

Section 39 Stone building material

Cross-references to Digital Supplement in red
Cross-references to Printed Synthesis in brown

Andrew Harris

Introduction

The report was completed in March 2001 and revised in May 2006.

A total of 538 architectural fragments, whose general condition can be described as good to fair, were retained. All material was examined, analysed, catalogued, and given an individual Architectural Fragment number (AF). This formed the basis for a computerised database which allowed sorting on a number of fields, so drawing out like material. Distribution plots [39.03, 39.07=4.08, 39.08, 39.09, 39.10, 39.11, 39.12, 39.13] have been useful in providing supportive evidence for the dating of structures and any additional phases. Density of stone material within particular areas of the site has also been used to locate those buildings more likely to have been of masonry construction. The material ranges in date from the 12th century through to the 14th, the most intense phases of the site's occupation. There is little moulded work, squared and chamfered ashlar material predominating. This may be misrepresentative, as the retrieved sample cannot nearly represent the total amount of material employed on site, later robbing and quarrying taking their toll.

Materials: sources and uses

The county of Bedfordshire lies at the interface between cretaceous chalk strata, greensands, and gault clays. The superficial strata of boulder clays derive from glacial drift and contain extensive tracts of erratic material, gravels, and sands. These geological deposits yield two main types of highly suitable building material, both of which are represented to some degree at La Grava [1.03].

Clunch, BM3

Of the 538 fragments retrieved only thirteen were of materials other than clunch. Clunch is a blue/grey firm calcareous material with calcite and glauconite inclusions. It is located within the lower chalk series, and outcrops at Totternhoe (to the south-west of the county) where it was extensively mined (Roberts 1974). Though more accurately termed Totternhoe stone, the material, being chalk based, is popularly classed as a clunch. The stone is a true freestone and being soft can be easily carved. These same properties also affect the durability of the material which is prone to weathering, wearing, and rubbing. Clunch is not really suitable as an exterior face but in regions such as Bedfordshire, Hertfordshire and Cambridgeshire where clunch materials were easily obtainable, it was commonly employed on a whole range of exterior and interior surfaces, eg at Dunstable Priory, Bedfordshire. The proximity of the site of La Grava to Totternhoe makes it certain that the material was obtained direct from the quarries.

Little clunch material was observed in the fabric of the excavated walls, in contrast to the quantity of material recovered from non-structural contexts. The inference is that clunch was not the preferred walling material and that it was selected due to ease of carving for architectural detailing and dressings.

Carstone, BM1, 2

Carstone is a very hard and dense blue-grey to black, ferruginous, coarse sandstone with gravel inclusions up to 5mm across. It weathers well but, despite being soft when first extracted, it is not suitable for extensive carving. It can be spade-cut into rough building blocks. Its lithology is related to other carstones such as those in Norfolk, Middlesex, or Surrey. These materials are formed by iron solutions percolating down into deposits of silty sands cementing together the particles. This process and the range of materials so created are discussed in Robinson 1988. Bearing in mind the processes by which the material is formed there is no reason to suspect that the carstone employed at La Grava was obtained any place but locally. Carstone may be found in the area of Heath and Reach within the royal manor.

Most excavated walls were constructed of carstone, rough hewn into irregular sized squared and ovoid building blocks. Some quite distinct colour variations in the carstone were observed, broadly allowing classification into 'brown carstone' or 'blue carstone'. These two types were found singly or together within a single wall. More commonly brown carstone predominated, but in a number of walls the reverse is true. During the course of post-excavation it was found that, generally, walls of blue carstone post-dated those of brown carstone .

The east wall of nearby church at Grove, Buckinghamshire is dated to the 14th century, and is largely comprised of blue carstone; this may provide some independent dating evidence for the use of blue carstone at La Grava in the 14th century and brown walls dating generally earlier, to the 12th and 13th centuries. Walls constructed with blue fabric at La Grava reflect the view that the new masonry building works undertaken during or after the 14th century use either blue carstone or a mixture of blue and reused brown stone. As the two types of material can be differentiated on account of their colour and period of usage, a case may be made for suggesting a different source for the blue carstone, one not employed by the earlier builders. It may be that the quarry for brown carstone, exploited since at least the 12th century, was now exhausted.

Erratics, BM8

The footings of some agricultural buildings were constructed of large natural boulders found in the clays on site. They were often mixed with carstone, and had cob superstructures.

