.73	3.25	0.31	0.12	3.53	0.68	0.50	0.07	1441	15	97	23	95	53	14	53	85	19	159	53	42	74	29	8.1	1.4	3.8	1.8	17

Table 7: *continued*

ICP	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Ba	Co	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb
Crowcombe																													
41	16.50	6.73	6.59	0.42	0.24	4.61	0.72	0.10	0.10	482	25	101	24	207	52	15	48	96	25	495	54	43	64	29	6.5	1.6	4.1	2.0	235
42	17.01	6.92	6.59	0.39	0.23	4.84	0.74	0.10	0.12	504	37	106	20	201	53	16	48	101	27	269	48	46	68	33	5.4	1.6	4.6	2.0	315
Barnstaple Green Lane kiln																													
45	16.83	6.43	2.71	4.17	0.34	3.17	0.72	0.41	0.10	423	26	102	25	108	52	15	178	105	20	103	52	39	67	29	5.4	1.2	3.4	1.6	176
46	16.40	6.87	2.47	4.18	0.44	3.13	0.75	0.88	0.13	455	22	102	25	98	52	15	227	107	21	95	48	38	67	34	6.2	1.4	3.6	1.6	307
47	17.71	6.78	2.33	1.56	0.32	3.22	0.78	1.69	0.08	491	24	111	34	96	58	16	203	120	24	119	58	42	78	30	7.0	1.6	3.9	2.0	2490
Barnstaple Tuly Street kiln																													
55	17.82	6.51	3.24	5.27	0.51	3.39	0.82	0.29	0.11	405	29	114	29	96	65	17	185	112	23	117	57	52	87	55	8.3	1.4	3.5	1.5	
Pottery from Cleeve Abbey																													
Assigned by analysis to Donyatt																													
13	20.18	6.98	1.96	1.42	0.34	3.03	0.81	0.20	0.05	393	38	139	41	161	103	20	178	196	22	159	80	35	64	26	3.4	1.0	3.4	2.3	609
15	18.86	6.62	1.26	0.42	0.08	2.52	0.88	0.19	0.02	462	36	125	26	116	37	17	66	148	13	73	78	30	52	21	0.7	0.8	2.3	1.6	3148
16	16.93	8.27	1.83	2.53	0.05	2.89	0.72	0.21	0.16	346	50	127	62	84	87	19	88	181	30	136	63	42	72	37	4.9	1.5	4.8	2.6	275
17	20.14	6.71	1.75	1.47	0.31	2.88	0.80	0.77	0.41	1124	27	127	128	127	116	20	139	160	24	154	77	34	67	26	5.9	1.3	6.0	2.3	4112
28	20.37	6.30	2.02	1.68	0.31	3.01	0.84	0.25	0.05	409	38	140	37	169	91	20	156	183	26	163	93	38	74	36	5.1	1.5	4.1	2.7	708
29	20.24	6.90	1.89	1.14	0.32	2.95	0.80	0.27	0.08	480	58	138	41	172	150	19	168	191	21	165	63	33	79	25	4.3	1.1	3.8	2.2	343
Assigned by analysis to west Somerset (cf Nether Stowey/Crowcombe)																													
18	15.44	5.99	3.56	0.37	0.11	5.10	0.63	0.13	0.16	1406	21	86	21	106	48	14	65	82	19	296	47	40	59	34	6.2	1.1	3.6	1.7	516
19	16.74	6.80	2.91	0.25	0.30	5.40	0.73	0.06	0.09	868	36	99	23	103	55	15	63	94	31	276	52	48	72	52	8.3	1.8	5.3	2.3	728
20	18.39	7.49	3.20	0.26	0.26	5.10	0.80	0.05	0.13	963	37	112	27	135	61	18	57	106	30	368	46	54	96	52	8.2	1.8	5.2	2.3	235
27	16.71	6.33	4.32	0.21	0.16	5.36	0.73	0.08	0.07	535	18	104	18	130	48	16	50	106	21	353	67	34	62	24	5.6	1.0	3.5	2.0	260
30	16.20	6.16	4.16	0.21	0.12	3.34	0.68	0.07	0.10	569	20	93	21	109	51	14	49	101	19	327	39	40	67	29	6.6	1.6	3.7	1.7	278
31	15.66	6.19	4.55	0.21	0.16	4.87	0.64	0.07	0.09	511	26	85	16	133	51	14	52	92	18	407	48	34	80	23	5.7	1.1	3.2	1.7	255
32	16.79	6.66	4.80	0.23	0.20	4.77	0.67	0.07	0.13	544	32	94	23	150	55	15	51	99	19	442	48	35	78	24	5.5	1.2	3.6	1.7	925
33	15.38	5.80	3.32	0.24	0.31	4.36	0.62	0.08	0.10	537	32	85	23	114	61	14	58	93	22	269	36	41	105	37	6.9	1.2	4.2	1.8	6765
34	16.32	7.30	5.29	0.26	0.26	4.18	0.70	0.08	0.08	550	24	105	24	170	52	15	54	96	23	282	45	43	60	32	7.1	1.5	3.9	1.9	118
35	14.64	5.63	4.34	0.26	0.19	4.29	0.59	0.09	0.09	607	18	87	63	136	57	13	54	86	23	328	33	40	57	31	7.1	1.3	4.2	1.7	2211
36	15.35	6.37	3.78	0.25	0.15	4.21	0.63	0.13	0.12	684	28	91	19	120	49	14	51	85	22	312	35	45	64	30	6.1	1.4	3.9	1.6	720
Assigned by analysis to Barnstaple																													
14	17.52	5.74	2.24	1.78	0.49	3.12	0.82	0.19	0.17	637	41	108	24	84	51	16	112	118	20	97	68	40	72	36	3.4	1.3	3.8	1.8	1011

