

LATE ANGLO-SAXON FINDS FROM THE SITE OF ST EDMUND'S ABBEY

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DURING SITE CLEARANCE of the eastern parts of the church of St Edmund's Abbey by the then Ministry of Works, following their acceptance of the site into guardianship in 1955, two groups of important Anglo-Saxon material were found, but have remained unpublished until now. These comprise a series of fragments of moulded stone baluster shafts and a number of polychrome relief tiles. These are illustrated¹ and discussed here; it is concluded that the baluster shafts belong to around the second quarter of the 11th century or shortly thereafter; and that the tiles belong to the same period or, possibly, to the 10th century.

HISTORY OF THE BUILDINGS OF THE LATE ANGLO-SAXON ABBEY

The Tenth-Century Minster

Whatever weight may be attached to the tradition that a minster was found at *Boedericeswilde* in the 7th century by King Sigberct, there can be little doubt that the ecclesiastical establishment there only rose to importance in the 10th century as a direct result of the translation to the royal vill of the relics of King Edmund (*ob.* 870);² this translation is recorded as having taken place in the reign of King Aethelstan (924 – 39).³

Abbo of Fleury, writing in the late 10th century, says that the people of the place constructed a 'very large church of wonderful wooden plankwork' (*permaxima miro ligneo tabulatu ecclesia*) in which the relics were enshrined.⁴ Nothing further is known about this building apart from this one tantalising reference. The church, which stood for a century or more, was served by a community of secular priests.⁵

The Monastic Refoundation

Probably in the year 1020 the minster was refounded as a regular monastery by King Cnut,⁶ and a monk of St Benet at Hulme, Ufi, was appointed abbot. According to one source the building of the new church which followed the refoundation was instigated by Aelfwine,⁷ who became bishop of Elmham in 1021. Herman the Archdeacon (writing at the end of the 11th century) implies that a new stone basilica (*basilica lapidea*) replaced the existing timber church;⁸ This new church was dedicated on 18 October 1032 by Archbishop Aethelnoth in honour of St Mary and St Edmund.⁹

The church stood on the site of the Lady chapel of the later medieval church, east of the north transept,¹⁰ in the angle between the transept and the presbytery. From later references it is clear that the church was round,¹¹ comprising a central rotunda and a surrounding ambulatory.¹² Furthermore Herman, in passing references, indicates that the relics of St Edmund, which were enshrined in the church, lay in a wooden reliquary or coffin (*locellus ligneus, lecticus*) situated on one side of the sanctuary (*sancta sanctorum*) and screened off by a curtain; on the other side the sanctuary was closed off by doors (*valvae interioris asyli*), and in front of these lay the choir (*ecclesiae chorus*).

The building of the rotunda of St Mary and St Edmund seems to have been followed closely by two other churches. The only reference to one of these, the *aeccllesia sancte Marie*, is the entry for its dedication feast in the calendar of the mid 11th-century St Edmund's Psalter.¹³ However, a 12th-century tract in the *Liber Albus* preserves the tradition of an ancient stone church (*antiqua*

ecclesia lapidea) with parochial status and dedicated to St Mary, which stood on the site of the *dextrum brachium* (north transept?) of the later medieval church.¹⁴

The third important building was the *basilica sancti Benedicti*, constructed probably in the latter part of the abbacy of Ufi (*ob.* 1044).¹⁵ The building stood some thirty metres north-east of the rotunda, near the later new infirmary.¹⁶ It comprised a great tower (*magna turris*) and a *porticus*,¹⁷ while internally it had at least two bays, divided by piers (*columpnae*), running in an east and west direction.¹⁸ The building seems to have had more than one function: in the first place, the infirm son of the donor, Aelfric, lived in the tower during the abbacies of Ufi and Leofstan (1044 – 1065);¹⁹ secondly, Ufi and three of the 12th-century abbots were buried there.²⁰

The Abbacy of Baldwin (1065 – 1097/8)

To the earlier part of Baldwin's abbacy must be attributed the construction of the church of St Denis: a 'large and beautiful basilica' (*basilica grandis et pulchra*) which was intended both to contain the whole monastic community (for which the existing buildings must have been rather inconvenient) and to serve as a parish church for the town.²¹ It seems to have stood on the site of the chapel flanking the north side of the west front of the Romanesque church.²²

To a similar period probably belonged the chapel of St Margaret built by the priest Albold. It is described as a 'by no means small tower and a chapel adjoining it' (*turris non parva et adhaerens ei capella*)²³ – a description which might apply to a structure of the type of Barton on Humber or Broughton by Brigg. The situation of the building is unknown.

An important change at St Edmund's was marked by Baldwin's commencing a new church on a huge scale, designed to replace the existing heterogeneous collection of buildings by a single structure. The date of the start of the work is not recorded, but probably it should be placed in the early '80s. The presbytery of the new building was laid out south of the rotunda of St Mary and St Edmund; in 1094 it was ready to be brought into use, and in 1095 the relics of St Edmund were translated into it.²⁴

History of the Anglo-Saxon Buildings following 1095

(i) The basilica of St Mary and St Edmund. The description of the translation of 1095 implies that the rotunda was still intact at that date and had not been affected by the new presbytery.²⁵ The central part of the rotunda was retained until 1275 when it was pulled down to make way for the new Lady chapel;²⁶ the surrounding ambulatory had been demolished already by that time.²⁷ Though there are no references to the date of the latter event, it is reasonable to assume that it was connected with the building of the north transept of the Romanesque church. Work on the north transept seems to have been begun by Godfrey, who was sacrist in the time of Abbot Robert II (1102 – 07).²⁸

(ii) The church of St Mary. If this building stood on the site of the north transept, then its demolition was probably contemporary with that of the aisle of the rotunda. The new parish church of St Mary was built in the time of Abbot Anselm (1121 – 48).²⁹

(iii) The basilica of St Benedict. This apparently stood intact until the time of Abbot Sampson (1182 – 1211) when the tower was demolished during the construction of the New Infirmary.³⁰ The part of the basilica which contained the burials of the abbots, however, was standing c. 1425³¹ and probably continued up till the Dissolution.³²

(iv) The basilica of St Denis. This was demolished in connexion with the building of the west end of the nave in the time of Abbot Anselm (1121 – 48).³³

(v) The chapel of St Margaret. A new chapel of St Margaret was built at the south gate of the great cemetery in the time of Abbot Anselm;³⁴ the demolition of the old chapel occurred at the same time.

MOULDED BALUSTERS

CONTEXT

During the excavations of 1959 to 1964 which cleared the Romanesque crypt of the abbey church, many fragments of balusters were recovered.³⁵ These apparently were re-used in core work which had collapsed into the crypt at the time of the 16th-century demolition of the church, and were thought by the excavators to have come from the upper parts of the building as reconstructed after the great fire of 1465. If this were so, the material must already have been re-used on a previous occasion, for it is hardly conceivable that the balusters were manufactured for the late 11th-century church: rather, they must already have been re-used in it, probably again as core work.

The absence of information on the location of the fragments when re-used in the Romanesque fabric makes it difficult to draw much chronological significance from their context. The excavator's belief, however, that where found they had come from a 15th-century context and not from the Romanesque work of the east arm is important, for it has been suggested above that the Anglo-Saxon buildings stood intact until the greater part of the east arm was completed. On the other hand, it may perhaps be reasonable to believe that the fragments had not travelled very far either after the 1465 fire or when re-used in the Romanesque building, and in this case they may be likely to have derived from the buildings demolished for the construction of the north transept: that is, the sanctuary and ambulatory of the rotunda of St Mary and St Edmund, or the church of St Mary.

Wherever the precise context of the original balusters their date is unlikely to be earlier than 1020 when the development of the monastic complex with stone buildings seems to have started. At the other terminus they are unlikely to be later in date than the start of work on the great Romanesque church in the early 1080s. If they did in fact come from the rotunda of St Mary and St Edmund or from the church of St Mary their date range can be narrowed to between 1020 and the mid 11th century.

DESCRIPTION

The fragments recovered by the excavators comprised forty-three pieces coming from moulded shafts or their bases: these are all here called balusters, irrespective of whether they are of true baluster shape; that is, expanding to their widest diameter in the middle of their height. Further fragments which had no characteristic mouldings but which were plain may have gone unrecognised by the excavators or the present authors.

The balusters noted by the authors in 1972 are those numbered in the Department of the Environment site catalogue with the prefix letter M: 9, 9a, 10, 11, 12a, 17, 18, 19, 20, 21, 22, 22a, 23, 24, 33, 34, 35, 36, 37, 39, 40, 41, 42, 50, 254, 255, 256, 257, 258, 259, 260, 262, 263, 264, 264*bis*, 265, 268, 294, 296, 297. In addition there are three uncatalogued fragments, here numbered I, II, III. Of these forty-three all but five are illustrated here.³⁶

Material

Those of the pieces that were brought to the Ancient Monuments Laboratory in London were submitted to Dr F. W. Anderson for petrological examination. There was no difference discernible by the authors between these and the material left at Bury St Edmunds; the identification, therefore, is likely to be applicable to all the balusters. Dr Anderson writes:

Baluster shafts. A creamy oolitic limestone (Lincolnshire Limestone) from the *Barnack* quarries in Huntingdonshire. The main building stone used for the construction of the [later medieval] Abbey came from Barnack, but some was taken from the Alwalton quarries (the so-called *Alwalton Marble*) and was probably used only for decorative work.

Form

a. Bases

Among the fragments are some which appear to be bases since they are finished flat on the bottom. These include the simple M37 (Fig. 1) which has three shallow, stepped mouldings. More elaborate is M19 (Fig. 2) which has three heavy and rather angular rings separated by flat bands; M20 (Fig. 1) may belong to the upper part of the same base. M262 (Fig. 1) appears to be the lower part of a base with one flat and one rounded ring, separated by a flat band.

b. Shafts with Multiple Rings or Corrugations

Probably forming the top or bottom part of a shaft, rather than a base proper, are M17 and M33 (Fig. 3) which seem to be from the same baluster. They have a flat surface at one end (and in it a dowel hole) and expand outwards with a series of ring mouldings which have fairly distinct grooves between them (on M17 one of the rings has been cut away deliberately). M40 (Fig. 3) is a fragment of baluster with multiple rings separated by distinct and angular grooves, but on several more balusters the ring mouldings lose the distinct grooves between them and the surface takes on a continuous corrugated effect. A good example of the latter is M42 (Fig. 4) which perhaps comes from near the middle of a shaft made up in sections, for it is dowelled at its wider end. Other examples of the corrugated decoration are M11, M18, M34, M36, M39, M263 and I (Fig. 5).

c. Shafts with Series of Isolated Rings

M294 (Fig. 6) is part of a baluster that appears to have had a series of single ring mouldings widely spaced down the length of the shaft. With this should be grouped perhaps M254 (Fig. 6) which has a single surviving ring, not in the middle of the shaft for there is no change in the direction of the tapering either side of the ring. The same is true of M24 (Fig. 7) where the ring moulding is much wider and sharply angled, not rounded; the stone has a complex series of dowel holes. M256 (Fig. 7) has a double ring moulding, again not round the middle of the shaft; and M10 (Fig. 7) may be similar — in this case the fragment comes from one end of a shaft and has again a complex series of dowel holes.

d. Shafts with Central Rings

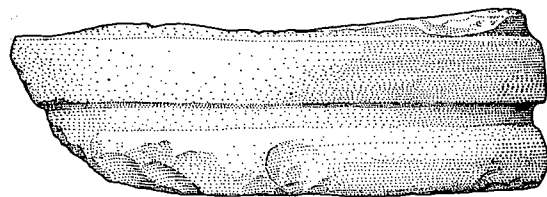
In some cases it is clear that the ring moulding was around the middle of the shaft, for the shaft tapers inwards away from the ring in either direction (whether or not there were other rings down the shaft at a distance from the middle is unknown). M258 (Fig. 8), though lacking any rings, belongs to this group. In the example M41 (Fig. 8) there is a moulding round the middle of the shaft comprising a broad ring flanked by two narrower, flatter ones — almost, indeed, forming a ring on a raised band rather than a triple ring.