Limestone, BM4

Bedfordshire lies just beside the limestone belt, deposits of the great and inferior oolites outcrop to the north-west of the county. Further north, just south of Northampton in an area around Blisworth, extensive deposits of a very fine limestone material occur. Shenley limestone, a cream, dense, fossiliferous and slightly oolitic material, outcrops to the south-west of the county, just north of Leighton Buzzard.

Despite the proximity of these deposits and the widespread use of limestone materials elsewhere in the county, limestone was not a material in common use at La Grava. In fact there is no evidence for its use in any structure (save possibly as a roofing material [39]). What limestone material has been retrieved is limited to the coffin lids and material used to line some of the water channels.

Tooling marks

Diagonal tooling

This diagnostic mark consisting of a series of chiselled marks cutting obliquely across the face of the stone is characteristic of, and confined to, work of the 12th century. Its presence on otherwise undatable material allows attribution of the fragment to the 12th century. Of the material where a mark could be identified, approximately 50 showed positive traces of diagonal tooling. The breadth of tool used seems to have varied between 5mm and 10mm, but precise measurement was not possible due to the overlapping marks. Generally it is assumed that coarse bold marks are indicative of early work, whilst finer, close-set, marks are indicative of later works. Of the limited sample examined the spacing varied, but in no instance could the mark be described as coarse; accordingly a date of towards the second half of the 12th century is tentatively suggested.

Claw tooling

Claw tooling, a further datable type, has been recognised on 120 fragments. This equally characteristic mark was made by the use of a wide bolster with a serrated edge. As it produces a coarse mark it is more normally found on worked faces that were not intended to be exposed. On dressed faces the mark has been removed by further working, but even here worn vestiges of the claw tool can be identified beneath the dressing. Due to repeated blows of the bolster producing overlapping marks, the size of bolster employed cannot be assessed. A likely breadth would seem to lie between 50mm and 100mm. The interval between teeth varied slightly, the most common bolster employed having teeth at intervals of between 3mm and 4mm. Outliers to this (thirteen examples), which may indicate the use of a separate tool type, have teeth with an interval of between 5mm and 7mm.

The use of claw tooling is attested in Yorkshire from the 1160s, which happily coincides with the gift of La Grava to Fontevrault in 1164. Given that Fontevrault is known to have carried out works to the royal manor of Leighton from 1164 it is reasonable to suppose that a proportion of stones showing claw tooling date to this period. However claw tooling was long lived and continued in use throughout the 13th and 14th centuries. The identification of this mark alone is not therefore a reliable indicator of date.

Chisel tooling

A further 100 examples preserve a mark made by the use of a fine chisel. Though superficially this mark resembles diagonal tooling (both employing a chisel), the present tooling type can be identified where the very close-set narrow marks are incised along the face of the stone rather than obliquely. This mark produces a very fine, smooth worked face, and is particularly evident on the few moulded stones: in particular the rolls, where a tool, more like a point, was probably employed. This type of mark cannot be used as an indicator of date. The mark is a result of finely working moulded and rough worked faces to present a smoother dressed face. This type of tooling occurs contemporaneously with both diagonal and claw tooling.

In a few cases moulded stones with 12th-century type diagonal tooling have had much or all of the moulding removed and were redressed with a combination of claw and chisel tooling. Clearly earlier material was not only reused but also reworked.

Catalogue

The catalogue is organised by date rather than by category of material. The catalogue description is prefixed by catalogue and figure numbers, the excavation AF number, context, phasing, and structure number. The illustrations all follow standard conventions for the illustration of stone material, there being a reliance on the profile to show the form of the mould.

No attempt has been made to portray either tooling marks or surface texture although rubbings of surfaces are part of the archive. Damaged surfaces are shown in minimal detail. In some instances the profile is composite and may not represent an actual section through the material at any given point.

For an overview of all stone found in stratified buildings by phase see [13].

12th-century material

1 [4.08, 39.05] AF24

T7 C32 [S16]

Capital, clunch; BM3

Free standing 'monolith' comprising waterleaf type capital with quirked abacus, rebate, and half-octagon shaft. Behind the capital is a shaped, drilled rebate. The stone is finely carved with slight traces of diagonal tooling evident. Incised on the shaft is a mason's mark taking the form of two linked triangles. The scale of the stone and the shaped rear rebate suggests that the piece derived from a window rather than a doorway. The drilled rebate indicates that the window was glazed, the drilled hole being used for the fixing of glazing in a wooden frame. The piece would appear to be the central element in a two-light opening. The waterleaf capital indicates a date of the 1160s or 1170s.