ICP: analysis number The elements from Al2O3 to MnO inclusive are quoted in weight percent, and the rest in parts per million.

Element symbols: Al2O3:aluminium; Fe2O3: iron; MgO: magnesium; CaO: calcium; Na2O: sodium; K2O: potassium; TiO2: titanium; P2O5: potassium; MnO: manganese; Ba: barium; Co: cobalt; Cr: chromium; Cu: copper; Li: lithium; Nb: niobium; Ni: nickel; Sc: scandium; Sr: strontium; V:vanadium; Y: yttrium; Zn: zinc; Zr: zirconium; La: lanthanum; Ce: cerium; Nd: neodymium; Sm: samarium; Eu: europium; Dy: dysprosium; Yb: ytterbium (La to Yb are rare earth elements); Pb: lead.

Table 8: Average analyses on pottery from kilns in North Somerset and Devon, analysed by Inductively-Coupled Plasma Atomic Emission Spectrometry (ICP-AES)

Kiln	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Ba	Co	Cr	Cu	Li	Nb	Ni	Sc	Sr	V	Y	Zn	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb
Donyatt 3, mean (6)	17.15	6.63	1.44	0.57	0.33	2.38	0.78	0.23	0.05	381	38	123	48	102		76	17	89	146	24	127	63	39	68	37	5.7	1.4	4.0	2.2	971
s.d.	1.96	0.81	0.25	0.11	0.25	0.41	0.12	0.24	0.03	63	23	13	32	20		31	3	33	18	10	36	7	8	15	11	2.8	0.4	1.7	0.8	1349
Donyatt 4, mean (6)	18.34	8.68	1.69	0.70	0.18	2.53	0.78	0.11	0.07	353	46	133	41	114		131	20	76	156	32	144	78	44	88	43	7.0	1.8	5.5	3.1	1258
s.d.	2.15	2.54	0.21	0.15	0.09	0.32	0.10	0.02	0.04	31	20	15	9	16		65	3	10	20	9	43	15	8	31	10	2.1	0.5	1.5	0.8	683
Donyatt 13, mean (2)	19.89	5.64	1.04	0.61	0.40	2.51	0.99	0.11	0.02	349	10	127	26	59	18	36	17	74	134	12	72	67	33	65	32	4.7	0.8	1.4	1.0	
s.d.	1.15	0.69	0.00	0.15	0.06	0.01	0.08	0.03	0.01	4	0	1	4	0	1	3	1	10	16	1	2	4	2	6	1	0.4	0.1	0.1	0.0	
Nether Stowey, mean (10)	16.24	6.65	3.20	0.25	0.15	3.71	0.73	0.33	0.07	1143	23	100	34	101		61	15	50	92	22	181	54	43	72	36	7.6	1.4	4.1	2.1	21
s.d.	0.75	0.69	1.03	0.04	0.03	0.27	0.05	0.25	0.02	416	11	6	10	22		21	1	8	7	4	24	9	3	9	6	1.9	0.3	0.6	0.3	9
Crowcombe, mean (2)	16.76	6.83	6.59	0.41	0.24	4.73	0.73	0.10	0.11	493	31	104	22	204		53	16	48	99	26	382	51	45	66	31	6.0	1.6	4.4	2.0	275
s.d.	0.36	0.13	0.00	0.02	0.01	0.16	0.01	0.00	0.01	16	8	4	3	4		1	1	0	4	1	160	4	2	3	3	0.7	0.1	0.4	0.0	57
Barnstaple, Green Lane, mean (3)	16.98	6.69	2.50	3.30	0.37	3.17	0.75	0.99	0.10	456	24	105	28	101		54	15	203	111	22	106	53	40	71	31	6.2	1.4	3.6	1.7	991
s.d.	0.67	0.23	0.19	1.51	0.06	0.05	0.03	0.65	0.03	34	2	5	5	6		3	1	25	8	2	12	5	2	6	3	0.8	0.2	0.3	0.2	1300
Barstaple, Tuly St. (1)	17.82	6.51	3.24	5.27	0.51	3.39	0.82	0.29	0.11	405	29	114	29	96	18	65	17	185	112	23	117	57	52	87	55	8.3	1.4	3.5	1.5	