e. Shafts with Central Contraction and Rings

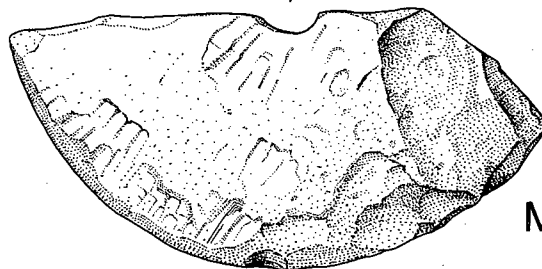
In further examples where what is apparently the middle part of a baluster survives it is clear that, far from the middle of the shaft having the widest diameter, it in fact contracted inward at the middle. This seems to be the case with M35 (Fig. 9) which has a single broad ring around it. The contraction is still more pronounced in M21 and M22 (Fig. 10), possibly from the same shaft, which have a double ring around them. M23 (Fig. 9) has a double ring around the contracted part, but enough of the rest of the shaft survives to show that it was carinated rather than contracting inwards evenly from the end towards the middle.

f. Miscellaneous

The remaining fragments (Fig. 11) do not have enough surviving to be certain what part of the shaft they come from, though most of them could probably be fitted into one of the above



M.262



M.20

M.37

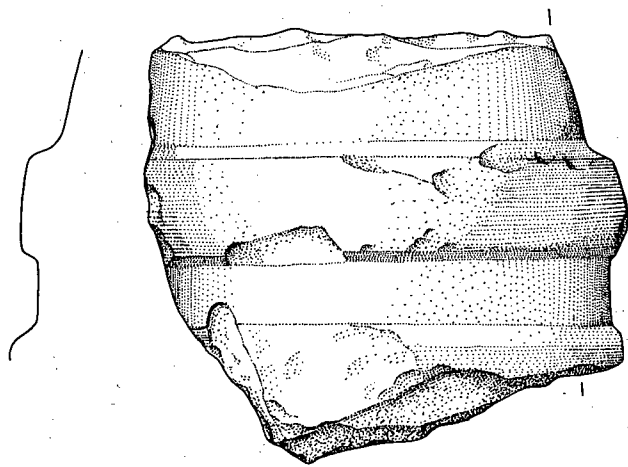
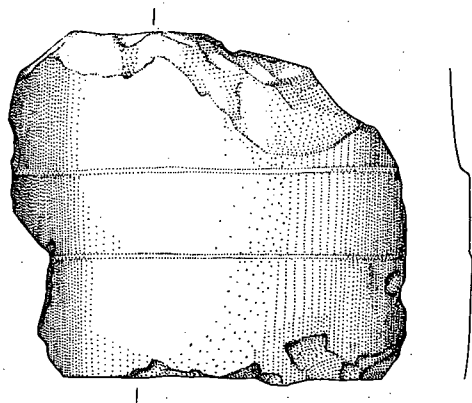
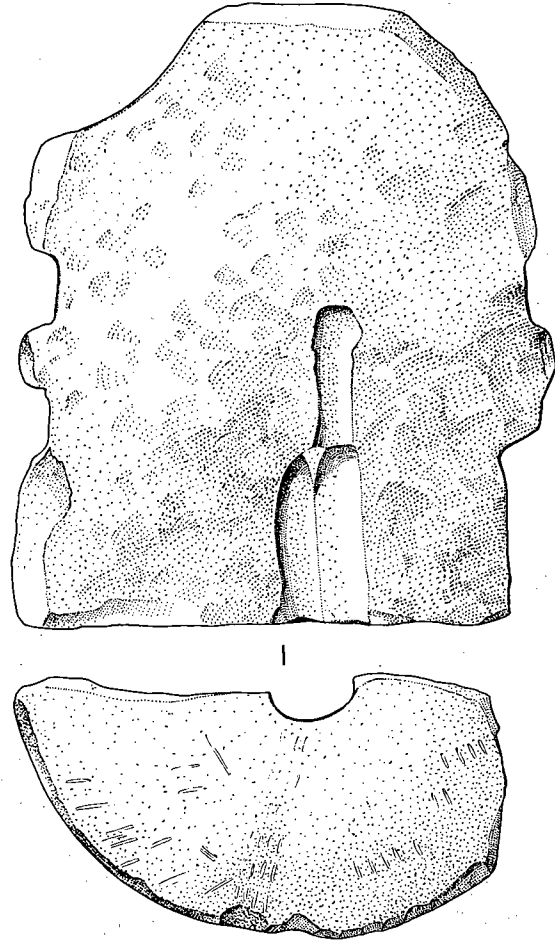


FIG. 1 — St Edmund's Abbey: Bases of stone shafts (1-4).



M.19

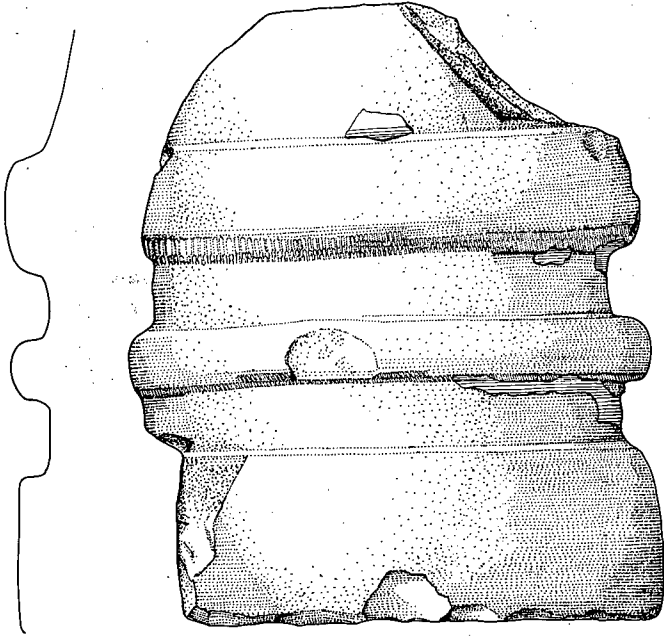


FIG. 2—St Edmund's Abbey: base of stone shaft (1:4).

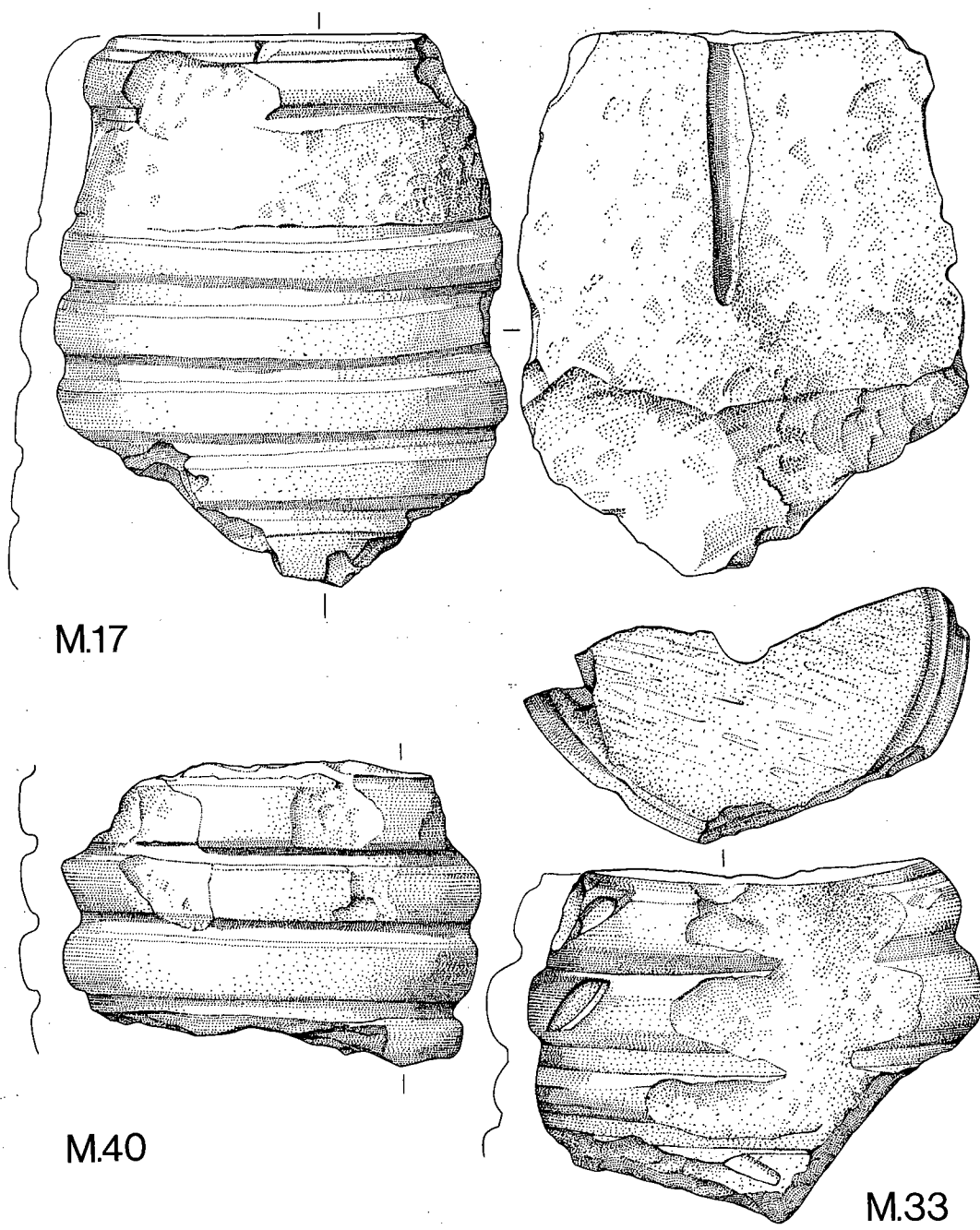
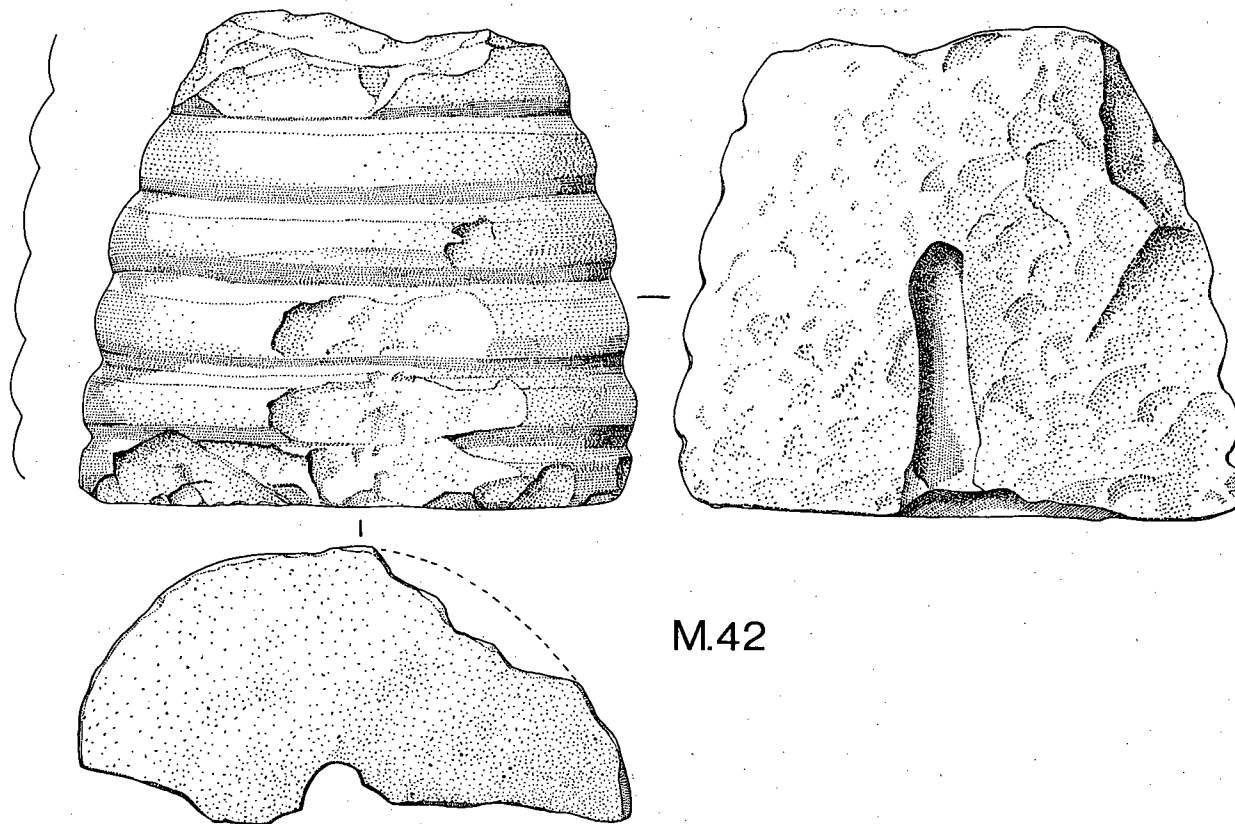