A further very worn fragment was found in the rubble backfill of fishpond **CF33: AF467**, P6.1, 23/F97.10.

2 [39.05] AF379

T13 F414 [P6.2 S65A] located to east of S16

Stoup, clunch; BM3

Free-standing square stoup with pronounced volutes at angles. There is a deep cleft between the volutes above which is an un-carved shield. The square central basin, 0.2m in depth, is rough hewn and tapers slightly. The stone is incomplete and very worn; no tooling marks remain. The general form of the stone is of the 12th century. The pronounced volutes seem to be akin to crocket or stiff-leaf forms and so could be used to suggest a date in the last decades of that century. As a water stoup it most certainly would have been located alongside the principal entrance to S16.

4 [39.05] AF488

T30 C3, P5.4 (incorporated into the fabric of the boundary wall, Rt G)

String or impost block, clunch

Chamfered with rolled and quirked arris. The stone is very worn but some diagonal tooling does remain. A 12th-century date is inferred.

6 [39.05] AF439

T23 C123, P5.5, S57, hearth setting SS58

Window head, clunch; BM3

Curved fragment with rebate. Extensive diagonal tooling indicates a 12th-century date. The size of the stone could indicate the head of the window to have been formed from a single shaped stone rather than individual voussoirs. The hearth produced a further rebated fragment, also of the 12th century.

10 [39.05] AF214

T6, S19A

Architectural detail, clunch; BM3

Large curious fragment of polygonal profile. Two very close-set openings seem to be represented, one round-headed the other square; the stone is splayed internally. The internal face of the round-headed opening is squared. The close-set openings and their different form make it unlikely that these are window splays: recessed panels are possible, but on an external surface unlikely on a manorial site such as La Grava Priory. The most likely context, the prior's lodgings S19 rather than the chapel S16, suggests that an aumbry or sedile is probable. The tooling shows the use of the chisel in several places. This tooling could be described as diagonal, and if so a 12th-century date is possible. The evidence is far from certain, and so the piece must remain largely undatable on the basis of tooling alone. The round-headed form in contrast to pointed forms may be further grounds to suggest a 12th-century rather than a 13th-century date.

11 [39.06] AF469

T23 C84, P5.3, S23 reused in hearth setting SS14

Polygonal shaft, clunch; BM3

Free-standing polygonal-sectioned shaft with extensive diagonal tooling on most surfaces. The general dimension of the shaft (90mm across) is comparable to the polygonal shaft of the capital fragment. There are a number of other fragmentary polygonal moulds, details of which are contained in the archive listings.

12 [39.06] AF269

T7 C712, P5.4, S54

Jamb, clunch; BM3

Rebated and chamfered, slightly weathered. Diagonal tooling remains on most surfaces, implying a 12th-century date. The stone is more likely to have derived from a splayed window.

12th- and mid-13th-century material

3 [39.05] AF89

T7 C664, P6.1 S16A

Volute, clunch; BM3

Small fragment showing bold spiral forms meeting at right angles on two faces, probably part of a capital. Little of the design remains: a prominent rib rises between two volutes. What limited detail remains could link this piece with the stoup and its prominent volutes. However, in contrast to that piece the volutes here are well defined, and may in fact be part of stiff-leaf type detail. A date between the later 12th century (after c 1180/90) and the first decade of the 13th century is probable.

5 [39.05] AF2007

Nibbed roll, clunch; BM3

Small fragment, damaged; traces of white paint remain. Datable to between c 1170 and the early decades of the 13th century.

7 [not illus] AF437

T23 C123, P5.5, S57

Vousoir; BM3, BM1

There are six other vousoir fragments, some with diagonal tooling, all derived from simple un-moulded arches. One of these examples is of carstone; all others are clunch. Details can be found in the archive listings. All derive from either Trench 6 or Trench 7 contexts, and therefore relate to the prior's lodgings and chapel.