Element symbols: Al2O3:aluminium; Fe2O3: iron; MgO: magnesium; CaO: calcium; Na2O: sodium; K2O: potassium; TiO2: titanium; P2O5: potassium; MnO: manganese; Ba: barium; Co: cobalt; Cr: chromium; Cu: copper; Li: lithium; Nb: niobium; Ni: nickel; Sc: scandium; Sr: strontium; V:vanadium; Y: yttrium; Zn: zinc; Zr: zirconium; La: lanthanum; Ce: cerium; Nd: neodymium; Sm: samarium; Eu: europium; Dy: dysprosium; Yb: ytterbium (La to Yb are rare earth elements); Pb: lead.

The elements from Al2O3 to MnO inclusive are quoted in weight percent, and the rest in parts per million.

mean: average of the analysis results for that kiln (the number in brackets is the number of sherds analysed) ; s.d.: one standard deviation about the mean.

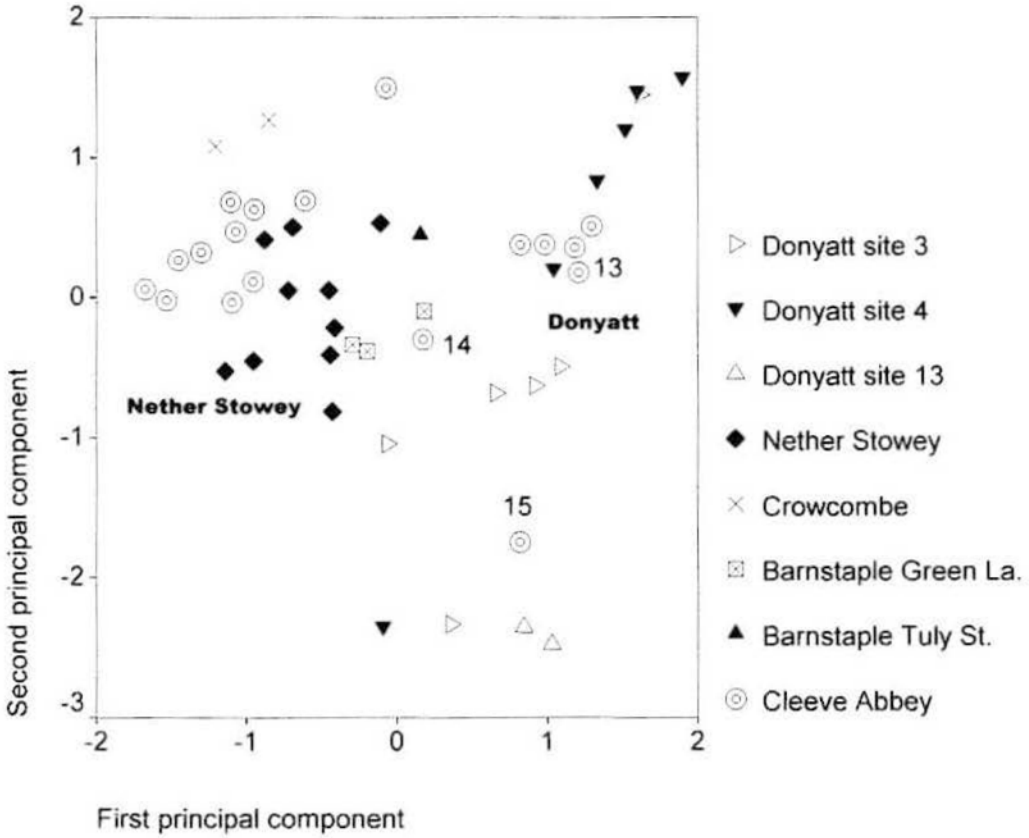

Fig. 6 Plot of the first two principal components arising from ICP-AES analyses of South Somerset pottery from Cleeve Abbey and kilns in Somerset and Devon, containing respectively 42% (first component—horizontal axis) and 22% (second—vertical axis) of the variance in the analyses. This is a type of chemical 'map' showing which sherds are closest to each other in chemistry of body fabric, and indicating that there are differences in composition between the products of kilns in Somerset and Devon. The numbers 13–15 on the Figure indicate the three medieval sherds from Cleeve Abbey. (The loadings for the first six elements in descending order of contribution are: PC1—Cr (.96), Sc (.89), V (.88), Al (.82), Mg (-.82), K (-.82); PC2—Li (.70), Y (.68), La (.63), Ni (.55), Zn (.52), Ce (.52)).