FIG. 3—St Edmund's Abbey: stone shafts with multiple corrugations (1:4).



M.42

FIG. 4.—St Edmund's Abbey: stone shaft with multiple corrugations (1:4).

groupings. Worthy of particular comment, however, are M12a and M50 (Fig. 11), which possibly come from the same shaft. Each has a series of three mouldings, from which the shaft splays outwards; a dowel hole in the end near the rings suggests that these were at one end or near the middle of the complete shaft.

Dowel Holes

Several of the balusters, as already pointed out, retain dowel holes. In M42 (Fig. 4) and M17 (Fig. 3) the hole penetrates some 14cm into the stone, but M19 (Fig. 2) provides an interesting example of how a deeper penetration might be achieved by a series of drillings. The drill appears to have had a rather blunted end. The inner surfaces of the holes are smoothly abraded.

The possibility that the holes were not for dowels but for a lathe used in turning the balusters has been examined and rejected. The smoothly rounded interior of the holes would provide little purchase for a mandrel by which the stone might be turned; and, though it would have allowed the stone itself to be turned upon a fixed mandrel, several of the holes are not strictly parallel to the axes of the stones. Furthermore, the holes penetrate further into the stone than would be needed for a lathe mandrel and, perhaps most telling, the lateral holes (see below) are inexplicable in terms of a lathe. Whether there was a lathe used and whether holes associated with this process were subsequently redrilled to a greater depth for dowels is a possibility for which there is no evidence. If a lathe were used it is difficult to believe, in view of the weight of the stones, that it was of horizontal type.

In many cases the dowel holes are axial (or approximately so) and must have been designed for securing the baluster at top and bottom, or for joining in the middle a shaft made in sections. In other cases, however, the arrangement is more complicated (e.g. M10, M24 — Fig. 7): these have holes drilled in from the side of the shaft at oblique angles. The purpose of the lateral

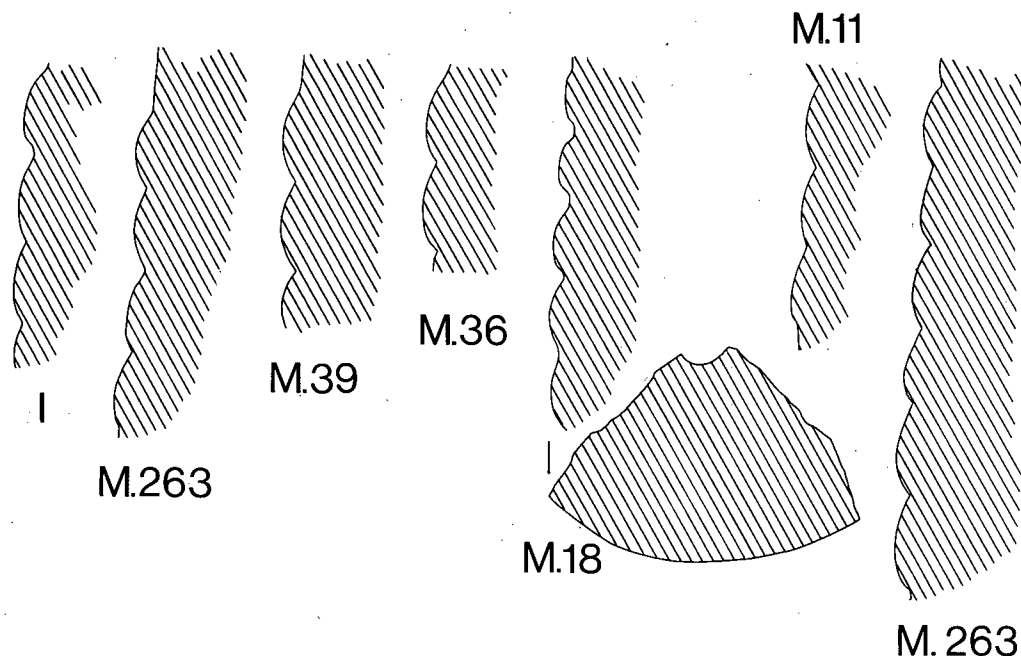
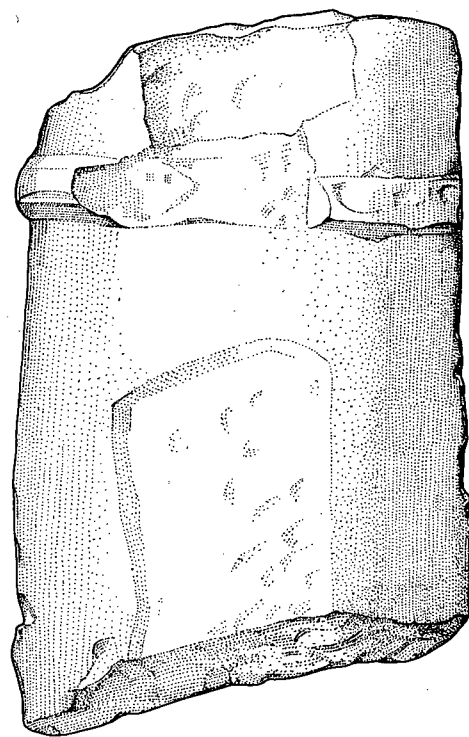
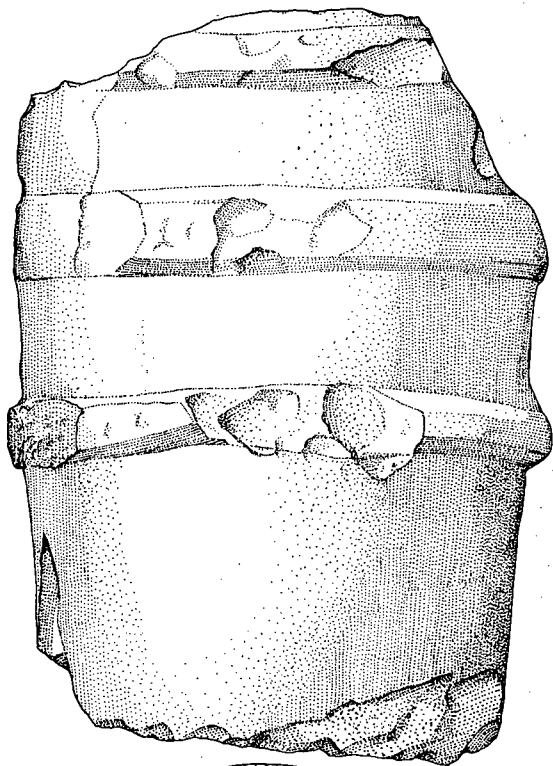


FIG. 5 — St Edmund's Abbey: profiles of stone shafts with multiple corrugations (1:4).



M.254



M.294

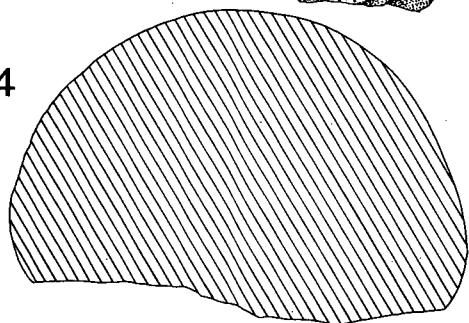


FIG. 6—St Edmund's Abbey: stone shafts with isolated rings (1:4).