8 [39.05] AF228

T6 C25, P6.1, S19D and

9 [39.05] AF 148

T7 C524, P7, S16D

Channelled roll or beaked half-roll, clunch; BM3

Two fragments showing either of these forms. The fragments are so incomplete that certain identification was not possible. The channelled roll is a distinctive type of mould dated to the later 12th century. It can be seen at the Temple church, London, Peterborough cathedral and at Little Dunmow Priory (Essex), monuments which are dated to between c 1180 and the early decades of the 13th century. The beaked half-roll is common to mouldings of after c 1210 and lasted in use to the middle of the 13th century. In general, however, later 12th- and 13th-century mouldings are characterised by the use of hollow chamfers, some of shallow depth, and it may be that these pieces are part of this general repertoire rather than specific elements such as channelled rolls or beaked rolls.

13 [39.06] AF334

T13 C169, P6.2, S63D and

14 [39.06] AF215

T6, S19A

Chimney material, clunch; BM3

A number of shaped stones showed extensive traces of sooting but little actual burning. Ten examples are cylindrical with a circular bore, but the large majority, 50 pieces, are octagonal with circular bore. These stones are interpreted as deriving from sections of chimney shafts. The circular shafts all have chisel tooling and at least three have diagonal tooling indicating a 12th-century date. All of the octagonal shafts have claw tooling. Octagonal chimneys do not occur before the 13th century; at Fountains Abbey they first appear on the infirmary in the 1230s. The exact form of the shafts is not known: both types were segmental with four stones needed to complete a lift.

Chimneys were often capped with a lantern, vents, and a conical cap, but there is no direct evidence for features of this sort within the assemblage. Three small fragments of cusping, one of which was sooted, may have derived from vents or lanterns.

13th- and 14th-century material

15 [39.06] AF48

T7 C709, S16A

Half roll with frontal fillet, clunch; BM3

Curved fragment from an arch mould showing chisel tooling. This type of mould is common to medieval architecture of c 1220, but is long lived, and in developed forms can be found in structures of the 14th century. There are further examples of this mould, not all identical in form. Details can be found in the archive listings.

16 [39.06] AF460

T23 F182/01, P5.2, S23

Curved jamb, clunch; BM3

Small fragment of polygonal section; the worked base shows extensive claw tooling and there is no evidence for either a rebate or a glazing slot. The form of the stone shows it to be a fragment of a mullion at the springing of the window head, indicating a window of more than one light. Furthermore, the narrow section of the stone (c 120mm) shows the mullion and the head of the openings not to have extended through the full thickness of the wall. Internally, a window with these details would have had both lights contained beneath a single arch. Although this piece is without a glazing channel, it may well be that any glass was set into the jamb behind the mullion. There are a number of similar pointed or chamfered moulds whose form shows these to be mullion terminals, though not necessarily of the type illustrated here. Details can be found in the archive listings.

17 [39.06] AF161

T7 C522, P6.2, S16A

Roll with hollow chamfer, clunch; BM3

Small fragment of an otherwise unidentifiable mould. The remaining fragment does not allow certain attribution as either an arch mould or an impost/abacus block.

18 [39.06] (SS51) AF317

T13 C22, P6.1, S30 and T13 C27, Rt H

Coffin lid, probably Shenley limestone; BM4

Complete though fragmentary; the profile is stepped and chamfered. The head of the lid is decorated with a raised foliate cross with curving members terminating in pronounced nodes. The shaft of the cross, square in profile, is continued to the foot of the lid by a simple raised rib; this part of the lid is worn. All these details point to an early or mid-13th-century date. The lid was found upturned and fragmented, used as hearth stones. There is no direct evidence to associate the lid with the stone coffins in the cemetery but it is reasonable to assume that this is the case, as both coffins were discovered without their lids.

19 [8.02, 39.06] AF2006

S16A, T7 and

20 [39.06] AF2003

S16A, T7

Coffins, clunch; BM3

Both coffins were located *in situ* within the annexe located against the south wall of S16. They were well carved and shaped with settings for the head, and there was extensive chisel dressing. The base of coffin AF2006 was pierced and channelled to ease drainage. AF2003 had twelve holes for the same purpose. A decorated coffin lid

[39.14] was found reused as a hearth in the main gatehouse, and probably belonged to one of the coffins.