The *post-medieval* pottery from Cleeve divided into two groups, shown on Figure 6. One group matches quite closely the Donyatt kiln sherds, especially those of site 4 (which specialised in producing barrel costrels), though they are slightly separate from the latter on the Figure, implying production at a closely-related site at Donyatt. Since the Donyatt clay sources are a series of small individual clay lenses,[10] it is not surprising that the three kiln sites sampled have differing clay compositions, and the group of Cleeve sherds differs slightly from them, though being of the general chemistry of Donyatt products. However, more than half the Cleeve pottery (11 sherds) formed a second group which plots between the Nether Stowey and Crowcombe kilns of west Somerset. The latter group seems to be from an unsampled production centre geographically close to the latter pair of kilns.

At this point, the separations achieved (as visualised by Principal Components Analysis) between the products of the different kilns suggested it would be worthwhile to apply *Dis-*

criminant Analysis. In contrast, this requires information on which groups they can be divided into, in addition to the analytical data, and here the groups were those from known kilns. The pottery from Cleeve was treated as a test group against the kiln samples and entered the Discriminant Analysis only after the factors for the kiln groups had been calculated. Discriminant Analysis aims to find that combination of chemical elements which will give the smallest possible 'spread' in composition within each (kiln) group, but will also maximise the differences between groups. There were too few samples from many kilns for a statistically robust Discriminant Analysis, so the results should be taken as an indication of differences in composition and ability to discriminate between the sites. The same initial starting point (18 elements) was used as for PCA, and the results showed all kiln groups could be discriminated from each other by chemical analysis. The same pattern as PCA emerged with the closest groups being those of Donyatt on the one hand, and Nether Stowey/Crowcombe on the other, with Barnstaple kilns intermediate. Surprisingly, calcium and magnesium did not dominate the Discriminant Analysis,[11] though the minor element yttrium was the most important for the second function. After eliminating calcium and magnesium, yttrium became the first element for the first two functions. There seems no chemical reason why it might be particularly useful as a discriminator, and applying the rule of avoiding single-element statistics, it was also removed and the analysis re-run. This gave a more even contribution of elements to the functions and the resulting analysis and plot of the first two functions (Figure 7) was used for interpretation. Here the importance of analysing for many elements is clear: elements which cause problems can be omitted without compromising the aim of interpreting the general analytical patterns present in the pottery.

All three Discriminant Analyses showed consistency in attribution of the Cleeve sherds, but the degree of confidence which one could place in the assignments of the 'unknowns'[12] did rise sharply through the stages. Even so, none of the Cleeve sherds could be assigned with a statistically acceptable degree of confidence to the specific kilns included and the limited numbers of kiln sherds has to be taken into account. This implies that none of these particular kilns was the exact supplier, but the grouping of the Cleeve sherds on Figure 7 shows them to be products of kilns near to those included. Figure 7 shows (as expected) a much tighter grouping of kiln sherds compared to Figure 6 (PCA). This is the result of Discriminant Analysis deliberately seeking those elements which will minimise the within-kiln 'spread' in composition while maximising those elements responsible for between-kiln differences. The listing of the assignments of the Cleeve sherds to their nearest kiln by Discriminant Analysis (Table 9) agrees with the conclusions from principal components, showing a division of these South Somerset wares into definite Donyatt products and those from the South Somerset tradition probably made in south-west Somerset.

COMPARISON OF ICP-AES ANALYSES OF POTTERY AND TILE FROM CLEEVE ABBEY

A parallel investigation of thin-section petrography and ICP-AES analysis has been carried out on floor tiles from the site.[13] It was of interest to see how the ICP-AES of the pottery and tiles compared, so all the tile analyses were included in the statistical investigations described above.

In broad terms, the tiles showed quite similar analytical features to the pottery, dividing into the same groups as the pottery on the calcium/magnesium plot (Figure 5). Thus one group of tiles had slightly lower calcium concentrations than the spread of Donyatt kiln products and pottery from Cleeve on the left of the Figure (low magnesium, high calcium). Another group had high magnesium (3–6%) but only a few had the low levels of calcium