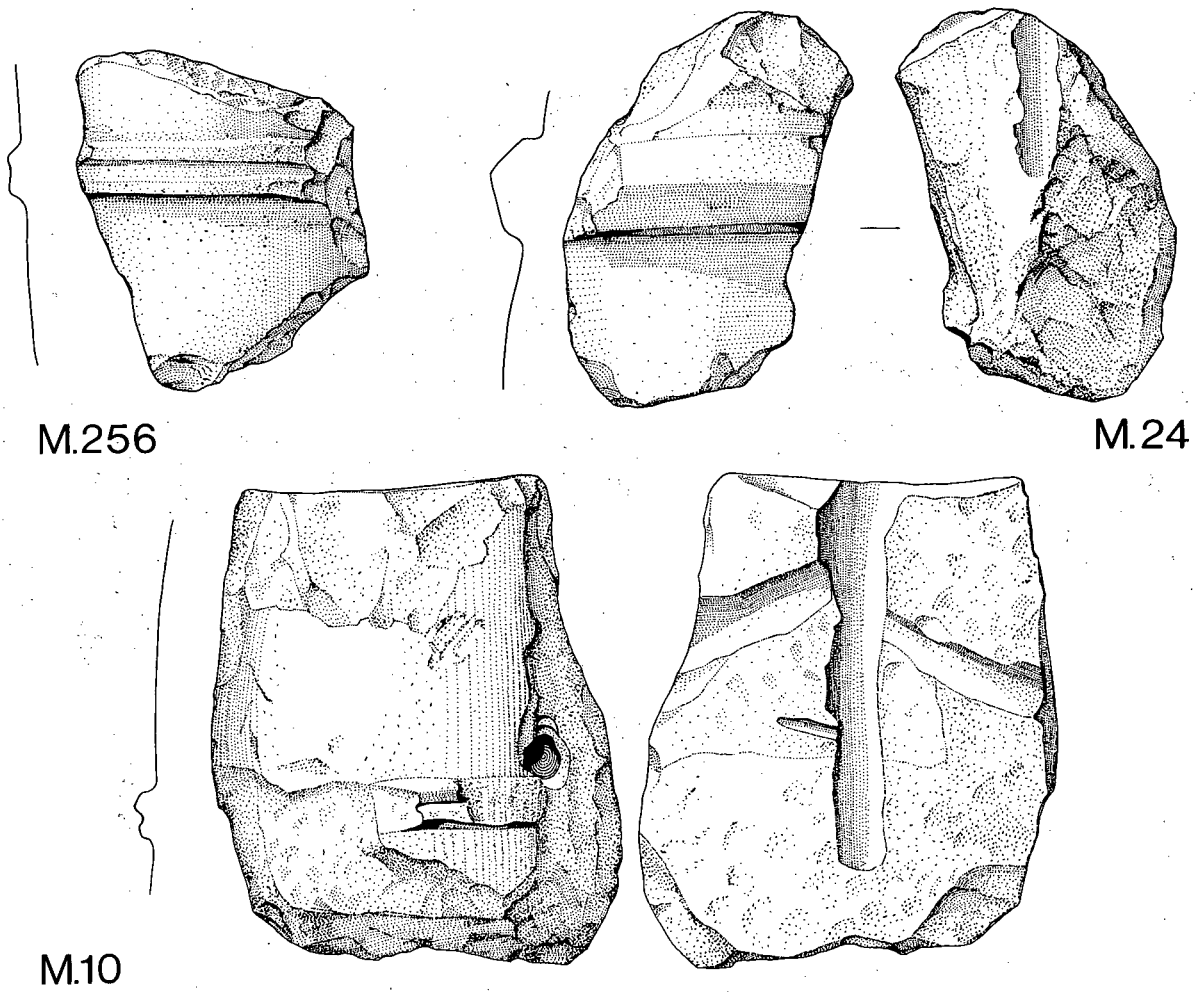
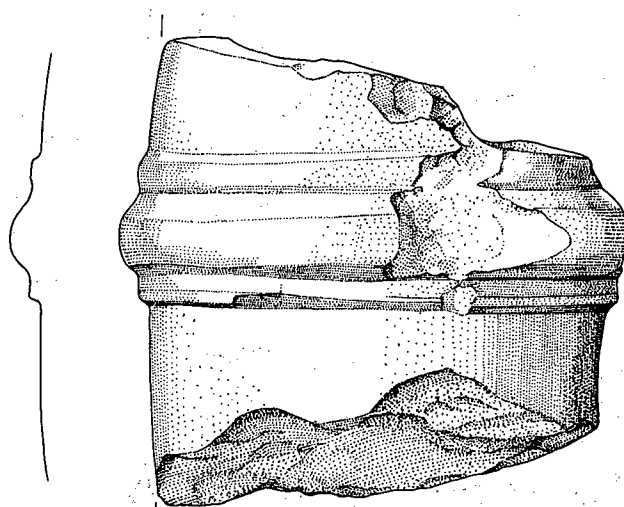
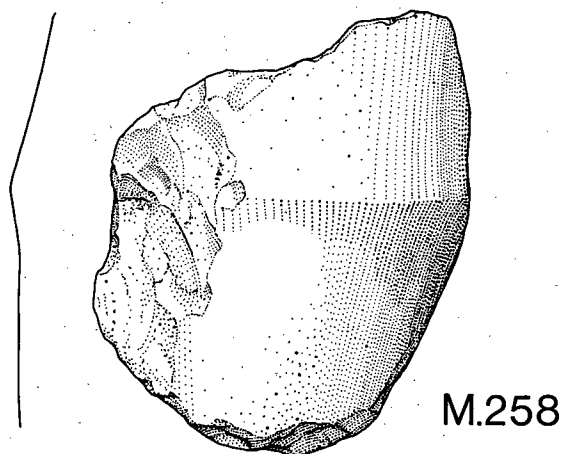


FIG. 7—St Edmund's Abbey: stone shafts with isolated rings (1-4).



M.41

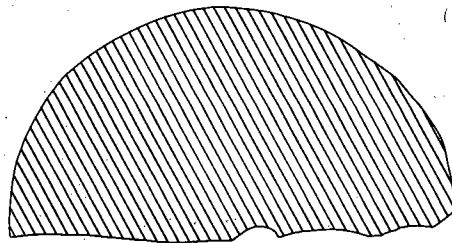
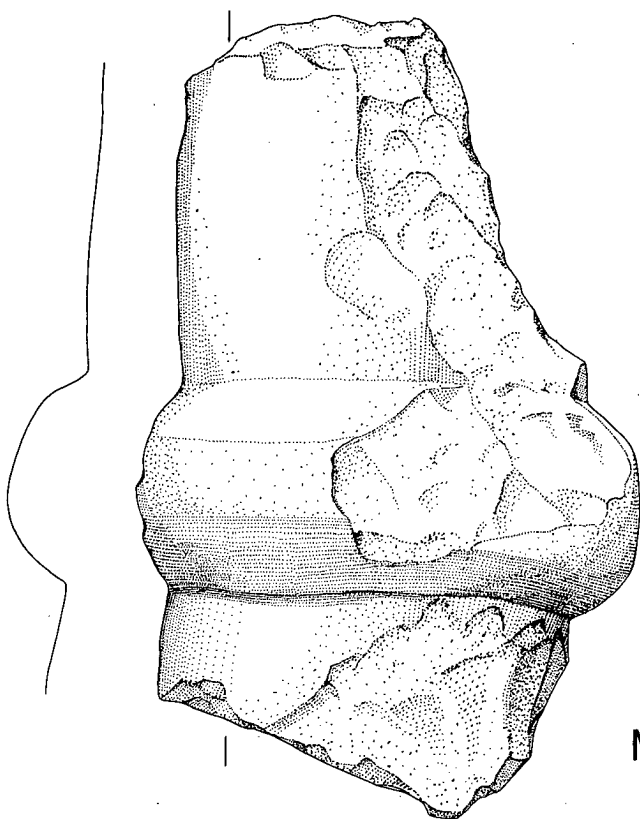
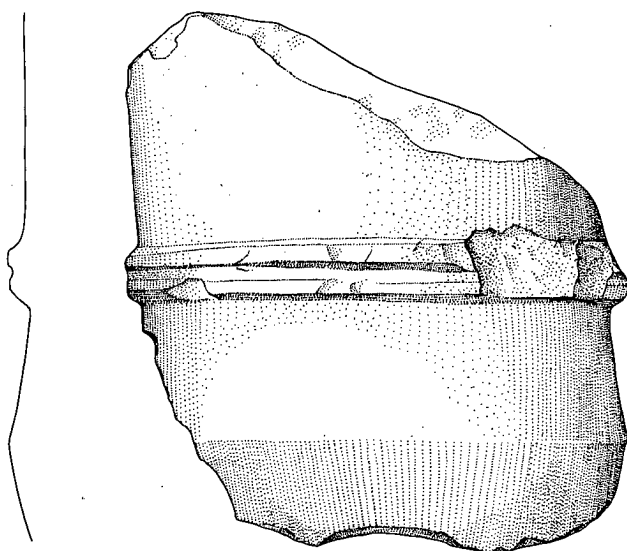


FIG. 8—St Edmund's Abbey: stone biconical shaft and shaft with central rings (1:4).



M.35



M. 23

FIG. 9—St Edmund's Abbey: stone shafts with central contraction and rings (1:4).

dowels is uncertain; they may have been for securing the baluster itself in a context in which it did not have adequate support from below; or they may have been for tying in other features to the sides of the balusters.

Dressing of the Stone

The evidence for the method of dressing the stone is fairly limited. Where a worked surface survives on the end of a shaft there are marks left by an axe or chisel. On the main surface, however, after the initial dressing the stone has been polished to a smooth surface; marks that might have been left from turning on a lathe have therefore been obliterated.

Painting

Several of the balusters retain traces of painted decoration, and a number of these were submitted to the Ancient Monuments Laboratory for examination: M24, 255, 256, 257, 258, 262, 264, 264*bis*, 265, 268. Dr B. Knight writes:

Some of the fragments have patches of dark red paint remaining, particularly in the recesses of the moulding. On those stones where the paint is clearly visible it appears to consist of at least two fairly thick white layers, followed by a thin dark red layer. Where abraded, the dark red appears pink, and where it has been completely lost the white paint

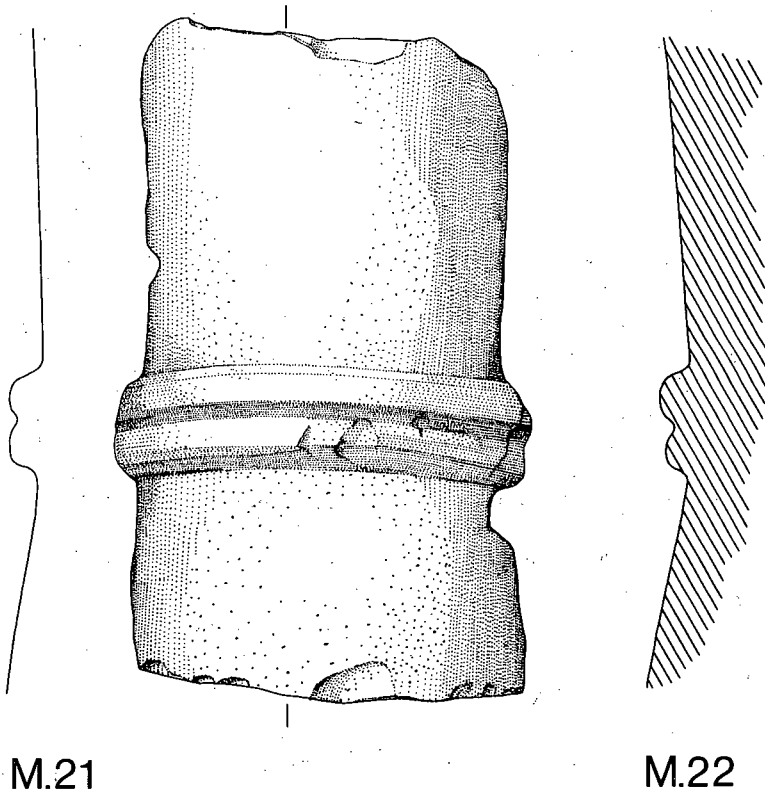


FIG. 10—St Edmund's Abbey: stone shafts with central contraction and rings (1:4).

appears yellowish. There is, however, no evidence of there having originally been any colours other than red. There is no sign of re-painting before the stones were re-used: the mortar associated with their re-use directly overlays the red paint.

(Two samples were taken and submitted to X-ray diffraction analysis, and a further sample was taken and submitted to X-ray fluorescence analysis. Detailed accounts of these are available in *Ancient Monuments Laboratory Report 3150*).

Conclusions: It appears that the stones were first given several coats of limewash. The fact that the layers could be easily separated indicates that each coat was allowed to dry before applying the next. The top layer consists of plaster of Paris containing haemetite as colouring agent.

DISCUSSION

The baluster shafts from St Edmund's are of considerable importance because they constitute the only group of such material from the Late Anglo-Saxon period that can be dated with any moderate degree of accuracy on historical evidence; they constitute also one of the largest groups.

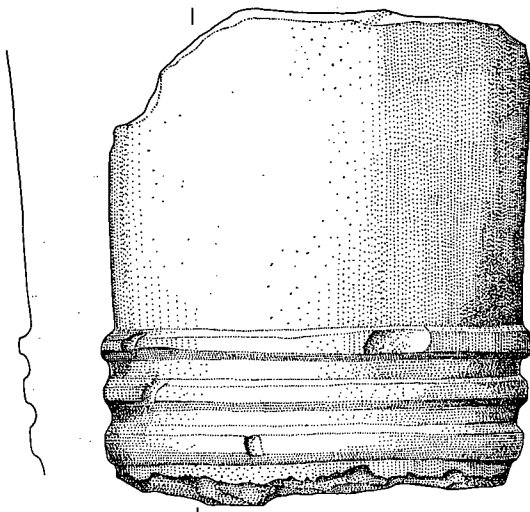
Important collections of Mid Anglo-Saxon balusters survive from the early monasteries of Wearmouth and Jarrow. Some are *in situ* in the west porticus of St Peter's church at Wearmouth (built c. 684 x 716), where they decorate the reveals of the main entrance archway. Other balusters at the two sites are *ex situ* and Professor Cramp has suggested that these may have been used in the furnishing of the sanctuary, e.g. in a balustrade around the altar.³⁷ But the Wearmouth and Jarrow balusters, which Professor Cramp has pointed out are closely comparable in form to examples from Merovingian Gaul (e.g. Poitiers, Nouaillé), are totally different in form from the St Edmund's ones, and there is no reason to support any similarity in their use.