Stone roofing material

	Stone type					
S	1	2	3	4	5	Total
13	1	2				3
16	1			5	4	10
17					1	1
19	3	1	2	6		12
20		1			2	3
23				6	1	7
27				1		1
28					3	3
31				1		1
35	1					1
50				3		3
51	1					1
63	1			2	1	4
76				1		1
Total	8	4	2	25	12	51

39.01 Table of types of stone slates associated with structures

	Stone type				
Phase	1	2	3	4	5
3	1				
5.2		2			2
5.3				1	
5.4					2
5.5	1	1		7	
5.6	1		1	1	2
6.1	4			4	1
6.2	1	1	1	10	
7				4	5

39.02 Table of types of stone slates by phase. Where contexts have been allocated a range of phases the end date has been used

The stone roofing material [39.01, 39.02, 39.03] is less easy to analyse, not least because most of the 90 or so fragments were found in a secondary position. Very few yielded sufficient information to be able to determine dimensions, and no quantitative analysis has been attempted. Due to the nature of the petrology it was not always possible to be certain that the fragments retained their original thickness. Items selected for publication show the range of forms identified and the techniques of hanging employed.

The stone tiles have been separated into five types, some of them closely related; from these, three principal groups emerge. They can be broadly paralleled with those published from St Peter's Street, Northampton (J H Williams 1979), though the types relate only to La Grava. The material comprising the stone slates is very similar, the differential being varying degrees of shell and sand. Williams identified the St Peter's Street material as having been derived from the Northamptonshire sands, resembling examples from the Duston area near Northampton. The more shelly examples probably derived from limestone strata from the Farthinghoe area southwest of

Northampton. La Grava Type 5 is almost certainly Collyweston slate obtained from northeast Northamptonshire. There are 29 examples of the very shelly material Groups 3 and 4, and 28 examples of the less shelly Groups 1 and 2. In contrast, there are only fifteen of the micaceous Collyweston Group 5.

Stone slates were found in discrete areas [39.01, 39.02], relating almost exclusively to S16, S23, and S19, with twelve examples; given the proximity of buildings S23 and S19 it is possible that all derived from S19. In some cases, such as in the first stone structure to be constructed, S16, it is uncertain but possible that the roof was originally clad with stone slates, changing to ceramic tile at about the beginning of phase 5.3. Much of the stone roofing material in this area was derived from a stone-lined drain CF18, constructed in phase 5.4 and going out of use in phase 5.6. Only smaller fragments derived from earlier levels, and it could be that the S16's roofing material was reused some time after the building was clad with clay tile at the beginning of phase 5.3. (Coppack has commented (pers comm) that this was a royal building, so why go for second best?). Williams has stated that stone roofing tile was rare pre-1250 but common in the 15th century. Most of the material associated with S16 derived mostly from phases 5.6 to 6.1 which saw some major structural alterations to the building. It could therefore have derived from reuse, these modifications or from repair or patching.

The distribution plan [39.03] shows a clear concentration of all three stone roofing materials in and around S16: Collyweston, shelly laminate oolitic, and micaceous shelly material. A further concentration of stone slates was found in association with S31 where there were strong indications that the gatehouse had a stone tile roof, made exclusively of micaceous shelly material Type 5.

The major masonry building S19 also appeared to start out with a stone slate roof in mid-phase 5.2, but was reroofed with clay tile at the end of phase 5.3. The distribution plot shows a concentration of the oolitic and micaceous material without Colleywestons confined to the area of the building.

S23 also was probably stone roofed in phase 5.2, changing over to clay tile at the beginning of phase 5.4. Some Collyweston was mixed with oolitic and micaceous material.

<p>Type 1 (J H Williams 1979 Group 2) Sixteen examples of coarse, shelly oolitic material</p>
--

<p>Type 2 (Williams Group 2) Twelve examples of a coarse, sandy-shelly material containing small fragments of shell</p>
--

<p>Type 3 (Williams Group 4) Two examples of a very coarse shelly material containing large fragments of shell</p>

<p>Type 4 (Williams Group 4) Twenty seven examples of a very dense shelly material containing large fragments of shell in a slightly oolitic/sandy matrix</p>
--

<p>Type 5 (Williams Group 6) Fifteen examples of a sandy, fine-grained micaceous material</p>
--

Stone chimneys

A total of 53 pieces of worked stone were identified as having derived from chimney shafts. All were of clunch, and most show traces of sooting or heat crazing on the inner surface. Two chronological types have been recognised, though the number of chimneys they represent is difficult to determine. There were at least two, and the maximum possible was five. [39.04] lists structures with chimneys.