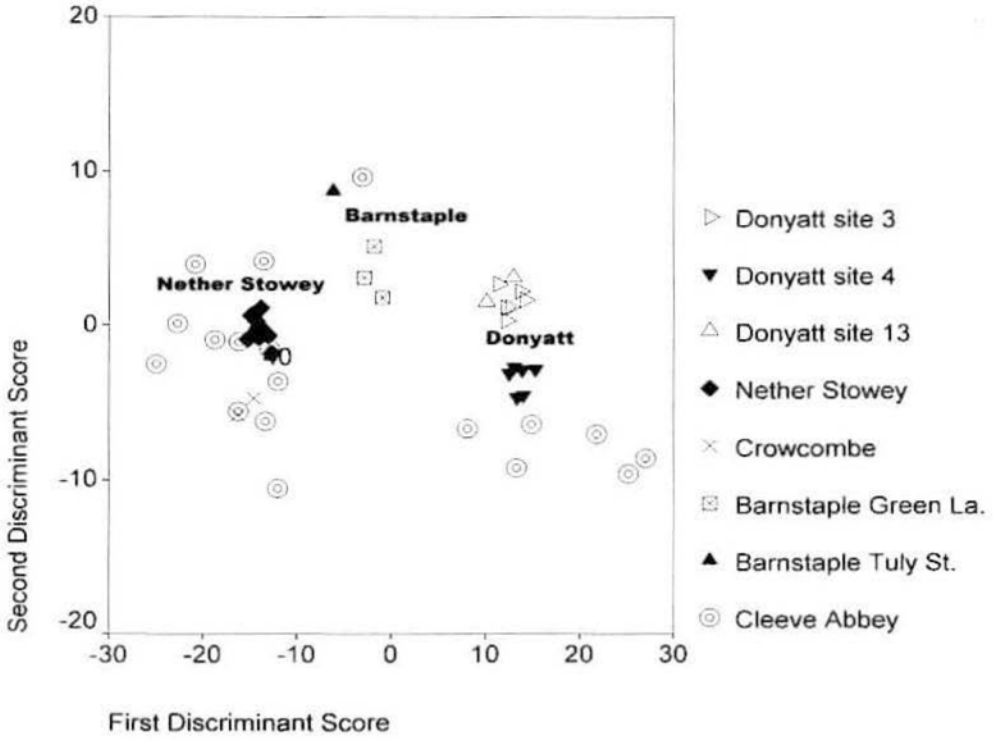

Fig. 7 Plot of the first two discriminant scores arising from ICP-AES analyses of South Somerset pottery from Cleeve Abbey and kilns in Somerset and Devon, containing respectively 89% (first function—horizontal axis) and 5% (second—vertical axis) of the discrimination in the analyses. (The loadings for the first six elements in descending order of contribution are: Function 1—La (-3.4), V (3.1), Ti (-1.94), Ni (1.81), K (-1.38), Li (1.27); Function 2—Na (2.26), Co (1.62), Li (-1.34), La (1.24), Sc (-1.21), K (-1.00)).

associated with Nether Stowey and Crowcombe kilns, so might be products of other, perhaps related, production centres.

Turning to multivariate statistics, in the principal components analyses a group of Cleeve tiles shared the same area of Figure 6 as the Donyatt pottery from Cleeve, including the slight separation from most of the kiln 3 and 4 sherds, and suggests a fairly specific common origin for both tiles and pottery. Discriminant Analysis also picked out these Cleeve tiles as having similarities to Donyatt material.[14] Seven of these tiles are in petrographic fabric C and two in D, and were distinguished from other fabrics by the presence of glauconite. The consistent analytical pattern does suggest a single production centre or kiln. A larger group of tiles, mainly in fabrics E, F and G, containing Lower Greensand chert and flint, were more of the Nether Stowey/Crowcombe chemical pattern,[15] and may be indicative of a west Somerset origin. The four[16] in fabric G were chemically rather different from those in the other two fabrics. Another four tiles[17] had a chemistry which seemed similar to the Barnstaple kilns, though they are in three fabrics (A, B and D).

SOUTH NETHERLANDS MAIOLICA

Two sherds of suspected South Netherlands Maiolica from Cleeve Abbey were submitted for chemical analysis by ICP-AES : drawing No.18 from a flower vase with 'YHS' med-