There are, however, several important buildings which, despite the absence of documentary evidence, may with reasonable probability be attributed to the Late Anglo-Saxon period and in which balusters are preserved *in situ*. At Brixworth they are used to subdivide the triple opening from the nave to the first-floor chamber of the west tower. At Barton on Humber they are used to subdivide the double openings in the external walls of the tower on the first and second floors. At St Benet, Cambridge, they are used to subdivide the double openings of the top storey (bell chamber?) of the tower. At Worth (though here the shafts are plain not moulded) they are used to subdivide the double windows in the lateral walls of the nave. At Wing one is used to subdivide the double window in the gable of the east wall of the nave.

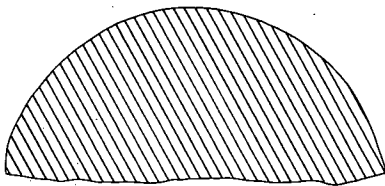
These instances give an indication of some of the uses to which balusters might be put, but they probably do not represent the full range of such uses. Balusters may also have been employed in such contexts as cloister arcades (there is a reference to columns in the cloister, *columnae claustrī*, at Ramsey c. 1016 x 1020)³⁸ or screen walls. They may also have been used to embellish altars and their surroundings, or important tombs or shrines (thus at St Augustine's, Canterbury, c. 1006 x 1027 certain columns and arches 'of Roman elegance', *arcus et columnae Romana elegantia aedificati*, were dismantled from over the shrines of the saints and re-employed to decorate the cloister).³⁹

Applying these parallels to St Edmund's, it can be seen that the material from there may have been used in a variety of different contexts. The balusters could have been used in double windows in the church, or in the sound openings of a bell tower; additionally they may have been used for the furnishings of the sanctuary and shrine; finally they may have been used for the cloister (for the location of which there is no evidence). The evidence of the lateral dowel holes on some of the pieces, discussed above, does suggest that some may have come from the second of these contexts.

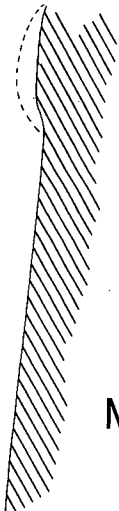
In looking for parallels to the form rather than the function of the St Edmund's balusters the



M.50



M.257



M.268



M.255



M.296



M.297



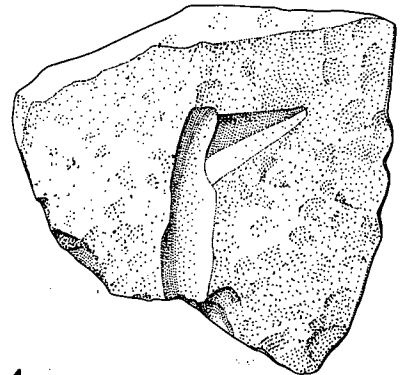
M.260



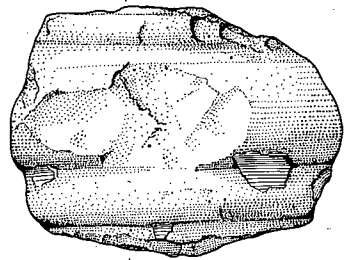
M.265



M.264b



M.12a



M.264

FIG. 11—St Edmund's Abbey: miscellaneous stone shafts (1:4).

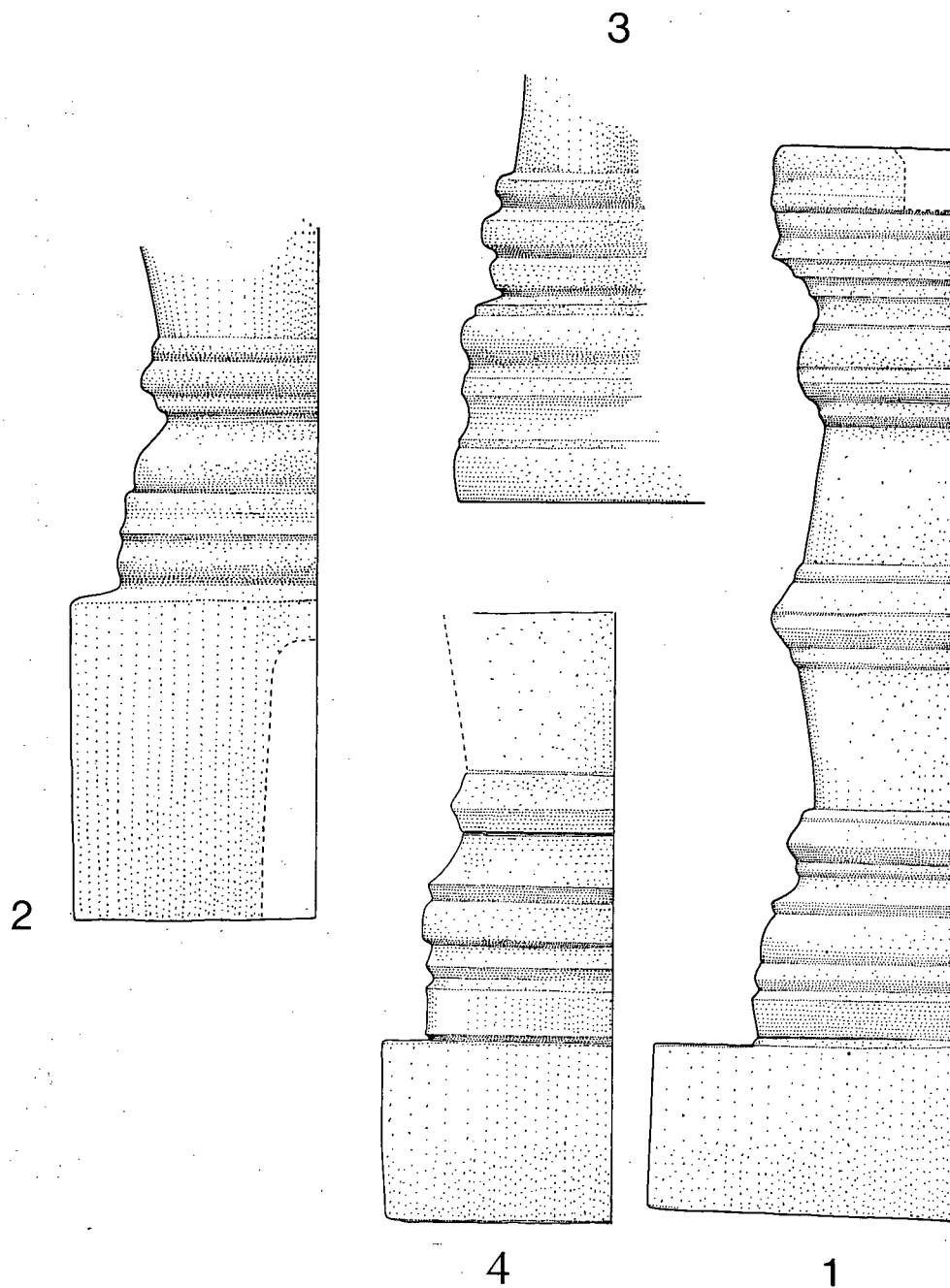


FIG. 12—St Augustine's Abbey, Canterbury (nos. 1–3) and St Mary in Castro, Dover: moulded baluster shafts (1:4).

few Late Anglo-Saxon examples already quoted do not take the search very far — though a general similarity may be seen in the Barton on Humber or Cambridge ones — because they do not provide a wide enough range of forms. There do exist, however, larger assemblages of balusters that may probably be assigned to a Late Anglo-Saxon date; but these are all *ex situ*. These assemblages are at St Augustine's, Canterbury; St Mary in Castro, Dover; St Alban's Cathedral (formerly Abbey); Peterborough Cathedral (formerly Abbey).

The Canterbury⁴⁰ and Dover⁴¹ balusters (Fig. 12) are closely related to one another and (to judge from what survives) may have been the products of a single workshop. The shafts are quite short and bulge outwards markedly towards the middle — though one of the Canterbury pieces tapers inwards from the base upwards. They are characterised by very finely cut mouldings, and were probably turned on a lathe. The mouldings are grouped around the top, middle and base of each shaft, and do not spread out down the whole length. This assemblage shows no real affinity with St Edmund's.

The St Alban's assemblage comprises the shafts re-used in the late 11th century in the transept triforia.⁴² At that time they had new bases and capitals added to them, and it is not clear how much the shafts themselves were altered at the same period. The latter are not cut from single pieces of stone, but each one in the present arrangement is made up in sections; it seems likely that this indicates a piecing together of original shafts of much shorter length, in order to make up the height required for their new situation. The original shafts must have been of

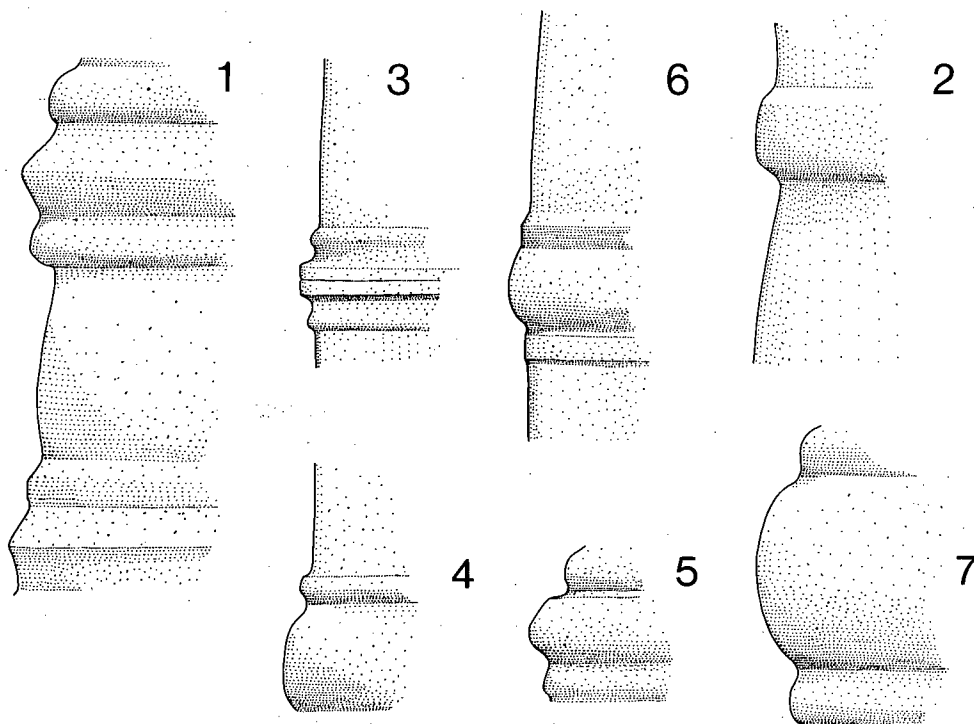


FIG. 13— Peterborough Cathedral: moulded baluster shafts (1:4).

distinctly romanising form — not surprising in view of the quantity of genuine Roman balusters that must have been known from Verulamium — and show no close resemblance to the St Edmund's material.

The Peterborough assemblage⁴³ comprises only fragments, but these suggest a wide range of different forms (they may in fact be of varying dates). Some of these pieces are of particular interest because there do appear to be similarities to St Edmund's. No. 2 (Fig. 13) comes from the central part of a shaft that is constricted in the middle and has a single ring moulding around it; it compares with St Edmund's M35 (Fig. 9). No. 6 (Fig. 13) comes from a shaft with a regular expansion and around the middle a shallow ring moulding flanked by flat bands; this compares with St Edmund's M41 (Fig. 8). No. 7 (Fig. 13) is a fragment with a broad ring moulding flanked by two narrower ones; it is similar to St Edmund's M264 (Fig. 11).