S	Location	Phase	Date	Status
16	Upper floor	5.1	E12th →	Certain
	Ground floor	5.1		Probable
17	Ground floor	5.2	L12th	Probable
19	Upper floor	5.2	L12th/ 13th	Certain
	Ground floor			Probable
23	Ground floor	5.4	13th/14th	Probable
29	Ground floor	5.3	13th	Probable
		5.4	13th/14th	Probable
54	Ground + Upper floor	5.4–	13th/14th	Certain
		5.5		14th

39.04 Table showing structures with stone chimneys (Baker and Harris)

12th century

AF215

T6/us

Chimney drum, clunch

Segment of a cylindrical chimney shaft with circular bore (diam c 110mm). Four stones would have been needed to complete the profile. The inner face is burnt and the piece shows extensive chisel tooling.

AF1000

us

Moulded chimney drum, clunch

Incomplete moulded segment from a hollow, burnt drum which was probably from the base of the shaft. The moulding is incomplete but seems to have been based on the water-holding motif, and shows coarse chisel tooling. The base is curiously chamfered in two planes.

13th/14th century

AF334

T13 C169

Chimney drum, clunch

A near complete segment of octagonal chimney drum with a circular bore of 406mm, and signs of extensive sooting on internal surfaces. Four segments are required to complete the profile of a shaft with sides measuring 262mm. All worked surfaces retain claw tooling.

Of the ten pieces of cylindrical section two show positive traces of diagonal tooling and the other eight use of the chisel. The absence of claw tooling confirms that at La Grava cylindrical shafts are restricted to the 12th century. The moulded fragment **AF1000** has coarse chisel tooling, is cylindrical in form, and is likely to have derived from the same shaft as the plain drums. It is common for 12th-century chimney shafts

to have decorated shafts or vents. Particularly fine examples are to be found at Framlingham Castle, Suffolk (1150) and Old Sarum, Wiltshire (1130+). Extant shafts are to be found at Boothby Pagnell in the chamber block and at Christchurch Castle Hall.

The distribution of shaft fragments is of little use in suggesting provenance since most were found in a reused position lining CF24 to the east of S16. Only three buildings dated to the 12th century would be candidates for shafts, S16, S17 (SS4), and S19. All 41 octagonal segments have claw tooling and are of the same dimension, and must come from a single shaft or closely-related features. Their findspot is also of little use in suggesting provenance since they derived from CF24, and all except six pieces came from Trench 1 or Trench 7 contexts. They most likely derive from the chimney associated with S16 or possibly S54, SS29, or SS36, and may well all derive from a single shaft.

Two possible vents are represented by AF23 and AF242. These two stones are poorly-preserved and worn, precluding positive identification, but were found in association with fragments of polygonal chimney shaft. They show claw tooling, traces of sooting or heat crazing, and a series of hollow moulds

The full catalogue is to be found in the archive. The illustrated pieces represent the most complete examples, and those which allow reconstruction of chimney shaft forms.

Discussion of architectural material

The chapel structure was the only stone building to have been virtually completely robbed out, much foundation material remaining on the site of the other buildings. Nevertheless, the relative scarcity of remaining architectural material makes it clear that much of the building stone was removed after demolition, presumably to be reused elsewhere. Only 538 fragments remained from the whole site, mainly carved material of relatively soft clunch for dressings. Stones were dated from the 12th century to the 14th and no later. Much had been reused and fragments were clearly no longer in the places where they were originally intended. This made dating difficult, because unless there was a clear datable form reliance had to be placed on the width and type of tooling that had often been obliterated through reworking. The earliest piece probably dates to the early to mid-12th century; for most early pieces a 12th-century date must suffice. What remained was of good quality but plain.

Structures 16, 17, and 19 constructed in the 12th century are the first, and the only, masonry structures to be erected at La Grava Priory during this phase. Distribution plots of excavated 12th-century material [4.08=39.07, 39.08] do however show a possible anomaly in that it is confined mostly to the area of Structures 16 and 19; S19, the prior's lodgings, was a building of the late 12th century.

The hall S17 retained evidence for a phase 5.1 fireplace set against the wall, and this is likely to be the provenance of the circular 12th-century chimney shaft. Whereas chimney shafts are known from the early 12th century, the example from La Grava may be after c 1160 since the location of the hearth setting was against the wall rather than set into it, which indicates the necessity of a smoke hood. However, the earliest examples of smoke hood are mid-12th century, becoming common in the later quarter of that century, and a royal property might well employ the latest mode.