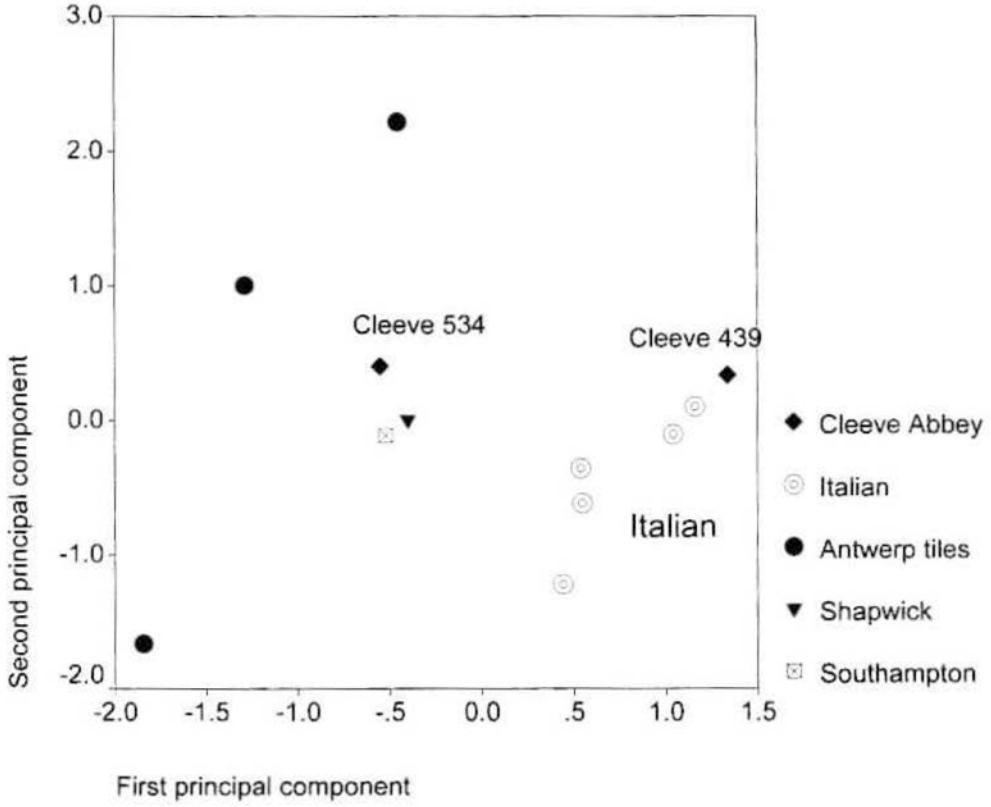

Fig. 8 Plot of the first two principal components arising from ICP-AES analyses of South Netherlands maiolica from Cleeve Abbey and kilns in the Netherlands and north Italy, containing respectively 58% (first component—horizontal axis) and 17% (second—vertical axis) of the variance in the analyses. (The loadings for the first six elements in descending order of contribution are: PC1—Al (.99), Fe (.97), Cr (.94), Ni (.94), Sc (.93), Mg (.93); PC2—La (.85), Y (.84), Na (-.45), Co (.30)).

allion[18] and No. 17 from a vase in all-over-blue.[19] They were compared with analyses of ceramics of known origin from the source areas. The following analyses by ICP-AES of South Netherlands maiolica were available:[20]

A 'Malling jug' from Shapwick House, Somerset (site code 73/94/64), mottled purple, blue and pale orange[21]
A 'Malling jug' from Southampton (site code 124 context 225)[22]
A tile of Herkenrode type from the Museé Royale d'Art et d'Histoire (LR08) of definite Antwerp type[23]
A tile from the abbey of Rameyen (L?32) thought to be an Antwerp product
A tile of Herkenrode type found at Whitehall Palace, London[24]

In addition, another small database of analyses of Italian tin-glazed pottery was available:

two blue-decorated jugs of 'Faenza' type from Southampton (site code 124, context 214[25] and 215[26])
a jug with blue medallion and ladder decoration from Southampton (site code 124, context 225)[27]
a Ligurian dish from Acton Court, Bristol Museum 36/1989/1067[28]

Table 9: List of pottery items assigned by chemical analysis to different source areas in Somerset and Devon

Pottery assigned by analysis to Donyatt:	
13	1981: 416 (12)
15	1981:478 III 6 (8)
16	1980–2 336:V (30)
17	1982: 582 (35)
28	1980 347 (38)
29	1980–82 336:V (37)
Pottery assigned by analysis to Nether Stowey/Crowcombe/west Somerset	
18	1980–2 459: V (32)
19	1980:307 (19C) (46)
20	337 (28)
27	1980–82 336:V (26)
30	1980–82 319:V (22)
31	1980–82 310: V (25)
32	1980–82 319: V (33)
33	1980–82 458:V (27)
34	1980–82 422:V (31)
35	1980–82 336:V (23)
36	1980–82 534:V (29)
Pottery assigned by analysis to Barnstaple:	
14	1980: 344 (10)

A much larger database of analyses has been created of Antwerp maiolica using Neutron Activation Analysis.[29] That study has confirmed that some of the items listed above match with the Antwerp clay composition. The Neutron Activation project has shown that a variety of clay resources were in use at Antwerp, producing slightly different chemical compositions for the fabric—for example, more calcium carbonate was incorporated in the maiolica tiles. Initially the analyses of the two Cleeve Abbey sherds were compared to the small ICP-AES database, and then to the Neutron Activation database. The latter comparison has a lesser degree of confidence in the interpretation because the two techniques analyse different suites of chemical elements, so there are only about eight elements measured in common. Analyses done by ICP-AES are therefore comparable for fewer elements when the reference database was compiled by Neutron Activation rather than by ICP-AES (when all 29 elements are available for comparison).