The comparisons with Peterborough serve primarily to show that as an assemblage the St Edmund's material is not without affinities in a Late Anglo-Saxon context, even though there are other features that cannot be paralleled in the surviving material. It is also of interest, however, that it is from close to Peterborough that the stone used for the St Edmund's balusters seems to come, particularly since it is known that some at least of the Barnack quarries were controlled by Peterborough Abbey.⁴⁴ This may be seen merely in the context of the known traffic in building stone in the pre-Conquest period;⁴⁵ but it may also be significant in relation to what was suggested above with reference to Canterbury and Dover, that moulded balusters might be produced in one workshop for use in buildings some distance from one another.

INTERLACE CARVING

Built into the ruined outer wall of the ambulatory of the 11th-century crypt, at the east end, close to the present ground level, is a stone slab carved with an interlace pattern (Fig. 14).

Only the top surface and part of one side is exposed, while at either end the slab is broken or overlaid by the core work of the wall. Down one angle the slab has a flattish roll-moulding, which is deeper on the side than on the top. The roll forms one border of a recessed panel which contains a raised three-strand interlace pattern. On the opposite side of this decorated panel is a

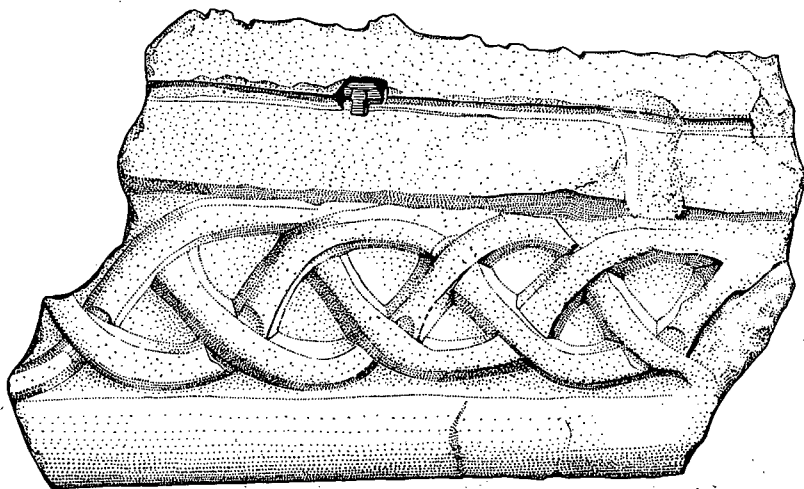


FIG. 14 — St Edmund's Abbey: stone slab with interlace carving and with iron fitting on one side (1:4).

raised flattish strip, delimited on the far side by a groove. Set into the groove is an iron fitting of uncertain form.

It seems likely that the slab formed part of a composite structure, perhaps as an upright in a screen or other furnishing. The interlace pattern is not diagnostic for a close dating.

POLYCHROME RELIEF TILES

CONTEXT

The group of tiles here discussed was located by one of the authors among the material deriving from the excavations of 1957 to 1964 and may be assumed to belong with that material, although there is no apparent record of their discovery or location. There can be no question, anyway, of their having been discovered *in situ*, since the secondary mortar still adhering to them indicates that they had been re-used in corework. This secondary mortar has inclusions of crushed brick or tile, and the Department of the Environment's works staff at the site say that they have only encountered similar mortar *in situ* in the crossing piers of the Romanesque church.

If the tiles had been re-used in the Romanesque crossing piers this gives some evidence for their original location. Work on the crossing must have begun soon after 1095, while the north transept was under construction in the opening years of the 12th century: the west end was reached by the second quarter of the 12th century. To have been available for re-use around 1100 or shortly thereafter, the tiles — assuming they came from one of the churches rather than the domestic offices — must have been located in the main basilica of St Mary and St Edmund (the rotunda) or in the church of St Mary. Furthermore, if they had been made in the first instance for one of these masonry buildings rather than having been made for the earlier timber structure and then re-used, they must have a *terminus post quem* of 1020. They are again unlikely to be later than the commencement of the great Romanesque church in the early 1080s, for this must have sealed the eventual fate by demolition of the building in which they were located.

DESCRIPTION

The ten pieces of tile discovered among the excavated material are illustrated in Fig. 15. Two distinct fabrics are represented: fabric 1, a white clay with a filler of small grits resulting in a very granular appearance; in almost all examples distinct layers are visible in cross section; fabric 2, a red earthenware, well mixed with a filler of small grits.

1 and 2 Fabric 1. Both with the same design, and with backs decorated with a bird drawn freehand and incised up to 1mm into the surface. (2) has a slightly reduced core. Both have a rounded profile to the raised ribs. The glaze on both examples is not very successful, particularly on (1), but a light brown has been achieved on part of (2). The glaze on (1) is opaque rather than translucent. This is due not to a different composition but to a different physical state. The glaze is vesicular and in two of the fields does not cover completely the surface of the tile. In one field there are grooves in the glaze as though it has been scraped while soft and in another a blob of metallic lead is trapped in the surface of the glaze. The backs are uneven and on the chamfers small score marks can be seen where grits have been dragged along the surface by a knife. There is no sign of wear on the top of the raised ribs.

3 and 4 Fabric 1. Both of the same design. (3) has a reduced core, part of the back and edge have a light green glaze. The front has a light green, olive and dark, almost black glaze, c. 0.5mm thick. Top surface worn. (4) has a reduced core, light green glaze on the back, which is very uneven. The front has a dark and very light green glaze and also a small patch of brown. On both tiles the lighter green has been achieved by the use of copper.

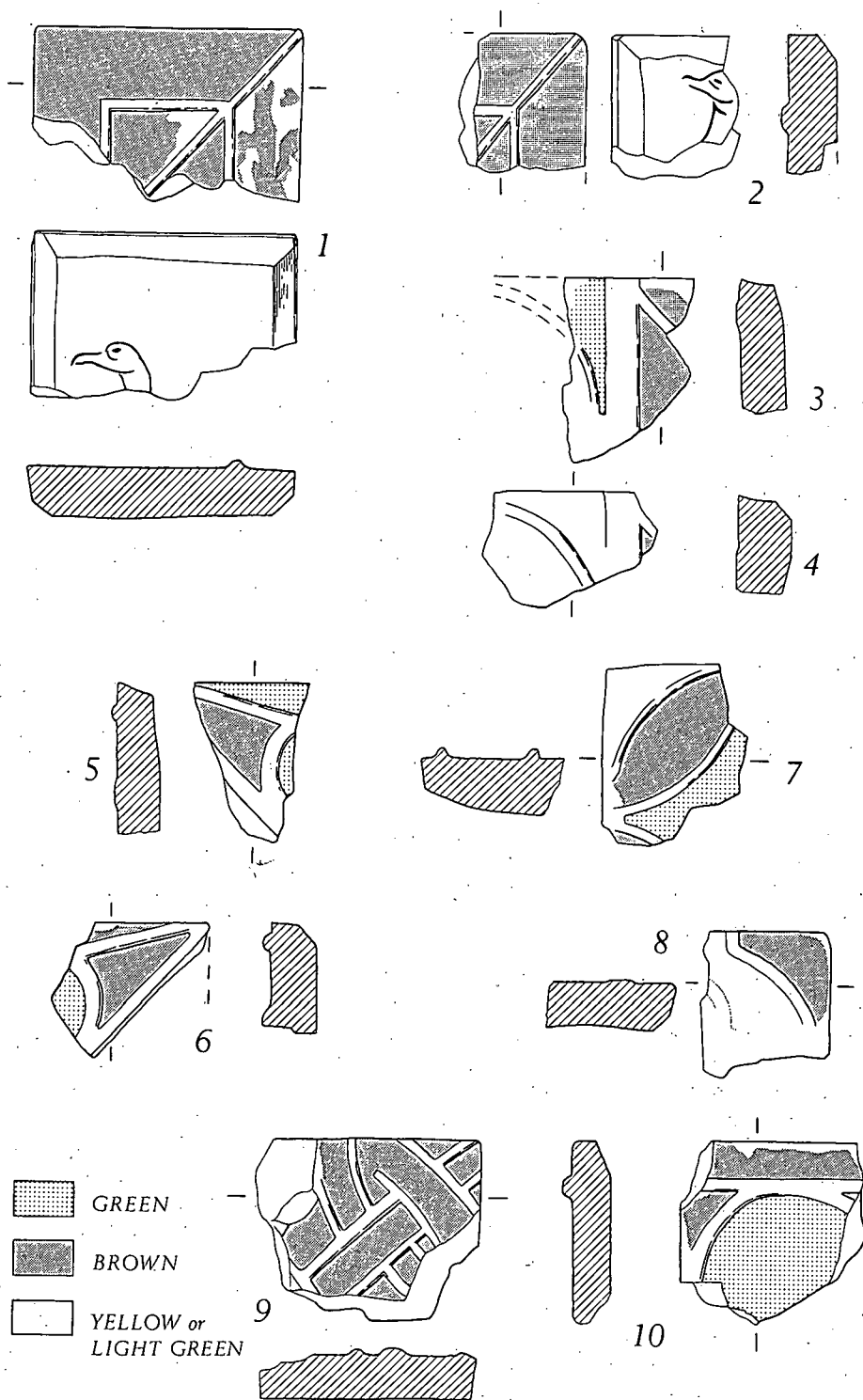


FIG. 15—St Edmund's Abbey: polychrome relief tiles (1:3).

- The dark glaze on (3) results from copper but the firing conditions have been sufficiently reducing for the glaze to appear a dull opaque red. The top surface of (4) is worn.
- 5 and May be from the same design. (5) is fabric 1, has an uneven back, and extremely badly
 - 6 mixed matrix. There are light green, yellow and brown glazes on the front separated by raised ribs the tops of which are worn. (6) is fabric 2, with reduced core and partly reduced top surface. Glaze survives on part of the rib tops but shows indistinctly as green and brown on the surface. The fragment is part of a tile which has been scored diagonally and broken after firing.
 - 7 Fabric 1, has reduced core and uneven back. Yellow, brown and green glazes are used, the green being achieved by using copper. There is no surface wear on the ribs that separate the glazes.
 - 8 Fabric 1, has uneven back on which there is some brown glaze. The surface is decorated with brown and yellow glazes and some yellow and brown glaze is present on one edge. Worn surface.
 - 9 Fabric 2, has reduced core and uneven, predominantly dark glaze, although green, brown and yellow might have been attempted. The back is uneven. The tops of the ribs appear to have been broken rather than worn.
 - 10 Fabric 1. Decorated with black, dark green and very small patch of copper-rich green glaze. The tops of the raised ribs are uneven and have some glaze surviving.

DISCUSSION

The St Edmund's Abbey tiles belong to a small but geographically widely distributed series which is of fundamental importance in any discussion of medieval decorated floor-tiles and serves as an important demonstration, not only of one aspect of the internal decoration of Late Anglo-Saxon churches but of the technical achievement of Late Anglo-Saxon potters.

Three tiles of this series from St Alban's Abbey were published in 1938⁴⁶ when it was noted that the use of different coloured glazes was found only at St Alban's. The dating suggested then was cautious. One of these three tiles was published again in 1939⁴⁷ when an early 13th-century date was implied. In 1940 Philip Chatwin published a small group of similar tiles from Coventry, among them some found in the river-bed near the site of the Priory.⁴⁸ Irvine in 1894 had referred to 'some fragments of tiles with ornament in relief' discovered below the south-east angle of the south transept at Peterborough.⁴⁹ The two pieces of tile which still survive belong to the series considered here.⁵⁰ Irvine observed that these fragments were similar to the tiles which remained in the floor of the north transept of St Alban's Abbey. These tiles are considered below.