A large number of pieces were associated with S16 which can be used to examine the architecture of the building, a likely structure from which much of the material was obtained. The large number of pieces from 12th-century cylindrical drums in S16 show that there must have been a chimney in that building, built probably when it was

constructed as a chamber block, possibly in the early to mid-12th century. The continued location of a chimney in this building is confirmed by [39.12] that shows a number of 13th- to 14th-century polygonal shafts within the building.

Another possible location for some octagonal shafts dating to the 13th or 14th century was in the northern part of the service wing to the east of S17, in S54; this was constructed in the mid-13th century, though the fireplace itself was replaced in the 14th century.

The stoup AF379, [39.05/2] can be readily associated with the later function of S16. It would have most certainly been located outside the south doorway. It seems that the bowl itself was lead-lined. Two factors suggest this, firstly the use of clunch, a very porous material not suited for the retention of water, and second, the poorly finished and rough hewn surface of the bowl itself. There was water staining in the stone, possibly showing leakage or removal of the lining. The stoup was found discarded within the late medieval cistern located to the east of S16. It is likely to have been removed from S16 in the course of secularisation reconverting the building into a domestic dwelling.

The volute fragment recovered from the site of S16 is most probably to have derived from a capital to one of the doorways. The engaged shaft(s) are represented by two fragments of diameter 24mm and 28mm, AF141, 7/524 Period 7, S17D and AF265, 7/us, S16D. As to the arch mouldings, rolled fragment AF90, 7/664 (the same context from which the volute was excavated) with a diameter of 42mm, is the only fragment recovered from excavation of the site of S16 that is likely to have derived from such a moulding. Other architectural mouldings that could be associated with a doorway such as the nibbed roll AF2007 [39.05/5], and the impost or string block AF488 [39.05/4], are so disassociated from both S16 and S17 that their original provenance can not be ascertained.

The waterleaf capital with polygonal shaft AF24 [39.05/1, 4.08] was retrieved from excavations of the site of S16. The form of the opening as suggested by the stone, a shuttered two-light window, strongly suggests a domestic function for the building. The discovery of an associated piece within the late medieval infill of the fishponds clearly shows that pieces of windows were dispersed over the site so that some findspots no longer relate to the structure from which they derived. The use of the waterleaf capital, whilst common in many other parts of the country is in fact rare in Bedfordshire. Its use at La Grava Priory is no doubt due to both the status of the site and its patronage by Fontrevault whose masons most certainly would have been familiar with this motif.

Minor openings are represented by the numbers of chamfered or rebated fragments. These define simple unmoulded lancet or round-headed single-splayed openings. Such openings are characteristic of much later 12th- and early 13th-century architecture. Altogether twelve pieces from openings of this type were recovered from excavations on the site of S16. Many of these are simply chamfered pieces from the splay. There are however two shaped voussoirs (AF37, 7/709 S17A Period 7, and AF164, 7/520, S16D) and two further fragments showing rebates on the chamfered plane including [39.06/12] and AF32, 7/501.

It has already been suggested that S16 had some windows that were more elaborate than these simple lancet types. The material from S19 includes material from splay and plain voussoirs. It is not possible to attribute the single small moulded fragment to either a window or a doorway. Likewise the complex piece showing at least two juxtaposed openings cannot be placed within its functional context. A chamber is likely to have cupboards, fire settings and other miscellaneous internal openings with a whole variety of functions. The building has been identified as the first prior's lodgings and as such could have had space and equipment for private devotion; an aumbry or sedile is suggested.

The numbers of splayed or chamfered pieces, squared fragments, and rebated moulds would suggest that openings were not elaborately moulded, but simply splayed or constructed in a series of chamfered orders. In addition, there are no recognisably round-headed elements, and so the inference is that window openings were pointed in form. However the stain of a round-headed shutter in the demolition debris of **S19** refutes this [4.19]. The lack of any traceried elements implies that later window openings were simple lancet or round-headed types. Several mullion terminals consisting of tapering elements would suggest that some windows were at least of two lights. Some of these smaller chamfered elements may well have derived from transoms, thus allowing a two-light panel window to be reconstructed. Such windows are common in the domestic context in the 13th and 14th centuries.