The analysis results are given in Table 10. It is clear that the two results are not identical. Given the known variety of clay compositions in use at Antwerp, the analyses were therefore compared to the ICP-AES database with Principal Components Analysis (Figure 8). The analysis of the Cleeve sherd with 'YHS' medallion falls within the range of the definite Antwerp products and confirms that this maiolica was made at Antwerp. This sherd plots close to the 'Malling jug' sherds from Shapwick House, Somerset and Southampton, both of which have been compared to the Neutron Activation Analysis database and found to have the composition of Antwerp pottery. The results in Table 10 confirm the close similarity in analysis, and therefore also in origin, for all three items across all the elements measured, not only those used for the Principal Components Analysis.

On the other hand, the all-over-blue sherd No. 17 is unlike the Antwerp composition, either of pottery or tiles, in a number of significant features. Also shown on the plot is the

Table 10: Analysis by ICP of two sherds of suspected South Netherlands maiolica from Cleeve Abbey

Maiolica	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO	Ba	Co	Cr	Cu	Li	Nb	Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb
Cleeve Abbey deposit 534 sample 48	9.99	4.21	0.92	19.86	0.08	1.06	0.59	0.39	0.13	380	22.0	78	74	36.0		30	9	321	81	22	52	68	32.0	65.0	25	4.7	0.9	3.1	1.4	12090
Shapwick 73/94/6477/A(5)	10.35	4.3	0.92	14.81	0.49	1.17	0.61	0.51	0.06	381	16.0	87	57	41.4	11	37	10	316	79	20	65	70	35.6	60.3	27	4.7	0.8	2.5	1.5	
Southampton 124/225 'Malling'	10.27	4.22	1.29	19.30	0.79	1.11	0.52	1.66	0.12	341	11.0	76	33	26.0		29	11	436	91	22	70	89	26.0	53.0	11	5	1.06	3.5	1	11591
Cleeve Abbey deposit 439 sample 49	15.31	6.17	3.86	15.03	1.12	1.75	0.64	0.32	0.14	501	19.0	131	70	61.0		83	14	467	111	27	97	55	34.0	64.0	26	6.2	1.1	4.2	2.0	3396
Southampton 124/225 'Italian'	12.34	4.56	2.74	13.22	1.14	2.65	0.52	0.99	0.1	408	30.0	100	184	58.0		57	11	405	75	21	136	70	27.0	58.0	18	5.4	1.13	3.4	0.9	24863
Southampton 124/214	12.14	4.66	2.81	13.68	1.37	2.19	0.53	2.61	0.1	366	15.0	112	93	57.0		66	11	476	92	21	203	106	26.0	77.0	14	5.2	0.83	3.5	1.1	27594
Southampton 124/215	14.61	5.87	2.8	14.47	0.87	2.44	0.56	3.04	0.1	488	22.0	119	163	48.0	14	81	15	652	96	24	510	50	33.0	68.0	34	6.9	1	3.6	1.8	2416
Acton Court, Ligurian	14.25	6.02	2.29	10.76	1.42	2.53	0.68	0.19	0.07	301	19.0	168	55	31.0	14	109	14	647	101	24	92	51	35.0	66.0	31	6.1	1	3.5	1.8	

Element symbols: Al2O3:aluminium; Fe2O3: iron; MgO: magnesium; CaO: calcium; Na2O: sodium; K2O: potassium; TiO2: titanium; P2O5: potassium; MnO: manganese; Ba: barium; Co: cobalt; Cr: chromium; Cu: copper; Li: lithium; Nb: niobium; Ni: nickel; Sc: scandium; Sr: strontium; V:vanadium; Y: yttrium; Zn: zinc; Zr: zirconium; La: lanthanum; Ce: cerium; Nd: neodymium; Sm: samarium; Eu: europium; Dy: dysprosium; Yb: ytterbium (La to Yb are rare earth elements); Pb: lead.

The elements from Al2O3 to MnO inclusive are quoted in weight percent, and the rest in parts per million.

small database of tin-glazed pottery of Italian origin and it is clear that sherd 17 falls among these. If one compares its analysis with those of the Italian database (Table 10), it does share many of their features. As the previous work using Neutron Activation on London finds of maiolica with an Italian composition has shown,[30] the Italian characteristics include higher concentrations of sodium and chromium, and other elements, compared to South Netherlands maiolica. The all-over-blue sherd has these same higher concentrations. In addition, not previously noted are the significantly higher concentrations of magnesium, strontium, nickel, zinc and potassium in the Italian pottery, which this Cleeve sherd also shares. These additional 'marker' elements will be useful in future work using ICP-AES to identify further examples of Italian products. The conclusion from the principal components and the results given in Table 10 is that the sherd No. 17 is yet another example of a flower vase produced in Italy. It is a noteworthy addition to the list of such items, since all the previous work by Neutron Activation which identified such Italian products had been on items found in London.[31] A straight rod handle in all-over-blue glaze was shown in the Neutron Activation Analysis programme to be made in Tuscany,[32] while a ring handle in all-over-blue was shown to be an Antwerp product.[33]