Given the small number of tiles and the great distances between the three sites, St Alban's, Peterborough and Coventry, together with the lack of any substantial dating evidence, it should come as no surprise that as a series the tiles should not have received any detailed academic scrutiny. These circumstances started to be reversed in 1963 when the late G. Willmot, then Keeper of the Yorkshire Museum, discovered a large number of tiles belonging to the series in a floor at All Saints, Pavement, York.⁵¹

A more conclusive stage in the understanding of the series was reached with the discovery by Professor M. Biddle of a number of tiles in the demolition levels of the Old Minster, Winchester.⁵² Biddle has added further to the series by finding several other fragments during his recent excavations on the site of the chapter house, St Alban's Abbey.⁵³

Although the series is still small it is nevertheless sufficient for a preliminary review to be undertaken,⁵⁴ although more definite conclusions must await publication of all of the material.

St Alban's Abbey

In the north transept, against the east wall, a large number of medieval tiles has been reset.⁵⁵ Among these are several examples of tiles of this series. Two designs are present (Fig. 16, 2.3); each design has raised ribs which separate different coloured glazes, two glazes being used on each tile. The worn surface of the tiles shows that the fabric is white and has many grits. There are three examples of Fig. 16, 2 which is the same design as a tile in the British Museum⁵⁶ and three fragments excavated by Biddle from the chapter house.⁵⁷ Loose in the abbey is one tile with a third design Fig. 16, 1, apparently of the same fabric. The other tiles in the British Museum and a single tile in the Victoria and Albert Museum are different from these. One of the tiles in the British Museum (Hobson A42) has a linear and quatrefoil design, two glazes are used and the fabric is a red earthenware. The tile also has a 2½ in flange on the back. The other tile (Hobson A41) has a pink fabric, foliate decoration and three glazes. The tile in the Victoria and Albert Museum (C 65 – 1933) has a geometric design and a pale grey fabric.

The other fragments from the recent excavations are of either a red earthenware or a white gritty fabric and several pieces have the remains of a flange. It is of the greatest interest that two pieces were found in 10th-century graves sealed by Abbot Paul of Caen's chapter house of 1077 – 88.

A small piece of tile from the Vintry Gardens, St Alban's, has been brought to the writers' attention by C. Saunders. The fragment has raised decoration which divides yellow and brown glazes.

Coventry

The fabric of the tiles from Coventry is predominantly a red earthenware. The designs range from simple linear designs, some of which include stamped decoration of rosettes or a cross within a circle, to one example of interlace. A variety of glazes is used. All the tiles have chamfered sides and nearly all of them have jabs or small impressed circles on the back. Photographs of some of this material were published by Chatwin.⁵⁸

Peterborough

Both the pieces, presumably found by Irvine, are of a white fabric. One is plain and glazed green, the other has a raised petal-type decoration and two glazes of different colours. The archaeological and historical evidence suggests that the pieces might be late 10th or 11th century in date.

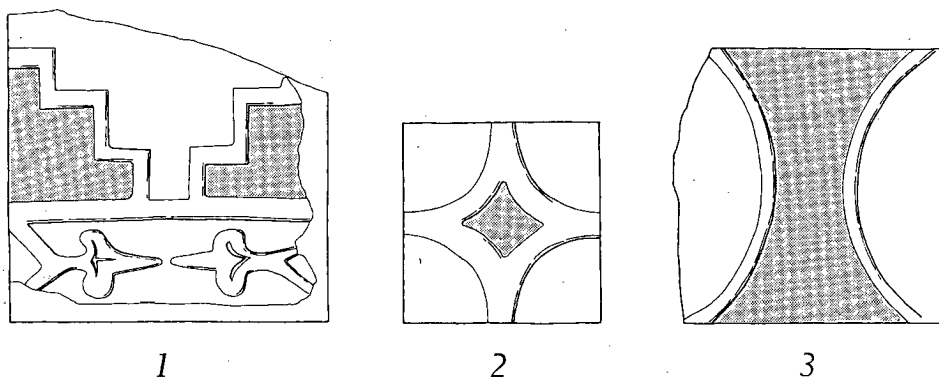


FIG. 16—St Alban's Cathedral: polychrome relief tiles (1:3).

York

The tiles from All Saints, Pavement excavated by G. Willmot in 1963 form the largest group in the series. There are seven designs on small tiles, and ten other designs on larger tiles. Pl. II shows all the small tile designs and seven of the designs of the larger tiles. All the tiles have the same dark pink to red earthenware fabric. Almost all have the backs covered with small scoops and, particularly with the small tiles, there are chamfers, not from near the top of the tiles but from a point half-way or over half-way down the sides. For nearly all the larger tiles there are examples with a single flange along the whole length of one side. Two glazes are used on those tiles where cells are formed by raised linear decoration, a light brown and a dull green. The tiles were laid as a pavement with a step, formed of tiles with flanges parallel to the east wall of the transept, so forming an altar platform. Some of the tiles were covered by the footings of a 14th-century wall. From plans made by Willmot it seems clear that the tiles were re-laid since no decorative scheme was followed. The tiles were contained within the south transept, dated on architectural grounds by Dr E. Gee to c. 1150. Professor F. Wormald examined the tiles and was of the opinion that the designs were of the second half of the 10th century or of the 11th century, rather than of a later date. While the dating is somewhat inconclusive it is of particular interest that in excavations carried out by the York Archaeological Trust on the nearby site in Coppergate several pieces of similar tiles have been discovered; the archaeological context of these may well help with dating the All Saints material.⁵⁹

Winchester

The tiles discovered by Biddle in excavations on the Cathedral Green are of significant importance since the archaeological context provides a firm indication of a possible date for the material. The tiles were discovered in the demolition levels of the Old Minster. The Old Minster as reconstructed before 980, or 994 at the very latest, was demolished in 1093.

The tiles are decorated with raised patterns and yellow and brown glazes are used. There are plain tiles with yellow or green glaze and backs with small circular holes; the backs of the decorated tiles are plain. The sides of the tiles have chamfers, but nearly always from near the top surface. The fabric is mainly white and rather granular.⁶⁰

Use

The presence of tiles with flanges at All Saints, Pavement, York and at St Alban's Abbey suggests that they were used as risers in steps or as wall decoration. If this hypothesis is correct it follows that in an ecclesiastical context the tiles most probably derive from sanctuaries, indeed, this was the position in which they were found, reset, at York. Since the majority of the tiles is likely to have been re-used in floors it is impossible to establish if some of the tiles without flanges may have been used as wall decoration. The tiles from St Edmund's Abbey, where glaze is still present on the top of the raised ribs or where the top surface is unevenly broken, would lend weight to the possibility that they were used vertically. However, the single diagonally-broken example (Fig. 15, 6) could be explained in terms of a tile pavement laid out at 45 degrees to a wall, since half tiles would be needed. Nevertheless, there seems no reason why tiles used as wall decoration could not be laid at an angle of 45 degrees as such arrangements are common in the stone decoration of Romanesque churches, while at Westminster Abbey c. 1090 stone and tile are used in this way for external decoration.⁶¹

Whatever the use to which the tiles were put they must have been an important element in the internal decoration of the church. The evidence from the sites discussed above suggests that they were used in stone buildings but it should not be forgotten that several major English churches of the Late Anglo-Saxon period were built of wood, and these could have included tiles as part of their decoration.⁶² Indeed, we know from evidence relating to Wilton that such timber buildings

might be decorated very elaborately,⁶³ and it is reasonable to believe that the shrine of St Edmund received an elaborate setting from the time of King Aethelstan.

St Edmund's Abbey Tiles: Technique of Manufacture

The tiles in this series have been called *polychrome relief* tiles because two, or sometimes three, different coloured glazes are used and the surface decoration, either as ribs separating the different glazes or as designs glazed one colour, stands in relief against the main surface of the tile. A discussion of the methods by which the decoration on a series of relief tiles from north Devon was achieved⁶⁴ examined the two methods proposed by R. Forrer.⁶⁵ The first was to press the clay into a mould with the design carved in intaglio at the bottom of the moulding box. In the second the tiles are shaped in a wooden frame, the top surface is stamped with a decorative mould while the tile is still in the frame and the frame then removed. While the second method may have been used in some tileries a detailed examination of the north Devon tiles showed that the following sequence took place: the clay was first fashioned into shape in a mould, keyed on the back, turned out on to a sanded surface and then allowed to dry; the tiles were then stamped with a mould which had the design carved into its surface.⁶⁶ There are, therefore, three possible methods to consider. In both the second and third methods, where the tile was formed in a mould and the design stamped later, the back of the tile would be flat. Almost all of the St Edmund's Abbey material has an uneven back. This fact rules out both the second and third methods and suggests that the first method was that used. Furthermore, it is possible that the incised bird decoration on two of the tiles was carried out while the tile was still in its mould. When the tiles were dry they were removed from the moulds. The majority of the tiles has chamfered edges and it is clear that they were knife-trimmed, since with a hand lens small grooves can be seen where grits have been dragged along the surface by the knife. After this trimming was carried out the tiles were glazed before being fired. Four glazes⁶⁷ appear to have been used on the St Edmund's Abbey tiles; black, brown, yellow and green, with a range of variations in each colour. It is apparent that as far as polychrome effect is concerned the glazes are most successful when the tile is completely oxidised and a fine white fabric results, less successful when part of the tile fabric is reduced near the surface and completely unsuccessful when an earthenware fabric was used. The colour is also affected by the thickness of the glaze and the firing conditions.

Each tile has been examined under a binocular microscope and each differently coloured area analysed by x-ray fluorescence which detects major and minor elements present. The only significant elements detected in the glazes were lead (found generally), iron and copper. Calcium was also detected at low levels in all samples, some probably in the glaze but most in the adhering mortar.

Iron was detected in all areas at low levels and in some areas at higher levels. This general 'background' of iron is not surprising as even the white-firing fabric contains a low but detectable amount of iron. The majority of the colours can be attributed to the presence of varying amounts of iron in the lead glaze. Low iron levels give a pale yellowish colour to the glaze in neutral firing conditions. If the kiln atmosphere is strongly oxidising the colour is a warmer yellow and the greater the iron concentration the deeper the colour, varying from golden brown to dark brown and ultimately to black. With a reducing kiln atmosphere the yellow becomes slightly olive in colour and as the iron content of the glaze increases this olive green becomes more pronounced and darker, eventually appearing black. The apparent colour is also affected by the thickness of the glaze layer, thicker coatings of the same composition appearing darker.

Most of the glaze colours can be attributed to the presence of iron. The two tiles where the fabric has fired red and grey have variable colours in individual fields as the tile colour shows through the translucent glaze, influencing its apparent colour. In most of the fields where copper was detected in the glaze the apparent colour was green, but of a brighter and bluer hue than the

olive, iron-coloured greens. The colour is a mixture of copper (bright) green and iron yellow or pale olive, as both iron and copper are present in these glazes.

When several colours were used on one tile the raised ribs of the designs separated the glazes and stopped them running together. It seems clear that the tiles were fired in an horizontal position, otherwise the glazes would run off the surface of the tile. It is suggested that kiln temperatures of 950°C to 1000°C were necessary for the glazes to fuse satisfactorily.

Such methods of production, in making the tiles and in glazing them, must have been extremely time-consuming and probably only a small number of tiles could be produced in one operation, unless many moulds of the same design were available.