The chamber block **S19** erected in the late 12th century is the penultimate major masonry structure to have been built at La Grava priory, though there is a possibility that some of the service structures erected towards the end of the 13th century for instance the latrine block and kitchen were also of masonry, as well as the link-block **S54**. Archaeological evidence further indicates that as these structures were being newly built those of the 12th century were undergoing some alteration. Architectural material of this period is more abundant but is still just as difficult to assign with any certainty to a particular feature within any given structure. Given the longevity of certain of the moulds present within the assemblage it has in practice been difficult to say other than that most alterations are likely to have been undertaken between the 1220s and the 1340s. Moulded material is restricted in the motifs employed. Notably absent from the assemblage are filleted rolls and other motifs normally associated with deeply moulded arches. The range of motifs at La Grava Priory suggests that openings were not elaborate, and were largely unmoulded with simple hoodmoulds.

As in the previous phase, distribution of the material is largely confined to the area of the prior's lodgings and the chapel. However a number of chamfered and squared ashlar are scattered over the rest of the site, but with no other particular spatial focus. An examination between the material excavated from the site of the chapel **S16** and the chamber, **S19**, though having several common moulds, also show slight differences in the makeup of the assemblage.

Archaeological evidence indicates the addition of two cells to the chapel, a sacristy to the north and a porch to the south. Heavy buttressing of the east wall and quantities of late 13th-century window glass attest to the insertion of a large east window. This window would seem to be at least of two lights, there being several mullion fragments within the architectural assemblage (see archive listing). Two pieces seeming to show the wave or ogee mould (the state of the fragments not allowing positive identification; **AF92**, **AF94**, 7/664), projecting filleted hoodmoulds (see archive listings for context) and a bead with hollow chamfer are probably to be associated with the jambs and head of the window. None of the fragments retrieved from excavations anywhere on site show any indication of cusping and so it seems fairly certain that the window was not cusped and of simple form. The style of the painted glass and the architectural fragments would suggest the likely date to be between the late 13th and early 14th century. A simple 'Y' traceried window of two or possibly three lights would be in keeping with this date.

The above pieces are unique to the assemblage associated with the chapel **S16** and so their attribution seems not to be in doubt. A further mould unique to excavations of the chapel (except a single piece unstratified from Trench 13) is that of a polygonal member projecting forward from the dressed surface of the stone. There are a total of four such pieces. Dating of this mould is not certain. Only a single piece (**AF391**, 13/us) shows claw tooling, giving a 13th-century date, others being so worn so as to obscure the tooling. A related piece (**AF272**, 7/5), showing the beginnings of a projecting member on a corner piece, shows also the use of the claw. A likely

interpretation is either recessed panelling or projecting pilasters. Recessed panelling could have been constructed against the east wall behind the altar. A series of projecting pilasters may have been supports for timber vaulting shafts.

The architecture of the chamber **S19**, in keeping with its domestic function, is even more sparse than that of the chapel. Of the recognisable forms that are likely to be of the 13th century, only five are anything other than chamfered or squared ashlar. Four of these pieces are based around the polygonal mould and would seem to define two-light openings with polygonal jambs and mullion. Chamfered fragments derive from the splays. The rebated piece has evidence for shutters in front of the glazing. The only piece not of polygonal form is a small fragment of beading (**AF221**, 7/3); this could have derived from anywhere within the structure, and possibly even the windows. In contrast to either ecclesiastic or earlier architecture style, much domestic architecture of the 13th century is based around the polygonal mould, used as jambs both for doorways and windows. There is generally little architectural sculpture.

Some architectural material was located within excavations of the smokehouse/bakehouse, **S23**. The archaeological evidence is unclear as to how much of this structure was of masonry: certainly the area around the fire was constructed of masonry, and the superstructure may well have been of timber. The large tank-like feature **SS11 [30.01]** was constructed of stone, many pieces of which showed diagonal tooling. These date construction to the 12th century; and are purpose-made for the feature, with laying-out lines to show contemporaneity.

It is, however, clear that the numbers of burnt architectural pieces located in excavation of other ovens/hearths represent salvaged material, and do not necessarily either date the structure or bear any relation to its architectural style. There is, however, a number of both 12th- and 13th-century fragments that remained unburnt, and derived from archaeological deposits both within and around the structure. In addition to the ubiquitous chamfered and squared material are several pieces derived from polygonal moulds and window heads. In view of the general amount of reused material the provenance of this material must therefore remain unknown but probably derive from refurbishment of earlier buildings.