CONCLUSIONS

Analysis by ICP-AES has assigned the pottery sherds tested from Cleeve Abbey to their production area. Of the South Somerset wares, the three medieval sherds all had different compositions: two were associated with different kilns at Donyatt, while the lobed cup was a Barnstaple product. None of these medieval sherds showed the composition of south-west Somerset (Nether Stowey/Crowcombe). Of the post-medieval South Somerset wares, more than half of those tested originated in south-west Somerset, while the rest were Donyatt products, all within a fairly small composition range and implying production in a limited number of kilns, perhaps even one. A noteworthy feature is that consistent patterns were found for the composition of pottery from Cleeve, rather than random analyses, and this indicates consistent use of a few production sources for the pottery analysed. Similar analytical patterns were also found for tiles and pottery, though with some differences.

The South Netherlands sherd with a 'YHS' medallion No.18 has been confirmed as an Antwerp product by ICP-AES analysis. However the bodysherd 17 in all-over-blue is another example of the vases produced in northern Italy, generally within Tuscany.

NOTES

1. See for example Hughes 1991; Lambert 1997.
2. Potts 1987.
3. Hughes, unpublished.
4. Olin and Sayre 1971—a few sherds of north Devon pottery were analysed by Neutron Activation.
5. Through the kind offices of Dr J.N.Walsh.
6. See for example, Orton (1980), Shennan (1997) and Baxter (1994).
7. SPSS version 8 was used; Norusis 1988 describes this widely-used program's capabilities for multivariate statistics, and many more recent books show how to use it.
8. A frequent practice is to select well-measured elements only (to avoid statistical 'noise' which may distort or obscure the main features of the analyses), providing the list includes a wide range of chemically different elements across the Periodic Table. Aluminium, calcium, magnesium, sodium, potassium, iron, manganese and titanium were the major elements selected; the trace elements were: chromium, cobalt, nickel, zinc, lithium, vanadium, scandium, yttrium, lanthanum and cerium.

9. Reliance on a single element for interpretation of pottery analyses is not recommended—it is much better statistically when a series of elements contribute to the principal components—i.e. the horizontal and vertical axes of Figure 6.
10. Coleman-Smith and Pearson 1988, 1–2.
11. Perhaps because the program looks for elements which distinguish between *every* kiln, whereas these elements are better at distinguishing between areas (e.g. Donyatt and south-west Somerset).
12. As measured by the Mahalanobis distance—see the statistical books quoted for an explanation.
13. Vince, this publication.
14. Tiles L2037–2041, 2047.
15. Tiles L 2031, 2036, 2045–6, and 2048–2062.
16. Tiles 2059–2062.
17. Tiles 2031, 2036, 2045 and 2046.
18. Previously published: Allan 1999, 161, No. 48.
19. Previously published: Allan 1999, 161, No. 49.
20. The analyses were carried out on different occasions and are here gathered together.
21. Gerrard 1999, 171–2; result courtesy of A.Vince, his TSNo. AG136. Comparison with analyses by Neutron Activation confirmed it as an Antwerp product.
22. Analysis result courtesy of A.Vince, TSNo. V357. For Southampton finds see Gutiérrez and Brown 1999.
23. This and the following tile was made available by C. Dumortier for analysis by the author (Dumortier 1999, 108); interpretation of these results to be published elsewhere.
24. Hurst and Le Patourel 1999, 181–3; note that it incorrectly states that the analysis was done by Neutron Activation, whereas it was by ICP-AES and was partly quoted in Hughes and Gaimster 1999, 178, Table 1. In the latter it was noted that its analysis was similar to Neutron Activation analyses of tiles known to have been made in Antwerp, including one from Herkenrode Abbey, Belgium (Musées Royaux d'Art et d'Histoire inv 2878).
25. Result courtesy of A.Vince, TSNo. V359.
26. Result courtesy of A.Vince, TSNo. V063.
27. Gutierrez and Brown 1999; analysis: A Vince TSNo. V358.
28. Previously unpublished analysis (author).
29. Hughes and Gaimster 1999, Gaimster and Hughes 1999.
30. Hughes and Gaimster 1999, 66.
31. Hughes and Gaimster 1999, 66.
32. Blake 1999, No.6. pp.23, 24 col. 2 end para 1, 26 end col.2.
33. Hughes and Gaimster 1999, 94; Table 1 item 4; Hurst 1999, p. 94 n. 28 briefly comments on this result.

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