Dating

The available evidence outlined above tends to suggest that the tiles from St Edmund's Abbey were probably used in the masonry buildings erected following 1020, rather than in the earlier timber building; but the earlier context must remain a possibility, which would give a *terminus post quem* of 924 x 939. The evidence from other sites reviewed above suggests that a mid 10th to 11th-century date may be proposed for the series as a whole. It is significant that such dating would correspond with the *floruit* of Late Anglo-Saxon glazed Winchester Ware which dates from c. 950 to the end of the 11th century when it was superseded by Developed Winchester Ware. The particular relationship between Winchester Ware and the tiles of this series from the Old Minster, Winchester, has been commented upon by Biddle.⁶⁸ It is also of interest that the use of stamped decoration on Winchester Ware vessels and on other Late Anglo-Saxon wares is probably related to the use of stamped decoration on the tiles from Coventry.

Conclusion

It is premature to attempt a comparison of the St Edmund's Abbey tiles with other tiles in the series. However, a few general comments may be appropriate. The object of making tiles of this kind was to produce a decorative building material with different coloured glazes. From the evidence presented above it can be seen that this object was achieved to advantage only when a white fabric was used and when the tile body was oxidized. In this respect the St Edmund's tiles correspond well with material at Peterborough, St Alban's and Winchester, and indeed the plain backs at both Winchester and St Edmund's contrast sharply with the stabbed backs at Coventry and York. The Peterborough relationship may be particularly significant in view of what has been said above on the similarity between the baluster shafts from this site and St Edmund's. Superficially the fabrics at these three southern sites are close and it is not without significance that although it cannot yet be shown that the same designs were used at all three sites, there are designs which are similar. It has been shown that the use of red earthenware fabrics prevents the satisfactory production of a polychrome effect and it is therefore reasonable to propose that the tiles at Coventry and York are probably later in date than the southern tiles, even though there are designs at Coventry and York which are similar to some used in the south.

Whatever the relationship between these five sites might be, available evidence suggests that the series is an important and perhaps short-lived example of an early attempt to produce decorative tiling. It has apparently no relationship with the more familiar decorated tiles of the 13th century but the link between these two distinct varieties of tiling may yet await discovery or be provided by a re-examination of existing material.

ACKNOWLEDGEMENTS

The authors would like to thank the following for their assistance and encouragement in the preparation of this paper: Peter Addyman; Dr F. W. Anderson; Miss Katherine Barclay; Professor Martin Biddle; Dr Eric Gee; Dr Antonia Gransden; Mark Horton; Dr Barry Knight; Mrs B. Kjøbye-Biddle; Don Mackreth; Miss Barbara Magid; David Sherlock; Eric Throssell; Arthur Whittingham; the late George Willmot; the Very Revd R. S. Wingfield Digby; and all the Department of the Environment staff at Bury St Edmunds. Our debt to Miss Judith Dobie was recorded at the outset.

NOTES

- ¹ The authors are particularly indebted to Miss Judith Dobie of the Ancient Monuments Drawing Office for her illustrations of the stonework.
- ² Abbo of Fleury, Arnold 1890–96, 19.
- ³ Herman the Archdeacon, Arnold 1890–96, 29–30.
- ⁴ Arnold 1890–96, 19.
- ⁵ Herman, Arnold 1890–96, 30.
- ⁶ Herman, Arnold 1890–96, 47; Bodl. MS 297, *ibid.*, 341.
- ⁷ John of Oxnead, Ellis 1859, 19.
- ⁸ Herman, Arnold 1890–96, 84. The only source to suggest that the wooden building survived until the 1080s is the *Gesta Sacristarum* (Arnold 1890–96, 84–85) and this was not written till c. 1300.
- ⁹ Herman, Arnold 1890–96, 85; Bodl. MS 297, *ibid.*, 342; Wormald 1934, 249.
- ¹⁰ Herman, Arnold 1890–96, 89; Gransden 1964, 58; MS Arundel xxx, James 1895, 188.
- ¹¹ MS Arundel xxx, James 1895, 188: '... *rotunde capelle S. Edmundi*'.
- ¹² Gransden 1964, 58: '... *muri cuiusdam veteris ecclesie rotunde, que quidem latior fuit quam capella [sancti Eadmundi] et ita constructa quod altare capella quasi in medio eius fuerat*'. For a discussion of the form of the church see Gem 1975, 37.
- ¹³ Wormald 1934, 244. This is a separate feast from that of the dedication of the church of St Mary and St Edmund.
- ¹⁴ Gransden 1966, 116–17. The author of the MS believed that the church of St Mary went back to a 7th-century foundation, but this does not seem altogether likely. If there was a stone church existing already before the translation of St Edmund's relics in the reign of Aethelstan, it is difficult to see why the relics were not enshrined therein, rather than there having been built for them a new timber church. Secondly, the dedication of Cnut's church to St Mary and St Edmund would imply that this building incorporated any existing dedication to St Mary and that, therefore, the separate dedication to St Mary was a later provision. It is significant that the author of the MS omits any reference to the 10th-century foundation: it appears as if he is attempting to re-write history in the interests of providing the Abbey with an early history.
- ¹⁵ Gransden 1966, 120 (this passage in the *Liber Albus* is probably early 13th century); Wormald 1934, 243.
- ¹⁶ Gransden 1966, 120.
- ¹⁷ *Ibid.*
- ¹⁸ *Registrum Coquinariae*, James 1895, 180–81. Whittingham (Whittingham 1951, 181) believes he has identified as the church a square building of which fragments survive; he suggests it had a rectangular ambulatory with barrel vaults.
- ¹⁹ Gransden 1966, 120.
- ²⁰ *Registrum Coquinariae*, James 1895, 181.
- ²¹ Gransden 1966, 118 (this passage in the *Liber Albus* is probably of early in the reign of Henry II).
- ²² *Ibid.*
- ²³ *Ibid.*, 117.
- ²⁴ Herman, Arnold 1890–96, 85–6, 88–9.
- ²⁵ *Ibid.*
- ²⁶ Gransden 1964, 58.
- ²⁷ *Ibid.*
- ²⁸ Gransden 1966, 116–17 (this passage in the *Liber Albus* is probably of early in the reign of Henry II); *Gesta Sacristarum*, Arnold 1890–96, II 289–90.
- ²⁹ *Ibid.*, 289.
- ³⁰ *Ibid.*, 291; Gransden 1966, 120.
- ³¹ *Registrum Coquinariae*, James 1895, 180–81.
- ³² Whittingham 1951, 181.

³³ Gransden 1966, 118; *Gesta-Sacristarum*, Arnold 1890–96, II, 289.

³⁴ Gransden 1966, 117.

³⁵ Gilyard-Beer 1969, 259.

³⁶ M22a and III were plain fragments of shaft not considered worth illustrating. M9, M9a and M259, noted by the authors in 1972, could not be traced in June 1978; preliminary notes had classified M259 as a plain fragment, M9a as a miscellaneous moulded fragment, and M9 as a fragment comparable to M41. In 1979 new numbers were assigned to the fragments at Bury St Edmunds (but not those in London, which have had numbers assigned subsequently); these correspond as follows (L = in London):

M9	missing 1978	M22a	missing 1980	M42	78103050	M264	L720564A
M9a	missing 1978	M23	78103042	M50	78103068	M264bis	L720564B
M10	78103057	M24	L720566	M254	78103041	M265	L720567
M11	78103072	M33	78103040	M255	L720568	M268	L720569
M12a	78103065	M34	78103075	M256	L720572	M294	78103059
M17	78103071	M35	78103063	M257	L720571	M296	missing 1980
M18	78103061	M36	78103076	M258	L720565	M297	78103034
M19	78103037	M37	78103043	M259	missing 1978	I	78103584
M20	78103048	M39	78103077	M260	78103051	II	78103600
M21	78103036	M40	78103038	M262	L720570	III	missing 1980
M22	78103039	M41	78103067	M263	78103060		

³⁷ In a lecture to the British Archaeological Association on 29 February 1978, 'Furniture and fittings in Anglo-Saxon churches'.

³⁸ Macray 1886, 122.

³⁹ Goscelin, *Historia Translationis S. Augustini Episcopi*, Migne 1880, col. 30.

⁴⁰ Now stored by the Department of the Environment at Dover Castle. More recent discoveries by H. Woods await publication.

⁴¹ Apart from one fragment remaining in St Mary's church the balusters appear to have been destroyed in the town museum during the war. They are illustrated in Brown 1925, 266 and Clapham 1930, Pl. 50b.

⁴² See Royal Commission on Historical Monuments, *St Albans Cathedral* (London, 1952), Pl. 12.

⁴³ Located some years ago by one of the authors in the south gallery of the presbytery and in the crypt of the Cathedral. Thanks are due to the Dean and Chapter of Peterborough for permission to examine this material. A full study of the pre-Conquest buildings at Peterborough has now been undertaken by D. Mackreth.

⁴⁴ There is evidence c. 1052 x 1066 of an agreement between the abbots of Peterborough and Ramsey to allow the latter to obtain 'from the property of St Peter freestone at Barnack and stone for walling at Peterborough': Harmer 1952, no. 62; Macray 1886, 165–66.

⁴⁵ Jope 1964, 91–118.

⁴⁶ Ward Perkins 1938, Fig. 5.1, 2 and 4 and p. 146. Fig. 5.1 and 2 are in the British Museum, Hobson A42, A41; a third tile of this series, Hobson A45, was not published by Ward Perkins. Fig. 5.4 is in the Victoria and Albert Museum, C.65–1933.

⁴⁷ Lane 1939, 44 and Pl. 19c.

⁴⁸ Chatwin 1940, 35–36 and Pl. IV.

⁴⁹ Irvine 1894, 53.

⁵⁰ The authors are indebted to D. Mackreth for discussing these fragments.

⁵¹ Ramm 1964, 176. L.K. is greatly indebted to the late George Willmot for discussing these tiles on many occasions and to Dr Eric Gee for providing copies of his notes on the discovery. The tiles and Mr Willmot's records will be published in Laurence Keen, *Catalogue of Medieval Floor-tiles in the Yorkshire Museum*, in preparation.

⁵² L.K. is indebted to Martin Biddle and Mrs B. Kjolbye-Biddle for many discussions on the tiles. See Biddle 1964, 209–10 and Pl. LIV.

⁵³ For a summary of the excavations see Biddle 1979. The writers are indebted to Professor Biddle for allowing reference to this material and to Miss Barbara Magid and Mr Mark Horton for kindly making the material available for examination.

⁵⁴ The following paragraphs are based on a lecture given by L.K. to the Cambridge Tile Seminar in 1978. For synopsis see Keen 1978, 27–28.

⁵⁵ The tiles from St Alban's Abbey will be included in the *Census of Medieval Tiles in Britain* directed by Mrs E. S. Eames. The Hertfordshire material is currently being studied by L.K.

⁵⁶ Hobson A45.

⁵⁷ Biddle 1979.

⁵⁸ Chatwin 1940, Pl. IV.

⁵⁹ L.K. is grateful to P. V. Addyman for bringing the Coppergate material to his attention.

⁶⁰ Details derived from Biddle in n. 52 above and from personal examination.

⁶¹ For 11th-century Westminster see Gem 1980, 33–60. The present authors hope to publish a further study of the tiles.

- ⁶² These timber buildings were discussed by R.G. (Gem 1973 and 1976). More recently see Christie, Olsen and Taylor 1979, 92–112.
- ⁶³ Wilmart 1938, 86–87.
- ⁶⁴ Keen 1969, 148–49.
- ⁶⁵ Forrer 1901, 71–72.
- ⁶⁶ Keen 1969, 149.
- ⁶⁷ For discussions of the preparation of glazes see Gardner and Eames 1954, 27–28 and de Boüard 1974, 67–76. The details of the glazes are derived from an analysis kindly undertaken by Justine Bayley of the Ancient Monuments Laboratory, Department of the Environment. The following three paragraphs are based on this analysis which is available for consultation in the laboratory (Report no. 3366).
- ⁶⁸ Biddle and Barclay 1974, 152.

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